Automotive industries

WEEKLY PRICE TEN CENTS

THE AUTOMOBILE

Vol. XXII JANUARY 13, 1910 No. 2

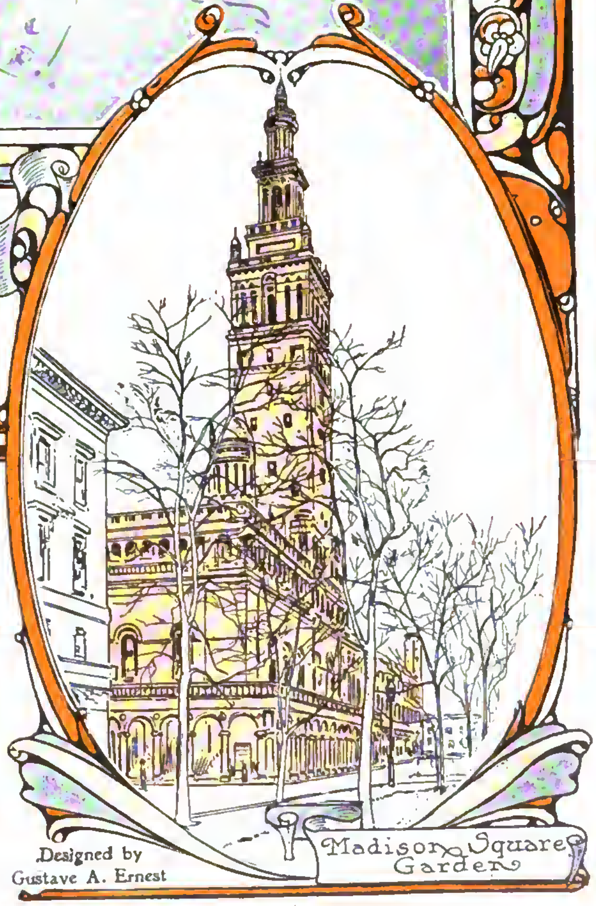
PUBLISHED BY THE CLASS JOURNAL COMPANY, 231-241 W. 39TH STREET, NEW YORK CITY

THE AUTOMOBILE

The A.L.A.M. Auto Girl.

A·L·A·M· TENTH NATIONAL SHOW

January 8 to 15, 1910



Designed by Gustave A. Ernest

Madison Square Garden

BIGGER AND BETTER than ever before, the annual show of the Association of Licensed Automobile Manufacturers, which opens in Madison Square Garden on the evening of January 8, will contain the fruits of fifteen years' development and growth on the part of the pioneer automobile manufacturers of America. There will be gathered the product of the oldest and most conservative members of the industry, the criterion by which all others are judged. With a few notable exceptions, the cars exhibited are intended to appeal to the class of buyers who ask the price last, rather than first; to whom elegance of line, detail and appointment is as important as mechanical perfection. The general reduction in automobile prices has, of course, been brought about by the perfection of quantity-producing machinery and the gradually won ability to use it to the fullest advantage. Too complete reliance on the machine, however, is admitted to have an injurious tendency. Again, in the designing of parts to simplify the machine processes through which they must pass, the temptation always arises to sacrifice a point here and there to greater facility of production. Here lies the need for a class of manufacturers to whom price is no object; in whose factories, no matter how clamorous the agent, the micrometer is never fogotten. The consciousness of the inevitable comparison forms the best possible check on any lowering of the standard.

Various are the ways in which the high-priced contingent has assisted—and will assist—the class which appeals to the thinner purse. It was the demand for quality at any cost which induced the steel manufacturers to take up the different kinds of nickel, chrome-nickel and vanadium steels. Once the demand for these was established and the steel plans prepared to produce them, the prices were soon reduced to a point which made their use possible in the lower-priced cars.

In the design of their cars the makers grouped under the Association of Licensed Automobile Manufacturers have always been, as became their position, conservative. Startling features have rarely originated with them. They have persisted in a steady policy of development and refinement, and have usually found themselves on the right side.

The Association of Licensed Automobile Manufacturers has rendered worthy assistance to its members in the work of development. As an organization, it has found a wide field in the reforming of unhealthy conditions in the trade, and in the general process of stabilization. As a head office for many factories, it has done valuable service in the maintenance of laboratories and in evolving standards. To it the industry owes the standard spark-plug, which has almost entirely replaced twenty or more sizes with which accessory makers were formerly compelled to struggle; the standard bolt and nut sizes, the standard rod ends and yokes, and last, but most important of all, the A.L.A.M. horsepower formula. Much has been written both in praise and in disparagement of this formula; yet it seems that if its adoption were to remain the only tangible result of the Association's existence, that existence would not have been quite in vain.

What will be remembered as perhaps the most important event in the whole history of this Licensed Association has been signalized the past year, namely, the favorable decision granted by the courts on the Selden patent. Although there remains a widespread impression that the last word on this subject has not been said, the importance of the decision can hardly be overestimated. Its direct result was practically the doubling of the numerical strength of the Association. Regarded as an association of licensed manufacturers only, this development was of unquestionable value. Regarded in the other light, as an association of leading manufacturers, it was of still more importance.

Many changes had taken place in the industry since the first organization of these manufacturers. Other manufacturers, by dint of honorable effort, had risen to positions as high as those of the pioneers. By reason of its originally limited membership, the Association was unable to accept these as equals and confer upon them its recognition, even if the newcomers had desired this recognition at the price, of course, of paying the Association license fees. The decision confirming the Selden patent not only made it highly advisable that these newly prominent makers should become licensed, but also changed the policy of the Association so that their admittance became possible.

Much has been said about the possibility of overproduction in the automobile industry. At first it was reported—and the report met with some credence—that the object of the enlargement of the Licensed Association was to restrict the output in order to prevent the panic which, according to the same report, was otherwise inevitable. Though now generally discredited, there is food for thought in this possibility.

The automobile industry is at present in an unnatural condition; one which cannot last for but a few years more. At present the market is in the process of being "filled up." Demands for automobiles are constantly arising in new quarters. Three-quarters of the output, perhaps, is being sold to persons who have never owned an automobile before. The time is sure to come when everyone who can profitably use an automobile will have one. Then the only field for the output will be the replacing of machines worn out in service, in addition to a certain amount of natural growth. This is the state of every other great industry in the country which is not of as recent origin, and is the natural state of every industry.

When this time comes there must inevitably be a contraction of the output. That time, it is true, is still several years distant; the market is not yet "filled up," and many new fields of usefulness, particularly in the line of commercial vehicles, have so far received but scant attention. The prudent manufacturers, however, will look ahead, and prudence and foresight could take no better form than the organization of a protective association of those members of the industry whose financial standing and responsibility are undoubted. By action of such an association the natural contraction of the output can be made with the least inconvenience. The change in character may be regretted by some, yet, after all, it is for the best. The principal objects of the old association have been accomplished. The alloy steels, special machinery and special testing devices are now in general use. Moreover, the makers of popular-priced cars have now gained sufficient strength to be able to dispense with outside assistance, and in many cases they themselves are inaugurating new methods.

At this particular moment the feature of the Association of most interest is its conduct of an annual automobile show. The situation in this respect, complicated by the increased membership of the Association, it such that future developments can only be surmised. It seems probthe increased membership of the Association, is such that under the plan in force for the past few years. If the management had desired to make a supreme effort by which its work should be remembered in posterity, the coming show could hardly have been surpassed.

THE LIST OF EXHIBITORS

AMERICAN GASOLINE PLEASURE CARS

ALCO: American Locomotive Co., Providence, R. I.
APPERSON: Apperson Bros. Automobile Co., Kokomo, Ind.
AUTOCAR: Autocar Company, Ardmore, Pa.
BUICK: Buick Motor Co., Flint, Mich.
CADILLAC: Cadillac Motor Car Co., Detroit, Mich.
CHALMERS-DETROIT: Chalmers-Detroit Motor Co., Detroit, Mich.
COLUMBIA: Columbia Motor Car Co., Hartford, Conn.
CORBIN: Corbin Motor Vehicle Corporation, New Britain, Conn.
ELMORE: Elmore Mfg. Co., Clyde, O.
E-M-F: Everitt-Metzger-Flanders Co., Detroit, Mich.
FRANKLIN: H. H. Franklin Mfg. Co., Syracuse, N. Y.
HAYNES: Haynes Automobile Co., Kokomo, Ind.
HUDSON: Hudson Motor Car Co., Detroit, Mich.
KNOX: Knox Automobile Co., Springfield, Mass.
LOCOMOBILE: Locomobile Co. of America, Bridgeport, Conn.
LOZIER: Lozier Motor Co., New York City.
MATHESON: Matheson Motor Car Co., Wilkes-Barre, Pa.
MERCER: Mercer Automobile Co., Trenton, N. J.
OLDSMOBILE: Olds Motor Works, Lansing, Mich.
OVERLAND: Willys-Overland Company, Toledo, O.
PACKARD: Packard Motor Car Co., Detroit, Mich.
PALMER-SINGER: Palmer & Singer Mfg. Co., New York City.
PEERLESS: Peerless Motor Car Co., Cleveland, O.
PIERCE-ARROW: Pierce-Arrow Motor Car Co., Buffalo, N. Y.
POPE-HARTFORD: Pope Mfg. Co., Hartford, Conn.
ROYAL TOURIST: Royal Tourist Car Co., Cleveland, O.
SELDEN: Selden Motor Vehicle Co., Rochester, N. Y.
SIMPLEX: Simplex Automobile Co., New York City.
STEARNS: F. B. Stearns Company, Cleveland, O.
STEVENS-DURYEA: Stevens-Duryea Co., Chicopee Falls, Mass.
STUDEBAKER: Studebaker Automobile Co., South Bend, Ind.
THOMAS: E. R. Thomas Motor Co., Buffalo, N. Y.
WHITE: White Company, Cleveland, O.
WINTON: Winton Motor Carriage Co., Cleveland, O.

COMMERCIAL CARS—GASOLINE AND ELEC.

ALCO: American Locomotive Co., Providence, R. I.
ALDEN-SAMPSON: Alden-Sampson Mfg. Co., Pittsfield, Mass.
AUTOCAR: Autocar Co., Ardmore, Pa.
BAKER: Baker Motor Vehicle Co., Cleveland, O.
FRANKLIN: H. H. Franklin Mfg. Co., Syracuse, N. Y.
GENERAL VEHICLE: General Vehicle Co., Long Island City, N. Y.
HEWITT: Hewitt Motor Co., New York City.
KNOX: Knox Automobile Co., Springfield, Mass.
PACKARD: Packard Motor Car Co., Detroit, Mich.
POPE-HARTFORD: Pope Mfg. Co., Hartford, Conn.
STUDEBAKER: Studebaker Automobile Co., South Bend, Ind.
THOMAS (TAXI): E. R. Thomas Motor Co., Buffalo, N. Y.

ELECTRIC PLEASURE CARS

BABCOCK: Babcock Electric Carriage Co., Buffalo, N. Y.
BAKER: Baker Motor Vehicle Co., Cleveland, O.
BAILEY: S. R. Bailey & Co., Amesbury, Mass.
COLUMBIA: Columbia Motor Car Co., Hartford, Conn.
DETROIT: Anderson Carriage Co., Detroit, Mich.
R & L: Rauch & Lang Carriage Co., Cleveland, O.
STUDEBAKER: Studebaker Automobile Co., South Bend, Ind.
WAVERLEY: Waverley Co., Indianapolis, Ind.
WOODS: Woods Motor Vehicle Co., Chicago, Ill.

MOTOR CYCLES

American Motor Co., Brockton, Mass.
Aurora Automatic Machine Co., Chicago, Ill.
Baker, F. A. & Co., New York City.
Consolidated Mfg. Co., Toledo, O.
Eclipse Machine Co., Elmira, N. Y.
Emblem Mfg. Co., Angola, N. Y.
Excelsior Supply Co., Chicago, Ill.
Greyhound Motor Works, Buffalo, N. Y.
Harley-Davidson Motor Co., Milwaukee, Wis.
Hendee Mfg. Co., Springfield, Mass.
Herring-Curtiss Co., Hammondsport, N. Y.
Marvel Motor Cycle Co., New York City.
Merkel-Light Motor Co., Pottstown, Pa.
Miami Cycle & Mfg. Co., Middletown, O.
New Era Gas Engine Co., Dayton, O.
N. S. U. Motor Co., New York City.
Pierce Cycle Co., Buffalo, N. Y.
Reading-Standard Co., Reading, Pa.
Reliance Motorcycle Co., Owego, N. Y.
Royal Motor Works, Worcester, Mass.
S. D. Mfg. Co., New York City.

PUBLICATIONS

The Automobile, New York City.
Automobile Trade Directory, New York City.
Automobile Blue Book, New York City.
Automobile Topics, New York City.
Bicycling World, New York City.
Class Journal Co., New York City.
Chilton Printing & Publishing Co., Philadelphia, Pa.
Horseless Age, New York City.
Motor, New York City.
Motor Age, Chicago, Ill.
Motorcycling Publishing Co., New York City.
Motor Print, Philadelphia, Pa.
Motor Vehicle Publishing Co., New York City.

BEARINGS

American Ball Bearing Co., Cleveland, O.
Bretz Co., J. S., New York City.
Hess-Bright Mfg. Co., Philadelphia, Pa.
International Engineering Co., New York City.
New Departure Mfg. Co., Bristol, Conn.
R. I. V. Co., New York City.
Standard Roller Bearing Co., Philadelphia, Pa.
Timken Roller Bearing Co., Canton, O.

BODIES, TOPS AND WINDSHIELDS

Chase Co., L. C., Boston, Mass.
Cowles & Co., New Haven, Conn.
Cox Brass Mfg. Co., New York City.
Grossman, Emil, New York City.
Hayes Mfg. Co., Detroit, Mich.
Metal Stamping Co., New York City.
Mezger, C. A., New York City.
Motor Car Equipment Co., New York City.
Mutty Co., L. J., Boston, Mass.
National Auto Top Co., New York City.
Newark Rivet Works, Newark, N. J.
Novelty Mfg. Co., Waterbury, Conn.
Pantasote Co., New York City.
Rands Mfg. Co., Detroit, Mich.
Sprague Umbrella Co., Norwalk, O.
Springfield Metal Body Co., Springfield, Mass.
Troy Carriage Sun Shade Co., Troy, O.
Valentine & Co., New York City.
Vanguard Mfg. Co., Joliet, Ill.

HORNS AND SPEEDOMETERS

Auto Improvement Co., Brooklyn, N. Y.
Gabriel Horn Mfg. Co., Cleveland, O.
Hoffecker Co., Boston, Mass.
Jones Speedometer Co., New Rochelle, N. Y.
Lovell-McConnell Mfg. Co., Newark, N. J.
Nightingale Whistle Mfg. Co., New York City.
Nonpareil Horn Mfg. Co., Brooklyn, N. Y.
Recometre Co., New York City.
Riley-Klotz Mfg. Co., Newark, N. J.
Shipman Instrument Co., New York City.
Sireno Co., New York City.
Stewart & Clark Mfg. Co., Chicago, Ill.
Veeder Mfg. Co., Hartford, Conn.
Warner Instrument Co., Beloit, Wis.

CARBURETERS

Allen Auto Specialty Co., New York City.
Byrne-Kingston & Co., Kokomo, Ind.
Lovell-McConnell Mfg. Co., Newark, N. J.
Stromberg Motor Devices Co., Chicago, Ill.
Waterhouse Co., Boston, Mass.
Wheeler & Schebler, Indianapolis, Ind.

IGNITION OTHER THAN MAGNETOS

American Ever Ready Co., New York City.
Apple Electric Co., Dayton, O.
Atwater-Kent Mfg. Co., Philadelphia, Pa.
Benford, E. M., Mt. Vernon, N. Y.
Briggs & Stratton, Milwaukee, Wis.
Champion Ignition Co., Flint, Mich.
Conn. Tel. & Elec. Co., Meriden, Conn.
Eastern Carbon Co., Jersey City, N. J.
Electric Storage Battery Co., Philadelphia, Pa.
Geiszler Bros. Storage Battery Co., New York City.
Grossman, Emil, New York City.
Hardy, R. E., Co., Brooklyn, N. Y.
Heinze Electric Co., Lowell, Mass.
Herz & Co., New York City.
High Frequency Ignition Co. Los Angeles, Cal.
Jeffrey-Dewitt Co., Newark, N. J.
Lovell-McConnell Mfg. Co., Newark, N. J.
Mezger, C. A., New York City.
Motsinger Device Mfg. Co., Pendleton, Ind.
Mosler, A. R., New York City.
National Carbon Co., Cleveland, O.
National Coil Co., Lansing, Mich.
New York Coil Co., New York City.
Philadelphia Storage Battery Co., Philadelphia, Pa.
Pittsfield Spark Coil Co., Dalton, Mass.
Remy Electric Co., Anderson, Ind.
Splitdorf, C. F., New York City.
Stackpole Battery Co., New York City.
Tray Plate Battery Co., Binghamton, N. Y.
Union Battery Co., Belleville, N. J.
U. S. Light & Heating Co., New York City.
Vesta Accumulator Co., Chicago, Ill.
Willard Storage Battery Co., Cleveland, O.
Witherbee Igniter Co., Springfield, Mass.

THE LIST OF EXHIBITORS

MAGNETOS

Bosch Magneto Co., New York City.
Brets Co., J. S., New York City.
Champion Ignition Co., Flint, Mich.
Conn. Tel. & Elec. Co., Meriden, Conn.
Heinze Electric Co., Lowell, Mass.
Hess-Bright Mfg. Co., Philadelphia, Pa.
Herz & Co., New York City.
K-W Ignition Co., Cleveland, O.
Lavalette & Co., New York City.
Motsinger Device Mfg. Co., Pendelton, Ind.
Pittsfield Spark Coil Co., Dalton, Mass.
Remy Electric Co., Anderson, Ind.
Simms Magneto Co., New York City.
Splitdorf, C. F., New York City.

LAMPS, ELECTRIC AND OIL

Apple Electric Co., Dayton, O.
Atwood-Castle Co., Amesbury, Mass.
Badger Brass Mfg. Co., Kenosha, Wis.
Dietz Co., R. E., New York City.
Edmunds & Jones Mfg. Co., Detroit, Mich.
English & Mersick Co., New Haven, Conn.
Gray & Davis, Amesbury, Mass.
Hall, C. M., Co., Detroit, Mich.
Ham, C. T., Mfg. Co., Rochester, N. Y.
Rushmore Dynamo Works, Plainfield, N. J.

LUBRICANTS

Adam Cook's Sons, New York City.
Columbia Lubricants Co., New York City.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Harris Oil Co., A. W., Providenc, R. I.
Havoline Oil Co., New York City.
Haws, Geo. A., New York City.
Keystone Lubricating Co., Philadelphia, Pa.
Miller's Sons, Wm. P., Brooklyn, N. Y.
N. Y. & N. J. Lubricant Co., New York City.
Valvoline Oil Co., New York City.
Vacuum Oil Co., New York City.
White & Bagley Co., Worcester, Mass.
Winn, Wm. R., New York City.

STRUCTURAL PARTS

American Vanadium Co., Pittsburg, Pa.
A-Z Co., New York City.
Baldwin Chain & Mfg. Co., Worcester, Mass.
Bowser, S. F. & Co., Fort Wayne, Ind.
Briscoe Mfg. Co., Detroit, Mich.
Brown-Lipe Gear Co., Syracuse, N. Y.
Carpenter Steel Co., Reading, Pa.
Coes Wrench Co., Worcester, Mass.
Columbia Nut & Bolt Co., Bridgeport, Conn.
Cook's Standard Tool Co., Kalamazoo, Mich.
Cramp & Sons Ship & Eng. Co., Philadelphia, Pa.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Driggs-Seabury Ordnance Co., Sharon, Pa.
Duff Mfg. Co., Pittsburg, Pa.
Elite Mfg. Co., Ashland, O.
Erie Foundry Co., Erie, Pa.
Franklin, H. H., Mfg. Co., Syracuse, N. Y.
Frasse, Peter A., & Co., New York City.
Gemmer Mfg. Co., Detroit, Mich.
Gilbert Mfg. Co., New Haven, Conn.
Globe Machine & Stamping Co., Cleveland, O.
Hancock Mfg. Co., Charlotte, Mich.
High Wheel Auto Parts Co., Muncie, Ind.
Janney-Steinmetz & Co., Philadelphia, Pa.
Jones, Phineas, & Co., Newark, N. J.
Johns-Manville Co., New York City.
Johnson, Isaac C. & Co., Spuyten Duyvil, N. Y.
Lavigne Mfg. Co., Detroit, Mich.
Lebanon Steel Castings Co., Lebanon, Pa.
Light Mfg. & Foundry Co., Pottstown, Pa.
Link-Belt Co., Philadelphia, Pa.
Livingston Radiator Co., New York City.
McCue Co., Hartford, Conn.
McCord Mfg. Co., Detroit, Mich.
Merchant & Evans, Philadelphia, Pa.
Noonan Tool & Machine Works, Rome, N. Y.
Perfection Spring Co., Cleveland, O.
Prosser, Thos., & Sons, New York City.
Pruden, W. A., Hardware Co.
Randall-Faichney Co., Boston, Mass.
Royal Equipment Co., Bridgeport, Conn.
Smith, A. O., Co., Milwaukee, Wis.
Spicer Universal Joint Mfg. Co., Plainfield, N. J.
Standard Welding Co., Cleveland, O.
Thermoid Rubber Co., Trenton, N. J.
Timken-Detroit Axle Co., Detroit, Mich.
Vanadium Metals Co., New York City.
Warner Gear Co., Muncie, Ind.
Warner Mfg. Co., Detroit, Mich.
Whitney Mfg. Co., Hartford, Conn.

TIRES, RIMS AND SUPPLIES

Ajax-Grieb Rubber Co., Trenton, N. J.
Batavia Rubber Co., Batavia, N. Y.
Burroughs Remountable Rim Co., New York City.
Calmon Asbestos & Rubber Works, New York City.
Consolidated Rubber Co., Akron, O.
Continental Caoutchouc Co., New York City.
Continental Rubber Co., New York City.
Dayton Rubber Mfg. Co., Dayton, O.
Diamond Rubber Co., Akron, O.
Empire Tire Co., Trenton, N. J.
Favary Tire & Cushion Co., New York City.
Federal Rubber Co., Milwaukee, Wis.
Firestone Tire & Rubber Co., Akron, O.
Fisk Rubber Co., Chicopee Falls, Mass.
Fox Metallic Tire Belt Co., New York City.
Goodrich, B. F. Co., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
G & J Tire Co., Indianapolis, Ind.
Gibney, J. L., & Bro., Philadelphia, Pa.
Hartford Rubber Works, Hartford, Conn.
Hopewell Bros., Cambridge, Mass.
Howard Demountable Rim Co., Trenton, N. J.
Leather Tire Goods Co., Niagara Falls, N. Y.
Merchant & Evans, Philadelphia, Pa.
McGraw Tire & Rubber Co., New York City.
Michelin Tire Co., Milltown, N. J.
Morgan & Wright, Detroit, Mich.
Motz Tire & Rubber Co., Akron, O.
N. J. Car Spring & Rubber Co., Jersey City, N. J.
Pennsylvania Rubber Co., Jeannette, Pa.
Republic Rubber Co., Youngstown, O.
Sager, J. H. Co., Rochester, N. Y.
Seamless Rubber Co., New York City.
Shaler, C. A. Co., Waupun, Wis.
Standard Leather Washer Co., Newark, N. J.
Stein Double Cushion Tire Co., Akron, O.
Swinehart Cushion Tire & Rubber Co., Akron, O.
Voorhees Rubber Mfg. Co., Akron, O.
Woven Steel Hose & Rubber Co., Trenton, N. J.
Zeglen Bullet Proof Cloth Co., Detroit, Mich.

SHOCK ABSORBERS

Flentje, Ernest, Cambridge, Mass.
Gabriel Horn Mfg. Co., Cleveland, O.
Hartford Suspension Co., Jersey City, N. J.
Kilgore Mfg. Co., Boston, Mass.

SUPPLIES

Detroit Motor Car Supply Co., Detroit, Mich.
English & Mersick Co., New Haven, Conn.
Grossman Co., Emil, New York City.
Miller, Chas. E., New York City.
New York Sporting Goods Co., New York City.
Pierson Motor Supply Co., New York City.
Post & Lester Co., Hartford, Conn.
Stevens & Co., New York City.
Victor Auto Supply Co., New York City.

MISCELLANEOUS

Ajax Trunk & Sample Case Co., New York City.
Allers Co., Harry A., New York City.
Asch, B. M., New York City.
Automatic Headlight Co., New York City.
Burn-Boston Battery & Mfg. Co., Boston, Mass.
Chandler Co., Pittsburg, Pa.
Cross, Frank H., New York City.
Dover Stamping & Mfg. Co., Cambridge, Mass.
Excelsior Motor & Mfg. Co., Chicago, Ill.
Gasoline Motor Efficiency Co., Jersey City, N. J.
Grimm-Plaut Construction Co., Pittsburg, Pa.
Hilton Mfg. Co., Boston, Mass.
Hoffnung & Co., New York City.
Kamlee Co., Milwaukee, Wis.
King Optical Co., Julius, New York City.
Mesinger Mfg. Co., H. & T., New York City.
Morrison-Ricker Mfg. Co., Grinnell, Ia.
Motor Parts Co., Plainfield, Mass.
Nathan Novelty Mfg. Co., New York City.
Noera Mfg. Co., Waterbury, Conn.
Oliver Mfg. Co., Chicago, Ill.
Perfection Wrench Co., Port Chester, N. Y.
Reilly & Son, Newark, N. J.
Rothstein Mfg. Co., New York City.
Tracy, Joseph, New York City.
Traver Mfg. Co., Philip C., Far Rockaway, N. Y.
Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.
Weed Chain Tire Grip Co., New York City.
Willey Co., C. A., Long Island City, N. Y.
Wright Wrench Mfg. Co., Canton, O.

SHOW COMMITTEE

Coker F. Clarkson
Ass't Gen'l Manager

Chas. Clifton
Pres. A·L·A·M·

Col. Geo. Pope
Chairman Show Committee

Merle L. Downs
Secretary

THE personality of the men comprising the Show Committee of the Association of Licensed Automobile Manufacturers assures excellence of management and careful attention to the mass of details that go to make an exhibition like the Tenth National Automobile Show, which will open for a week's run, at Madison Square Garden, New York City, on Saturday evening, January 8, a successful enterprise.

For four years the A. L. A. M. Show Committee has been headed by Colonel George Pope, under whose experienced eye and guidance each successive exhibition has advanced in character and attractiveness. No one connected with the industry has a wider range of business experience to draw upon, as he has been identified with the making of automobiles since 1897, and prior to that time was a constructor of the automobile's forerunner—the bicycle. He has served as treasurer of the Pope Manufacturing Company for many years, and his military title is one that dates from the Civil War. He was with Colonel Robert Shaw when that gallant soldier fell in the disastrous attack on Fort Wagner, July 18, 1863, and led the veterans of the Fifty-fourth Massachusetts Volunteers in the ceremonies attendant upon the unveiling of the famous Shaw Memorial on Beacon Hill, Boston, about ten years ago.

President Charles Clifton of the A. L. A. M., the second member of the Show Committee, has been prominently identified with the automobile industry since 1898, and has served with credit in many capacities that have identified him with publicly proclaiming the advantages of the motor-driven vehicle. He has always been an active participant in the business affairs of the A. L. A. M. and his election to the presidency of that successful organization was the natural culmination of his energetic work in its behalf. He is treasurer of the Pierce-Arrow Motor Car Company, of Buffalo, N. Y., itself a veteran business enterprise which had its inception in the early days of the bicycle.

Selden, Sr., and Jr.

For six years, Secretary Merle L. Downs, the third member of the committee, has attended to the detail work connected with A. L. A. M. Shows and has done it so well that he has won a recognized position as successful engineer of enterprises of that nature. His knowledge of the automobile business and its requirements is wide and varied, and in the early days of the industry he was prominently identified with the management of racing and touring events that gave wide publicity to the automobile as a self-propelled means of locomotion and helped materially to popularize it.

Although not a member of the Show Committee, Assistant General Manager Coker F. Clarkson, of the A. L. A. M., has much to do with the arrangements. He is the compiler of the A. L. A. M. handbooks, and is secretary of its mechanical branch. This naturally makes him a valuable authority for the committee to consult with, and his wide range of knowledge in engineering and other matters is of great service in the accomplishment of details requiring exactitude and dispatch. Mr. Clarkson is a lawyer by profession.

In the process of standardization of methods, formula, and materials, Mr. Clarkson has been a power to conjure by, and in contests, the fair and conservative attitude always assumed by him has made for him a host of friends, besides commanding the respect of opponents.

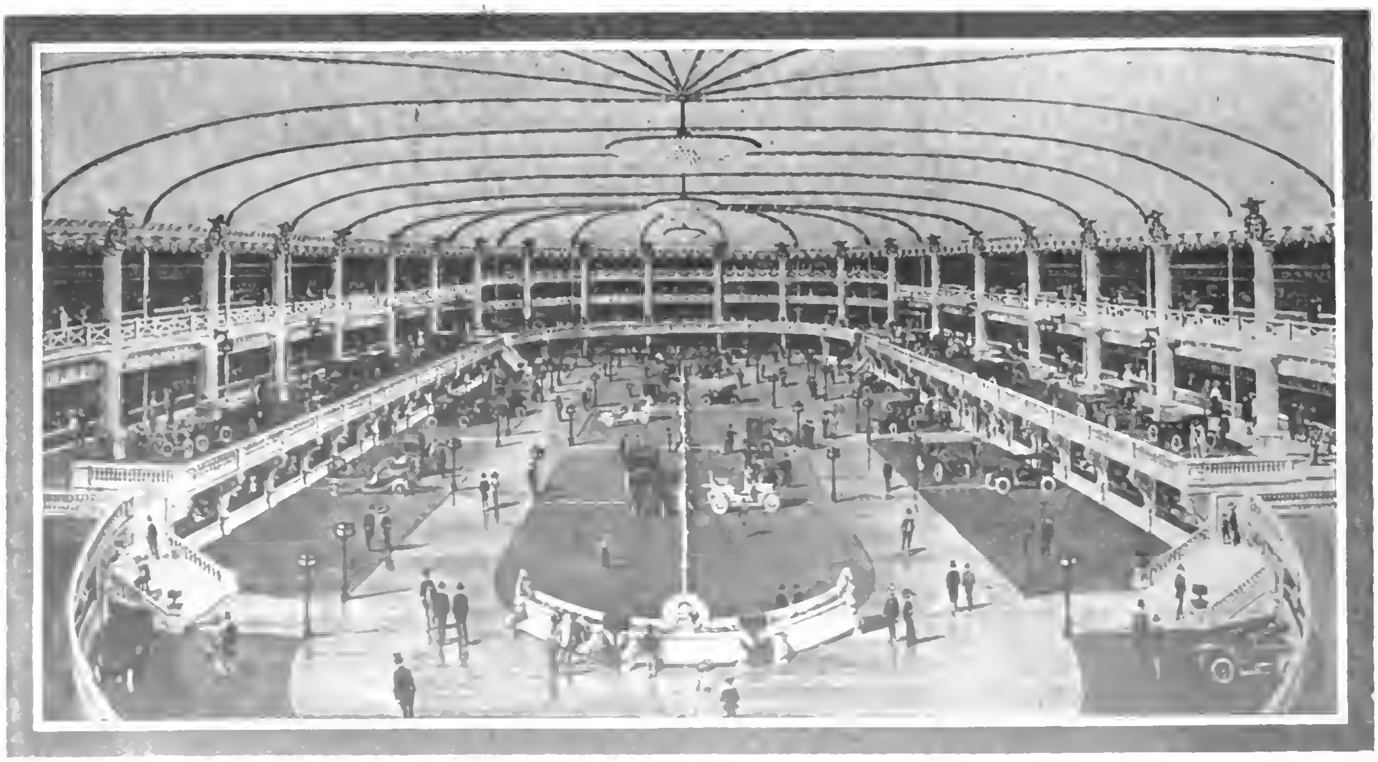
LICENSED ASSOCIATION OVERFLOWS GARDEN

EXPANDED by numerous acquisitions from the ranks of the A. M. C. M. A., the A. L. A. M. will make its 1910 début in sufficient force to overflow the Garden and present in dress uniform the finest array of automobiles the world has ever contemplated. The official list of the concerns which will exhibit under the banner of this pioneer association comprises in fact some 56 separate companies, it being the case that the Everitt car will show under the license of the Hewitt Motor Company, the White car using the license of the Waltham Manufacturing Company, and the Willys-Overland Company including the Overland and Marion under the old Pope-Toledo license.

As will be readily appreciated, the licensed association in its present form draws heavily on the ranks of the A. M. C. M. A., taking from the latter such companies as Brush, Stoddard-Dayton, Elmore, E. M. F., Hudson, Jackson, Maxwell, Mitchell, Moline, Moon, Mora, National, Premier, Regal, Reo, besides the companies which were non-members in either association. To what extent these withdrawals will affect the A. M. C. M. A. and its workings in the future is a matter with which we do not now have to deal, but the influence thus exerted on the A. L. A. M. will amount to more than a surface indication.

From what is already known, and considering the needs of the industry, it is believed that the stronger association will have a marked effect on the future, particularly in the direction of quality of the automobiles made, and to a vast extent, by way of inducing stability, all of which should react to the decided advantage of the patrons of the industry. True, prices may be maintained as they should, but the concentrated effort of the members of the association along well directed lines is bound to further the interests of the industry as a whole, and an examination of the automobiles which are to be shown this year, together with a close inspection of the plants in which they were made, renders judgment comprehensive, and prediction potent. If forecasting has any virtue, provided it is in the light of events transpired, it will have in its composition the statement to the future of the automobile industry is well assured.

American Locomotive Company	Alco
Apperson Bros. Auto Co	Apperson
Autocar Co	Autocar
Bartholomew Co	Glide
Brush Runabout Co	Brush
Buckeye Mfg. Co	Lambert
Buick Motor Co	Buick
Cadillac Motor Car Co	Cadillac
Chalmers-Detroit Motor Car Co	Chalmers-Detroit
Corbin Motor Vehicle Corp	Corbin
Columbia Motor Car Co	Columbia
Dayton Motor Car Co	Stoddard-Dayton
Elmore Mfg. Co	Elmore
Everitt-Metzger-Flanders Co	Studebaker E-M-F Studebaker-Flanders
H. H. Franklin Mfg. Co	Franklin
Haynes Automobile Co	Haynes
Hewitt Motor Co	Hewitt Truck Everitt
Hudson Motor Car Co	Hudson
Jackson Automobile Co	Jackson
Knox Automobile Co	Knox
Locomobile Co. of America	Locomobile
Lozier Motor Co	Lozier
Matheson Motor Car Co	Matheson
Maxwell-Briscoe Motor Co	Maxwell
Mercer Automobile Co	Mercer
Mitchell Motor Car Co	Mitchell
Moline Automobile Co	Moline
Moon Motor Car Co	Moon
Mora Company	Mora
National Motor Vehicle Co	National
Nordyke and Marmon Co	Marmon
Olds Motor Works	Oldsmobile
Packard Motor Car Co	Packard
Palmer & Singer Mfg. Co	Palmer-Singer
Peerless Motor Car Co	Peerless
Pierce-Arrow Motor Car Co	Pierce-Arrow
Pope Mfg. Co	Pope-Hartford
Premier Motor Manufacturing Co	Premier
Regal Motor Car Co	Regal
Reo Motor Car Co	Reo
Royal Tourist Car Co	Royal Tourist
Alden Sampson, 2d	Sampson Truck
Selden Motor Vehicle Co	Selden
Simplex Automobile Co	Simplex
F. B. Stearns Co	Stearns
Stevens-Duryea Co	Stevens-Duryea
Studebaker Automobile Co	Studebaker-Garford
E. R. Thomas Motor Co	Thomas
Waltham Mfg. Co	White
Willys-Overland Co	Overland, Marion
Winton Motor Carriage Co	Winton
York Motor Car Co	Pullman



Main Floor of Madison Square Garden, New York City, as Arranged for the Tenth National Automobile Show, January 8-15.

·A·L·A·M· Cars · in · Tabular · Form ·

CONSTRUCTED on the same plane as the table of specifications of the cars exhibited at the A. M. C. M. A. show, which appeared last week, the following table may be regarded as complementary, and the two together give a practically complete summary of the cars at present on the market. It may be stated here, however, that in the issue devoted to the Chicago show another table will be printed which will be a combination of the present two, with the addition of every other make which is built or sold in this country on a commercial scale. That is, the Chicago show table will not be restricted to exhibitors at that show, but will be as complete as it is possible to make such a table, in view of the constant additions to the ranks of the manufacturers.

The preliminary comment on the A. M. C. M. A. table applies as well to the following table of A. L. A. M. cars. For convenience it may be briefly summarized. The prices given are marked by an asterisk when they include a Cape top. Horsepower ratings are in all cases according to the A. L. A. M. formula; two-cycle motors are not rated, but are marked by a dagger in the horsepower column. It seems fair to add in this connection that the two Elmore models, which the maker rates at 36 and 46 horsepower, differ in respect to their motors in a way which the table does not show. The 46-horsepower is a differential-piston design, and although its cylinder dimensions are the same as those of the 36-horsepower, the difference in rating seems to be justified.

Representation of each maker in the table is according to the number of distinct chassis produced, without regard to the different bodies which may be fitted. Practically all touring models will be furnished with a runabout or baby tonneau body if desired, usually at the same price.

Lubrication systems are designated as "pump," "mechanical" and "splash." The first means that the oil is circulated and used repeatedly; the second that the oil is fed to cylinders or bearings by individual pumps, the number of such pumps being indicated whenever possible, and the last that oil is simply poured in the crankcase at given intervals. The location of the change-gear box, which is becoming a detail of considerable importance, is given in the column following the description of the gear and the number of speeds. The word "motor" means that the gear-box forms a single unit with the motor; "frame," that is a separate unit supported from the main frame; and "axle," that it forms a unit with the rear axle. In the next column the word "shaft," indicating that the car is shaft-driven, is followed by a figure "1" or "2," denoting the number of universal joints in the drive-shaft.

The design of the crankshaft is indicated by the items given under the head of motor bearings. The figure indicates the number of crankshaft bearings. In describing the transmission and axle bearings it was frequently found that in many cases different kinds of bearings were used; whenever this occurred the kind which seemed to be in the majority was given the preference.

Frames on the majority of pleasure cars are of pressed steel, which is indicated in the table by the abbreviation "P. steel"; other forms are wood and "armored," or combination wood and steel. Commercial cars frequently use structural steel shapes, either angle or channel.

In the table immediately following, showing the cars classified according to price, a different scheme has been followed. All the variations in body design on any make, whether or not on the same chassis, may be found therein, provided they entail a difference of price. For instance, a runabout model selling at the same price as the touring car is not given, even though it may be on a separate chassis; but a limousine selling at a higher figure is given, although often on the touring car chassis. This condensation was necessary in order to get the size of the tables within reasonable bounds. However, the intending purchaser may always rest assured of being able to obtain a suitable body on any chassis he may fancy.

DIVISION OF THE CARS INTO SIX DIFFERENT PRICE CLASSIFICATIONS

UNDER $1,500.

$600	Maxwell AA	Runabout
750	Flanders 20	Runabout
900	Maxwell Q	Runabout
1,000	Buick 10	Roadster
1,000	Hudson 20	Roadster
1,000	Maxwell Q	Touring
1,000	Overland 38	Runabout
1,150	Buick 10	Baby tonneau
1,150	Hudson 20	Touring
1,250	E. M. F. 30	Touring
1,250	Overland 40	Roadster
1,400	Buick 19	Touring
1,400	Overland 41	Touring

$1,500 TO $1,999.

$1,500	Chalmers-Detroit 30	Touring
1,500	Maxwell E	Touring
1,500	Overland 42	Touring
1,600	Cadillac 30	Touring
1,750	Buick 17	Touring
1,750	Elmore 36	Touring
1,750	Franklin G	Runabout
1,800	Autocar XXII	Touring
1,800	Franklin G	Roadster
1,850	Franklin G	Touring
1,850	Marion 10	Touring
1,950	Mercer A	Touring

$2,000 TO $2,999.

$2,000	Apperson 4-30	Touring
2,000	Haynes 19	Touring
2,000	Selden 35	Touring
2,000	White G-A	Touring
2,250	Palmer-Singer XXX	Roadster
2,250	Selden 35	Baby tonneau
2,450	Apperson O	Touring
2,500	Elmore 36	Landaulet
2,500	Elmore 46	Touring
2,500	White G-B	Touring
2,700	Franklin D	Roadster
2,750	Chalmers-Detroit 40	Touring
2,750	Columbia Mark 43	Touring
2,750	Corbin XVIII	Touring
2,750	Pope-Hartford T	Touring
2,800	Franklin D	Touring
2,850	Stevens-Duryea X	Touring

$3,000 TO $3,999.

$3,000	Apperson 4-40	Touring
3,000	Cadillac 30	Limousine
3,000	Matheson 6-50	Touring
3,000	Oldsmobile	Touring
3,000	Selden 29	Limousine
3,000	Winton 48	Touring
3,150	Knox R	Baby tonneau
3,200	Franklin K-4	Limousine
3,200	Packard 18	Touring
3,200	Stearns 15-30	Touring
3,250	Knox R	Touring
3,300	Stevens-Duryea AA	Touring
3,350	Alco 16	Landaulet
3,350	Palmer-Singer LXI	Roadster
3,500	Locomobile L	Touring
3,500	Lozier J	Touring
3,500	Palmer-Singer LXII	Touring
3,500	Thomas M	Touring
3,600	Franklin H	Roadster
3,600	White G-B	Limousine
3,650	Palmer-Singer XXX	Limousine
3,750	Corbin XVIII	Limousine
3,750	Franklin H	Touring
3,750	Pope-Hartford T	Limousine
3,750	Stevens-Duryea X	Limousine
3,800	White G-B	Landaulet
3,350	Pierce-Arrow 36	Roadster

$4,000 TO $4,999.

$4,000	Apperson 4-50	Baby tonneau
4,000	Franklin D	Limousine
4,000	Knox R	Limousine
4,000	Pierce-Arrow 36	Touring
4,000	Stevens-Duryea Y	Touring
4,000	Studebaker G-7	Touring
4,000	Thomas R	Limousine
4,200	Apperson 4-50	Touring
4,200	Apperson 6-40	Touring
4,200	Matheson 6-50	Limousine
4,200	Packard 30	Touring
4,250	Winton 48	Limousine
4,250	Winton 60	Touring
4,300	Peerless 30	Touring
4,350	Alco 22	Landaulet
4,400	Packard 18	Limousine
4,450	Simplex 50	Chassis
4,500	Locomobile I	Touring
4,500	Packard 18	Landaulet
4,500	Royal Tourist M	Touring
4,500	Thomas F	Touring
4,600	Oldsmobile	Touring
4,600	Stearns 15-30	Landaulet
4,600	Stearns 30-60	Touring
4,700	Locomobile L	Limousine
4,750	Alco 40	Touring
4,750	Matheson 4-50	Baby tonneau
4,800	Peerless 30	Demi-limousine
4,350	Pierce-Arrow 48	Roadster
4,900	Knox S	Baby tonneau
4,900	Pierce-Arrow 36	Limousine

$5,000 AND OVER.

$5,000	Franklin H	Limousine
5,000	Knox S	Touring
5,000	Lozier H	Touring
5,000	Matheson 4-50	Touring
5,000	Pierce-Arrow 36	Landaulet
5,000	Pierce-Arrow 48	Touring
5,000	Stevens-Duryea Y	Limousine
5,000	Studebaker G-7	Limousine
5,500	Alco 40	Limousine
5,500	Peerless 30	Limousine
5,550	Packard 30	Limousine
5,650	Packard 30	Landaulet
5,700	Royal Tourist M	Limousine
5,750	Matheson 4-50	Limousine
5,750	Stearns 30-60	Limousine
5,800	Peerless 30	Landaulet
5,350	Pierce-Arrow 66	Roadster
5,850	Stearns 30-60	Landaulet
5,900	Locomobile I	Limousine
6,000	Alco 60	Touring
6,000	Knox S	Limousine
6,000	Locomobile I	Landaulet
6,000	Lozier I	Touring
6,000	Peerless 50	Touring
6,000	Pierce-Arrow 66	Touring
6,000	Thomas K	Touring
6,100	Pierce-Arrow 48	Limousine
6,200	Pierce-Arrow 48	Landaulet
6,750	Alco 60	Limousine
7,500	Thomas K	Limousine

DETAILS OF CARS EXHIBITED AT 1910 MADISON SQUARE GARDEN SHOW—AMERICAN GASOLINE PLEASURE CARS

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Motor	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
Alco 16	3750	24.8	Land't	6	4	100	120	Pairs	H'comb	Cent'f'l	Bosch	None	Mech	Disc	Sel	3	Frame	Shaft 2	101	55½	P. steel	3 plain	Ball	Ball	.....	32x4	32x4
Alco 22	4350	24.8	Land't	6	4	100	120	Pairs	H'comb	Cent'f'l	Bosch	None	Mech	Disc	Sel	3	Frame	Shaft 2	112	55½	P. steel	3 plain	Ball	Ball	.....	32x4	32x4
Alco 40	*4750	35.8	Tour'g	7	4	120	150	Pairs	H'comb	Cent'f'l	Bosch	Storage	Mech	Disc	Sel	4	Frame	Shaft 2	126	55½	P. steel	3 plain	Ball	Ball	.....	36x4	36x5
Alco 60	*6000	53.6	Tour'g	7	6	120	150	Pairs	H'comb	Cent'f'l	Bosch	Storage	Mech	Disc	Sel	4	Frame	Shaft 2	134	55½	P. steel	4 plain	Ball	Ball	3,900	36x4	36x5
Apperson 4-30	2000	30.6	Tour'g	5	4	4½	5	Single	Tubular	Ecc'c	Bosch	Storage	4 mech	Con. b'd	Sel	3	Frame	Shaft	112	56	P. steel	5 plain	Ball	Ball	2,700	34x4	34x4
Apperson "O"	2450	30.6	B. tonn.	4	4	4½	5	Single	Tubular	Ecc'c	Bosch	Storage	4 mech	Con. b'd	Sel	3	Frame	Shaft	119	56	P. steel	5 plain	Ball	Ball	.....	34x4	34x4
Apperson 4-40	3000	36.1	Tour'g	7	4	4½	5	Single	Tubular	Ecc'c	Bosch	Storage	4 mech	Con. h'd	Sel	3	Frame	Shaft	122	56	P. steel	5 plain	Ball	Ball	.....	36x4	36x4
Apperson 4-50	4000	48.4	B. tonn.	4	4	5½	5	Single	Tubular	Ecc'c	Bosch	Storage	4 mech	Con. b'd	Sel	3	Frame	2-chain	116	56	P. steel	5 plain	Ball	Ball	.....	36x4	36x4½
Apperson 4-50	4200	48.4	Tour'g	7	4	5½	5	Single	Tubular	Ecc'c	Bosch	Storage	4 mech	Con. h'd	Sel	4	Frame	Shaft	128	56	P. steel	5 plain	Ball	Ball	.....	36x4	36x4½
Apperson 6-40	4200	48.6	Tour'g	7	6	4½	5	Single	Tubular	Ecc'c	Bosch	Storage	4 mech	Con. b'd	Sel	3	Frame	Shaft	128	56	P. steel	7 plain	Ball	Ball	.....	36x4	36x4½
Autocar XXII	1800	25.6	Tour'g	5	4	4	4½	Single	Tubular	Cent'f'l	Bosch	Battery	3 mech	3-plate	Prog	3	Frame	Shaft 2	102	56	P. steel	3 plain	Roller	Roller	.....	34x3½	34x3½
Buick "10"	1150	22.5	Tour'g	4	4	3¾	3¾	Pairs	Tubular	Cent'f'l	Magneto	Dry	Pump	Cone	Plan	2	Frame	Shaft	92	56	P. steel	3 plain	Plain	Roller	.....	30x3½	30x3½
Buick "19"	1400	28.9	Tour'g	5	4	4¼	4½	Pairs	Tubular	Cent'f'l	Magneto	Dry	Pump	Cone	Sel	3	Frame	Shaft	105	56	P. steel	3 plain	Roller	Roller	.....	32x4	32x4
Buick "17"	1750	32.4	Tour'g	5	4	4½	5	Pairs	Tubular	Cent'f'l	Magneto	Dry	Pump	Cone	Sel	3	Frame	Shaft	112	56	P. steel	3 plain	Roller	Roller	.....	34x4	34x4
Cadillac 30	1600	28.9	Tour'g	5	4	4¼	4½	Single	Tubular	Gear	Splitd'f	Dry	Pump	Cone	Sel	3	Frame	Shaft 2	110	‡56	P. steel	5 plain	Ball	Roller	.....	34x4	34x4
Cadillac 30	3000	28.9	Limous.	7	4	4¼	4½	Single	Tubular	Gear	Splitd'f	Dry	Pump	Cone	Sel	3	Frame	Shaft 2	114	‡56	P. steel	5 plain	Ball	Roller	.....	34x4½	34x4½
Chalmers-D't 30	1500	25.6	Tour'g	5	4	4	4½	Block	Tubular	Cent'f'l	Extra	Storage	Pump	Disc	Sel	3	Motor	Shaft 1	115	‡56	P. steel	2 ball	Ball	Roller	.....	34x3½	34x3½
Chalmers-D't 40	2750	40.0	Tour'g	5	4	5	4½	Pairs	H'comb	Cent'f'l	Bosch	Storage	Pump	Cone	Sel	3	Frame	Shaft 1	123	56	P. steel	3 plain	Ball	Roller	.....	36x4	36x4
Columbia M'k 48	2750	32.4	Tour'g	5	4	4½	4.7	Pairs	Cellular	Cent'f'l	Bosch	Storage	Pump	Cone	Sel	3	Frame	Shaft 2	115	56	P. steel	3 plain	Ball	Roller	2,720	34x4	34x4
Corbin XVIII	2750	32.4	Tour'g	5	4	4½	4½	Single	H'comb	Gear	Bosch	Dry	Pump	Cone	Sel	3	Frame	Shaft 2	120	56	P. steel	2b., 3pl.	Ball	Ball	2,780	34x4	34x4
Elmore 36	1750		Tour'g	5	4	4½	4	Single	Tubular	None	None	Dry	6 mech	Con. h'd	Sel	3	Frame	Shaft	110	56	P. steel	5 plain	Ball	Roller	2,400	34x4	34x4
Elmore 46	2500		Tour'g	5	4	4½	4	Single	Tubular	None	None	Dry	6 mech	Con. b'd	Sel	3	Frame	Shaft	120	56	P. steel	5 plain	Ball	Roller	2,800	36x4	36x4
E-M-F 30	1250	25.6	Tour'g	5	4	4	4½	Pairs	Tubular	Cent'f'l	Splitd'f	Storage	Splash	Cone	Sel	3	Axle	Shaft	108	‡56½	P. steel	3 plain	Ball	Ball	1,800	32x3½	32x3½
Flanders 20	750	20.2	R'bout.	2	4	3¾	3¾	Block	Tubular	Cent'f'l	Splitd'f	Dry	Splash	Cone	Sel	2	Axle	Shaft	100	‡56½	P. steel	2 plain	Ball	Ball	1,200	32x3	32x3
Franklin G	1850	18.2	Tour'g	4	4	3⅜	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	91½	53½	Wood	5 plain	Ball	Roller	.....	32x3½	32x4
Franklin D	2800	28.9	Tour'g	5	4	4¼	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	106	53½	Wood	5 plain	Ball	Roller	.....	36x4	36x4½
Franklin K-4	3200	18.2	Land't	5	4	3⅜	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	100	53½	Wood	5 plain	Ball	Roller	.....	30x3½	30x4
Franklin H	3750	43.8	Tour'g	7	6	4¼	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	127	53½	Wood	7 plain	Ball	Roller	.....	36x4½	37x5
Franklin D	4000	28.9	Land't	7	4	4¼	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	114½	53½	Wood	5 plain	Ball	Roller	.....	34x4½	34x5
Haynes "19"	*2000	28.9	Tour'g	5	4	4¼	5	Pairs	Cellular	Gear	Splitd'f	Dry	Pump	Con. b'd	Sel	3	Frame	Shaft 2	110	56	P. steel	3 plain	Roller	Roller	2,500	34x4	34x4
Hudson 20	1000	22.5	R'dster.	3	4	3¾	4½	Block	Tubular	Cent'f'l	Extra	Dry	Pump	Cone	Sel	3	Frame	Shaft	100	56	P. steel	3 plain	Plain	Roller	1,700	32x3	32x3½
Hudson 20	1150	22.5	Tour'g	5	4	3¾	4½	Block	Tubular	Cent'f'l	Extra	Dry	Pump	Cone	Sel	3	Frame	Shaft	110	56	P. steel	3 plain	Plain	Roller	2,000	32x3½	32x3½
Knox R	*3250	40.0	Tour'g	5	4	5	4¾	Single	Cellular	Cent'f'l	Bosch	Storage	Pump	3-plate	Sel	3	Motor	Shaft 2	117	56	P. steel	5 plain	Ball	Ball	3,100	36x4½	36x4½
Knox S	*5000	60.0	Tour'g	7	6	5	4¾	Single	Cellular	Cent'f'l	Bosch	Storage	Pump	3-plate	Sel	3	Motor	Shaft 2	134	56	P. steel	7 plain	Ball	Ball	4,400	36x5	36x5
Locomobile I	3500	32.4	Tour'g	5	4	4½	4½	Pairs	H'comb	Cent'f'l	M. & b.	None	3 mech	Cone	Sel	4	Frame	Shaft 2	120	54	P. steel	3 plain	Ball	Ball	.....	34x4	34x4½
Locomobile I	4500	40.0	Tour'g	7	4	5	6	Pairs	H'comb	Cent'f'l	M. & b.	None	3 mech	Cone	Sel	4	Frame	2-chain	123	54	P. steel	3 plain	Ball	Ball	.....	36x4	36x5
Lozier J	3500	33.7	Tour'g	5	6	3¾	4½	Pairs	H'comb	Cent'f'l	Bosch	Storage	3 mech	Disc	Sel	3	Frame	Shaft 1	116	55	P. steel	4 ball	Ball	Ball	2,900	36x4	34x4
Lozier H	5000	46.0	Tour'g	7	4	5⅜	5½	Pairs	H'comb	Cent'f'l	Bosch	Storage	2 mech	Disc	Sel	4	Frame	Shaft 1	124	56	P. steel	3 ball	Ball	Ball	3,500	36x4	36x5
Lozier I	6000	51.6	Tour'g	7	6	4⅝	5½	Pairs	H'comb	Cent'f'l	Bosch	Storage	3 mech	Disc	Sel	4	Frame	Shaft 1	131	56	P. steel	4 ball	Ball	Ball	3,700	36x4	36x5
Marion "10"	1850	28.9	Tour'g	5	4	4¼	4½	Pairs	H'comb	Cent'f'l	Splitd'f	Dry	Pump	38-disc	Sel	3	Axle	Shaft 1	112	56	P. steel	3 plain	Roller	Roller	2,150	34x4	34x4
Matheson M	3000	48.6	Tour'g	5	6	4½	5	Pairs	H'comb	Cent'f'l	Bosch	Battery	Mech	53-disc	Sel	3	Axle	Shaft 1	125½	56½	P. steel	4 plain	Ball	Ball	.....	36x4	36x4
Matheson E	5000	40.0	Tour'g	7	4	5	6	Single	H'comb	Cent'f'l	M. & B.	Dry	Mech	Disc	Sel	4	Frame	2-chain	128	56½	P. steel	5 plain	Ball	Ball	.....	36x4	36x5
Mercer A	1950	30.6	Tour'g	5	4	4⅜	4¾	Pairs	Tubular	Cent'f'l	Bosch	Dry	Pump	Disc	Sel	3	Frame	Shaft 1	116	56	P. steel	3 plain	......	......	.....	34x4	34x4
Oldsmobile	3000	36.1	Tour'g	5	4	4¾	4¾	Pairs	H'comb	Cent'f'l	Bosch	Dry	Pump	Cone	Sel	4	Frame	Shaft	118	56	P. steel	3 plain	Ball	Roller	.....	36x4	36x4
Oldsmobile	4600	54.1	R'bout.	2	6	4¾	4¾	Pairs	H'comb	Cent'f'l	Bosch	Dry	Pump	Cone	Sel	4	Frame	Shaft	118	56	P. steel	4 plain	Ball	Roller	.....	42x4½	42x4½
Oldsmobile	4600	54.1	Tour'g	7	6	4¾	4¾	Pairs	H'comb	Cent'f'l	Bosch	Dry	Pump	Cone	Sel	4	Frame	Shaft	130	56	P. steel	4 plain	Ball	Roller	.....	42x4½	42x4½
Overland "38"	1000	22.5	R'bout.	2	4	3¾	4½	Single	Cellular	None	Remy	Dry	Pump	Plate	Plan	2	Axle	Shaft 1	102	56	P. steel	5 plain	Plain	Roller	1,850	32x3½	32x3½
Overland "40"	1250	28.9	R'bout.	3	4	4¼	4½	Single	Cellular	None	Remy	Dry	Pump	Plate	Plan	2	Axle	Shaft 1	112	56	P. steel	5 plain	Plain	Roller	2,100	34x3½	34x3½
Overland "41"	1400	28.9	Tour'g	5	4	4¼	4½	Single	Cellular	None	Remy	Dry	Pump	Plate	Plan	2	Axle	Shaft 1	112	56	P. steel	5 plain	Plain	Roller	2,200	34x4	34x4
Overland "42"	1500	28.9	Tour'g	5	4	4¼	4½	Single	Cellular	None	Remy	Dry	Pump	Cone	Sel	3	Frame	Shaft 1	112	56	P. steel	5 plain	Ball	Roller	2,200	34x4	34x4

DETAILS OF CARS EXHIBITED AT 1910 MADISON SQUARE GARDEN SHOW—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL			BODY		MOTOR				COOLING		IGNITION				TRANSMISSION							BEARINGS				TIRES	
	Price	H.P.	Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Motor	Transmission	Axle	Weight	Front	Rear
Packard 18	3200	26.4	R'bout.	3	4	4 1/16	5½	Pairs.	H'comb.	Cent'f'l.	Eisem'n.	Storage.	2 mech.	Plate.	Prog.	3	Axle.	Shaft 2.	102	56½	P. steel.	3 plain.	Ball.	Roller.	.....	34x3½	34x4
Packard 18	3200	26.4	Tour'g.	5	4	4 1/16	5½	Pairs.	H'comb.	Cent'f'l.	Eisem'n.	Storage.	2 mech.	Plate.	Prog.	3	Axle.	Shaft 2.	112	56½	P. steel.	3 plain.	Ball.	Roller.	2,750	34x4	34x4
Packard 30	4200	40.0	R'bout.	3	4	5	5½	Pairs.	H'comb.	Cent'f'l.	Eisem'n.	Storage.	2 mech.	Plate.	Prog.	3	Axle.	Shaft 2.	108	56½	P. steel.	3 plain.	Ball.	Roller.	.....	36x3½	36x4½
Packard 30	4200	40.0	Tour'g.	7	4	5	5½	Pairs.	H'comb.	Cent'f'l.	Eisem'n.	Storage.	2 mech.	Plate.	Prog.	3	Axle.	Shaft 2.	123½	56½	P. steel.	3 plain.	Ball.	Roller.	3,300	36x4	36x4½
Palmer-S. XXX	2250	28.9	R'bout.	3	4	4¼	4½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Battery.	Pump.	Disc.	Sel.	4	Frame.	Shaft.	115	56	P. steel.	3 plain.	Ball.	Ball.	.....	34x4	34x4
Palmer-S. LXI	3250	54.1	R'bout.	3	6	4¾	5½	Single.	H'comb.	Cent'f'l.	Bosch.	Battery.	Pump.	Disc.	Sel.	4	Frame.	Shaft.	127	56	P. steel.	4 plain.	Ball.	Ball.	.....	34x4	34x4
Palmer-S. LXII	3500	57.0	Tour'g.	5	6	4⅞	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Battery.	Pump.	Disc.	Sel.	4	Frame.	Shaft.	127	56	P. steel.	4 plain.	Ball.	Ball.	.....	36x4	36x4½
Palmer-S. XXX	3650	28.9	Land't.	6	4	4¼	4½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Battery.	Pump.	Disc.	Sel.	4	Frame.	Shaft.	120	56	P. steel.	3 plain.	Ball.	Ball.	.....	34x4	34x4
Peerless "27"	4300	38.0	R'bout.	3	4	4⅞	5½	Pairs.	H'comb.	Gear.	Bosch.	Storage.	3 mech.	Ex. band	Sel.	4	Frame.	Shaft 2.	118½	56	P. steel.	3 plain.	Ball.	Ball.	.....	36x4	36x5
Peerless "27"	4300	38.0	Tour'g.	7	4	4⅞	5½	Pairs.	H'comb.	Gear.	Bosch.	Storage.	3 mech.	Ex. band	Sel.	4	Frame.	Shaft 2.	122	56	P. steel.	3 plain.	Ball.	Ball.	.....	36x4	36x5
Peerless "28"	6000	57.0	R'bout.	3	6	4⅞	5½	Pairs.	H'comb.	Gear.	Bosch.	Storage.	3 mech.	Ex. band	Sel.	4	Frame.	Shaft 2.	132½	56	P. steel.	4 plain.	Ball.	Ball.	.....	36x4	36x5
Peerless "28"	6000	57.0	Tour'g.	7	6	4⅞	5½	Pairs.	H'comb.	Gear.	Bosch.	Storage.	3 mech.	Ex. band	Sel.	4	Frame.	Shaft 2.	136	56	P. steel.	4 plain.	Ball.	Ball.	.....	36x4	36x5
Pierce-Arrow 36	3850	38.4	R'bout.	3	6	4	4¾	Pairs.	H'comb.	Cent'f'l.	Bosch.	Storage.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	119	55	P. steel.	4 plain.	Ball.	Roller.	.....	36x4	36x4
Pierce-Arrow 36	4000	38.4	Tour'g.	5	6	4	4¾	Pairs.	H'comb.	Cent'f'l.	Bosch.	Storage.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	125	55	P. steel.	4 plain.	Ball.	Roller.	.....	36x4	36x4½
Pierce-Arrow 48	4850	48.6	R'bout.	3	6	4½	4¾	Pairs.	H'comb.	Cent'f'l.	Bosch.	Storage.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	128	56	P. steel.	4 plain.	Ball.	Roller.	.....	36x4½	36x4½
Pierce-Arrow 48	5000	48.6	Tour'g.	7	6	4½	4¾	Pairs.	H'comb.	Cent'f'l.	Bosch.	Storage.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	134½	56	P. steel.	4 plain.	Ball.	Roller.	.....	36x4½	37x5
Pierce-Arrow 66	5850	66.2	R'bout.	3	6	5¼	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Storage.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	133½	56	P. steel.	4 plain.	Ball.	Roller.	.....	37x5	37x5
Pierce-Arrow 66	6000	66.2	Tour'g.	7	6	5¼	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Storage.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	140	56	P. steel.	4 plain.	Ball.	Roller.	.....	37x5	38x5½
Pope-Hartford T	2750	29.7	Tour'g.	5	4	4 5/16	5½	Pairs.	Cellular.	Cent'f'l.	Extra.	Storage.	4 mech.	Cone.	Sel.	3	Frame.	Shaft 2.	118	56	P. steel.	3 plain.	Roller.	Roller.	.....	36x4	36x4
Royal Tourist M	4500	48.4	Tour'g.	7	4	5½	6	Pairs.	H'comb.	Cent'f'l.	Magneto.	Storage.	Mech.	Cone.	Sel.	4	Frame.	Shaft 2.	126	56	P. steel.	3 plain.	Ball.	Roller.	.....	36x4½	36x5
Selden 35	2000	36.1	Tour'g.	5	4	4¾	5	Pairs.	H'comb.	Cent'f'l.	Extra.	Storage.	Pump.	Cone.	Sel.	3	Frame.	Shaft 2.	116	56	P. steel.	3 plain.	Roller.	Roller.	2,650	34x3½	34x4
Selden 29	3000	28.9	Limous.	6	4	4¼	4½	Pairs.	H'comb.	Cent'f'l.	Extra.	Storage.	Pump.	Cone.	Sel.	3	Frame.	Shaft 2.	114	56	P. steel.	3 plain.	Roller.	Roller.	.....	34x3½	34x4
Simplex 50	4450	53.0	Extra.	...	4	5¾	5¾	Pairs.	H'comb.	Cent'f'l.	Bosch.	None.	Mech.	Disc.	Sel.	4	Frame.	2-chain.	124	56	P. steel.	3p., 1 bl.	Ball.	Ball.	2,800	36x4	36x5
Simplex 50	4450	53.0	Extra.	...	4	5¾	5¾	Pairs.	H'comb.	Cent'f'l.	Bosch.	None.	Mech.	Disc.	Sel.	4	Frame.	2-chain.	129	56	P. steel.	3p., 1 bl.	Ball.	Ball.	2,850	36x4	36x5
Stearns 15-30	3200	32.4	Tour'g.	5	4	4½	4¾	Pairs.	H'comb.	Cent'f'l.	Bosch.	Dry.	Pump.	Disc.	Sel.	3	Axle.	Shaft 1.	116	56½	P. steel.	3 ball.	Ball.	Ball.	2,650	34x4	34x4
Stearns 30-60	4600	46.0	Tour'g.	7	4	5⅜	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Dry.	Pump.	25-disc.	Sel.	4	Frame.	Shaft 1.	124	56½	P. steel.	3 ball.	Ball.	Ball.	3,450	36x4	36x5
Stearns 30-60	4600	46.0	Tour'g.	7	4	5⅜	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Dry.	Pump.	25-disc.	Sel.	4	Frame.	2-chain.	124	56½	P. steel.	3 ball.	Ball.	Ball.	3,450	36x4	36x5
Stearns 45-90	6500	69.1	Tour'g.	7	6	5⅜	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Dry.	Pump.	Disc.	Sel.	4	Frame.	2-chain.	130	56½	P. steel.	4 ball.	Ball.	Ball.	.....	36x4½	36x5
Stevens-Dur. XXX	2850	36.1	R'bout.	3	4	4¾	4½	Pairs.	Cellular.	Cent'f'l.	Magneto.	Storage.	4 mech.	Plate.	Prog.	3	Motor.	Shaft 2.	109	56	P. steel.	3 plain.	Ball.	Ball.	.....	36x3½	36x4
Stevens-Dur. X	2850	36.1	Tour'g.	5	4	4¾	4½	Pairs.	Cellular.	Cent'f'l.	Magneto.	Storage.	4 mech.	Plate.	Prog.	3	Motor.	Shaft 2.	124	56	P. steel.	3 plain.	Ball.	Ball.	.....	34x4	34x4
Stevens-Dur. AA	3300	43.8	Tour'g.	5	6	4¼	4¾	Pairs.	Cellular.	Cent'f'l.	Magneto.	Storage.	6 mech.	Plate.	Prog.	3	Motor.	Shaft 2.	128	56	P. steel.	4 plain.	Ball.	Ball.	3,100	36x4½	36x4½
Stevens-Duryea Y	4000	54.1	Tour'g.	7	6	4¾	4½	Pairs.	Cellular.	Cent'f'l.	Magneto.	Storage.	6 mech.	Plate.	Prog.	3	Motor.	Shaft 2	142	56	P. steel.	4 plain.	Ball.	Ball.	.....	36x4	36x5
Studebaker G-7	4000	36.1	Tour'g.	7	4	4¾	5½	Pairs.	Tubular.	Cent'f'l.	Bosch.	None.	3 mech.	Cone.	Sel.	4	Frame.	Shaft 2.	117½	54	P. steel.	3 plain.	Ball.	Ball.	3,000	36x4	36x4½
Thomas M	*3500	43.8	Tour'g.	5	6	4¼	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Dry.	9 mech.	3-plate.	Sel.	3	Frame.	Shaft 2.	125	56	P. steel.	4 plain.	Ball.	Roller.	3,650	36x4½	36x4½
Thomas R	4000	28.9	Limous.	6	4	4¼	5½	Pairs.	H'comb.	Cent'f'l.	Bosch.	Dry.	Mech.	3-plate.	Sel.	3	Frame.	Shaft 2.	123	56	P. steel.	3 plain.	Ball.	Roller.	3,270	34x4½	34x4½
Thomas F	*4500	53.0	Tour'g.	7	4	5¾	5½	Single.	H'comb.	Gear.	Bosch.	Dry.	8 mech.	3-plate.	Sel.	4	Frame.	2-chain.	127	56	P. steel.	5 plain.	Ball.	Ball.	3,525	36x4½	36x5
Thomas K	*6000	72.6	Tour'g.	7	6	5½	5½	Single.	H'comb.	Gear.	Bosch.	Dry.	10 mech.	3-plate.	Sel.	4	Frame.	2-chain.	140	56	P. steel.	7 plain.	Ball.	Ball.	4,160	36x4½	36x5
White G-A	2000	22.5	Tour'g.	5	4	3¾	5¼	Block.	H'comb.	Cent'f'l.	Bosch.	None.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	110	56½	P. steel.	2 ball.	Ball.	Ball.	.....	32x4	32x4
White G-B	2500	22.5	Tour'g.	5	4	3¾	5¼	Block.	H'comb.	Cent'f'l.	Bosch.	None.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	120	56½	P. steel.	2 ball.	Ball.	Ball.	.....	34x4	34x4
Winton 48	3000	48.6	Tour'g.	5	6	4½	5	Pairs.	Tubular.	Cent'f'l.	Eisem'n.	Storage.	Pump.	67-disc.	Sel.	4	Frame.	Shaft 2.	124	56½	P. steel.	4 plain.	Ball.	Roller.	.....	34x4	34x4½
Winton 60	4250	60.0	Tour'g.	7	6	5	5	Pairs.	Tubular.	Cent'f'l.	Eisem'n.	Storage.	Pump.	67-disc.	Sel.	4	Frame.	Shaft 2.	130	56½	P. steel.	4 plain.	Ball.	Roller.	.....	36x4	36x4½

STEAM PLEASURE CARS

MAKE AND MODEL		BODY		ENGINE									TRANSMISSION						BEARINGS				TIRES	
	Price	Type	Seats	No. Cyls.†	Type	Action	Bore	Stroke	Valves	Position	Boiler	Condenser	Change-Gear	Speeds	Drive.	Wheelbase	Tread	Frame	Engine	Transmission	Axle	Weight	Front	Rear
White O-O	$2000	Touring.	5	2	Compound.	Double.	2½ & 4½	3	Joy.	Front.	Flash.	Yes.	Sliding.	2	Shaft 2.	110	56	P. steel.	Ball.	Ball.	Ball.	2,300	32x4	32x4
White M-M	4000	Touring.	7	2	Compound.	Double.	3 & 5	4½	Joy.	Front.	Flash.	Yes.	Sliding.	2	Shaft 2.	122	56	P. steel.	Ball.	Ball.	Ball.	3,600	36x4	36x5

*Price includes top. †Two-cycle motor. ‡Also 60 inches.

DETAILS OF CARS EXHIBITED AT 1910 MADISON SQUARE GARDEN SHOW—GASOLINE COMMERCIAL CARS

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Tons	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Motor	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES (Solid) Front	TIRES (Solid) Rear
Alco 16	3350	24.8	Taxic'b	...	4	100	120	Pairs	Cellular	Cent'f'l	Bosch	None	Mech	Disc	Sel	3	Frame	Shaft 2	104	55½	P. steel	3 plain	Ball	Ball	.....	32x4	32x4
Alco Truck	3500	24.8	Truck	3	4	100	120	Pairs	Tubular	Cent'f'l	Bosch	None	Mech	Disc	Sel	3	Frame	2-chain	110	65	I-beam	3 plain	Ball	......	.....	36x5	36x3½d
Alden Sampson	4500	40.0	Truck	4	4	5	5½	Pairs	Tubular	None	Bosch	Dry	3 mech	Cone	Sel	4	Frame	2-chain	148	68	Channel	3 plain	Ball	Plain	8,200	36x5	36x5d
Alden Sampson	5000	40.0	Truck	5	4	5	5½	Pairs	Tubular	None	Bosch	Dry	3 mech	Cone	Sel	4	Frame	2-chain	155	68	Channel	3 plain	Ball	Plain	9,000	36x6	42x6d
Autocar XXI	2300	18.0	Exp	1½	2	4¾	4½	Single	Tubular	Cent'f'l	Magneto	Battery	Mech	3-plate	Prog	3	Frame	Shaft 2	97	58	P. steel	2 plain	Roller	Roller	.....	34x3½	34x4
Elmore 36	2500	†	Taxic'b	...	4	4½	4	Single	Tubular	None	None	Dry	6 mech	Con. b'd	Sel	3	Frame	Shaft	110	56	P. steel	5 plain	Ball	Roller	.....	34x4	34x4
Franklin L-1	2000	18.2	Extra	½	4	3¾	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	83	53½	Wood	5 plain	Ball	Roller	1,750	32x2½	32x3
Franklin L-2	2200	18.2	Extra	1	4	3¾	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	83	53½	Wood	5 plain	Ball	Roller	1,850	32x3	32x3½
Franklin J-3	2500	18.2	Extra	2	4	3¾	4	Single	Air cool	....	Bosch	None	Mech	Disc	Prog	3	Frame	Shaft 2	100	53½	Wood	5 plain	Ball	Roller	2,550	32x3	32x3d
Hewitt	3000	24.2	Truck	2	2	5½	5	Single	Cellular	Cent'f'l	Magneto	Battery	Mech	Cone	Plan	2	Frame	2-chain	112	60	Channel	2 plain	Plain	Plain	.....	34x4	34x3½d
Hewitt	5250	28.9	Truck	5	4	4½	5½	Pairs	Cellular	Cent'f'l	Magneto	Battery	Mech	Cone	Plan	2	Frame	2-chain	140	68	Channel	3 plain	Plain	Plain	.....	36x4d	36x5d
Knox	1400	10.0	Extra	¾	1	5	7	Single	Air cool	....	None	Dry	3 mech	Plate	Plan	2	Frame	2-chain	85	56	Angle	2 plain	Plain	Roller	1,800	32x3	36x3
Knox	2200	20.0	Extra	1½	2	5	6	Single	Air cool	....	None	Dry	6 mech	Plate	Plan	2	Frame	2-chain	97	56	Angle	2 plain	Plain	Roller	2,100	32x3½	32x3½
Knox	2600	20.0	Extra	1½	2	5	6	Single	Air cool	....	None	Dry	6 mech	Plate	Plan	2	Frame	2-chain	100	56	Angle	2 plain	Plain	Roller	3,260	34x3½	34x4
Knox	3500	40.0	Extra	2	4	5	4¾	Single	Cellular	Cent'f'l	Bosch	Storage	Pump	3-plate	Sel	3	Frame	2-chain	125	60¾	Channel	5 plain	Ball	Roller	4,200	34x4	34x5
Knox	3750	40.0	Extra	3	4	5	4¾	Single	Cellular	Cent'f'l	Bosch	Storage	Pump	3-plate	Sel	3	Frame	2-chain	149	67	Channel	5 plain	Ball	Roller	5,100	36x4	36x3½d
Knox	4000	48.4	Extra	4	4	5½	5½	Single	Cellular	Cent'f'l	Bosch	Storage	Pump	3-plate	Sel	3	Frame	2-chain	154	67	Channel	5 plain	Ball	Roller	5,400	36x4	36x4d
Knox	4300	48.4	Extra	5	4	5½	5½	Single	Cellular	Cent'f'l	Bosch	Storage	Pump	3-plate	Sel	3	Frame	2-chain	154	67	Channel	5 plain	Ball	Roller	5,600	36x5	36x4d
Packard	3400	32.4	Extra	3	4	4½	5½	Pairs	Cellular	Cent'f'l	Eisem'n	Storage	2 mech	Plate	Prog	3	Frame	2-chain	144	68	Channel	3 plain	Ball	Roller	5,200	34x4	36x4d
Packard	3400	32.4	Extra	3	4	4½	5½	Pairs	Cellular	Cent'f'l	Eisem'n	Storage	2 mech	Plate	Prog	3	Frame	2-chain	172	68	Channel	3 plain	Ball	Roller	5,750	34x4	36x4d
Pope-Hartford	......	29.7	....	...	4	4 5/16	5⅛	Pairs	Cellular	Cent'f'l	Extra	Storage	4 mech	Cono	Sel	3	Frame	Shaft	130	56	P. steel	3 plain	Roller	Roller	.....	34x5x	34x5x
White	....	22.5	Extra	1½	4	3¾	5⅛	Block	H'comb	Cent'f'l	Bosch	None	Pump	Cone	Sel	4	Frame	Shaft 2	144	60	P. steel	2 ball	Ball	Roller	.....	36x4x	36x4dx

ELECTRIC PLEASURE CARS

MAKE AND MODEL	Price	BODY Type	BODY Seats	MOTOR Number	MOTOR H.P.	MOTOR Location	BATTERIES Type	BATTERIES No. Cells	BATTERIES Location	SPEEDS Forward	SPEEDS Reverse	First Reduction	Drive	Wheelbase	Tread	Frame	BEARINGS Motor	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
Baker	$2000	Runabout	2	One	2	Middle	Exide 11 PV	30	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	1,900	32x3½	32x3½
Baker	2000	Victoria	2	One	2	Middle	Exide 9 MV	28	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	1,950	32x3½	32x3½
Baker	2400	Coupe	2	One	2	Middle	Exide 9 MV	28	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	2,100	32x3½	32x3½
Baker	2600	Coupe	4	One	2	Middle	Exide 9 MV	28	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	2,200	32x3½	32x3½
Columbia	1600	Victoria	2	One	3½	Rear	Exide 13 PV	24	Divided	6	3	H'bone gears	Single chain	70	48	None	Ball	Ball	Ball	1,650	30x3½	30x3½
Detroit H	1650	Roadster	3	One	3	Axle	Option 13MV	24	Divided	5	3	Silent chain	Single Chain	87	51	Angle	Ball	Ball	Roller	1,900	32x3½	32x3½
Detroit A	1900	Victoria	2	One	3	Middle	Option 13MV	24	Divided	5	3	Silent chain	Double chain	80	51	Channel	Ball	Ball	Roller	2,100	32x3½	32x3½
Detroit E	2100	Coupe	2	One	3	Axle	Option 13MV	24	Divided	5	3	Silent chain	Single chain	87	51	Angle	Ball	Ball	Roller	2,300	32x3½	32x3½
Detroit C	2350	Coupe	2	One	3	Middle	Option 13MV	24	Divided	5	3	Silent chain	Double chain	80	51	Channel	Ball	Ball	Roller	2,300	32x3½	32x3½
Detroit D	2500	Brougham	4	One	3	Middle	Option 13MV	24	Divided	5	3	Silent chain	Double chain	80	51	Channel	Ball	Ball	Roller	2,400	32x3½	32x3½
Rauch & Lang 20	1900	Stanhope	2	One	2½	Middle	Exide 9 MV	24	Divided	6	3	Silent chain	Double chain	77	53	P. steel	Ball	Ball	Roller	1,975	32x3½	32x3½
Rauch & Lang 22	2100	Stanhope	3	One	2½	Middle	Exide 11 MV	24	Divided	6	3	Silent chain	Double chain	77	53	P. steel	Ball	Ball	Roller	2,125	32x3½	32x3½
Rauch & Lang 133	2100	Runabout	2	One	2½	Middle	Exide 11 PV	30	Divided	6	3	Silent chain	Double chain	85	53	P. steel	Ball	Ball	Roller	2,050	32x3½	32x3½
Rauch & Lang 23	2200	Victoria	4	One	2½	Middle	Exide 11MV	24	Divided	6	3	Silent chain	Double chain	85	53	P. steel	Ball	Ball	Roller	2,100	32x3½	32x3½
Rauch & Lang 24	2700	Coupe	4	One	2½	Middle	Exide 13 MV	24	Divided	6	3	Silent chain	Double chain	85	53	P. steel	Ball	Ball	Roller	2,550	32x4	32x4
Waverley 69	1225	Runabout	2	One	....	Axle	Option 9	30	Divided	4	4	H'bone gear	H'bone gear	72	54	Armored	Ball	Ball	Roller	.....	32x3	32x3½
Waverley 74	1600	Stanhope	2	One	....	Rear	Option 11	30	Divided	4	4	H'bone gear	H'bone gear	73½	54	Armored	Ball	Ball	Roller	.....	32x3	32x3½
Waverley 78	1700	Roadster	2	One	....	Rear	Option 11	32	Divided	4	4	H'bone gear	H'bone gear	94	54	Armored	Ball	Ball	Roller	.....	32x3½	32x3½
Waverley 60	1900	Surrey	4	One	....	Axle	Option 13	35	Divided	4	4	H'bone gear	Spur gears	91	54	Armored	Ball	Ball	Roller	.....	32x3½	32x3½
Waverley 70C	2000	Coupe	2	One	....	Rear	Option 11	30	Divided	4	4	H'bone gear	H'bone gear	79	54	Armored	Ball	Ball	Roller	.....	32x3	32x3½
Waverley 75C	2250	Brougham	4	Ono	....	Rear	Option 13	32	Divided	4	4	H'bone gear	H'bone gear	79	54	Armored	Ball	Ball	Roller	.....	32x3½	32x3½
Woods	2100	Victoria	2	One	....	Middle	Exide 9 MV	40	Divided	4	4	H'bone gear	Double chain	74	56	Bronzo	Ball	Ball	Ball	2,650	30x3½	34x3½
Woods	2650	Brougham	4	One	....	Middle	Exide 9 MV	40	Divided	4	4	H'bone gear	Double chain	74	56	Bronze	Ball	Ball	Ball	2,850	30x3½	34x3½

· SAID · IN · THE · SELLING ·

ALCO: Arthur N. Jervis, Advertising Manager—For 1910 this company offers a complete line of cars, which, in details of design, materials and workmanship, are unsurpassed. The reasons why a man should buy one of these cars in preference to some other car selling at the same or a different price are as follows:

The double chain drive, also the make-and-break system of ignition, has been discontinued, and all pleasure cars will be made with a shaft drive and a jump spark ignition, the Bosch dual system of high-tension magneto and storage batteries, with one set of spark plugs, being employed. These are the chief changes; they are in conformance with the policy of the company to Americanize the French design of the Alco in order to meet the prevailing demand. The company emphasizes the fact, however, that never is any change made until after it is certain that the quality and all the distinctive character can be maintained.

It is noteworthy in this connection that the shaft drive and floating rear axle construction adopted for all the 1910 cars is no experiment, but an original Alco design that was first introduced on the Alco town car in March, 1907. Since then it has become widely known and been much copied.

Most of the excellent features have been retained, and each one of these is a reason for buying in itself. The special design of rear axle of the full floating type, the French type of engine, Americanized, the anti-fatigue steel used throughout the car regardless of cost, the unusually large and powerful brakes, the deep, square tube radiator, and other features which space prevents the mention of, are all mute but eloquent arguments in favor of the Alco car.

APPERSON: George H. Strout, Sales Manager—To the prospective purchaser of an automobile, the dealer in Apperson cars usually points out that the Apperson Bros. have been constantly building high-grade automobiles for over sixteen years; that no maker in America, and few, if any, in Europe, have had more years of experience in this line of manufacture. Experience is the best teacher, and it has taught Apperson Bros. how to build motor cars that are in no way surpassed in efficiency by any other make of car.

Since every component part of an Apperson car is designed and built throughout in the Apperson factory, the resulting product is a well balanced, homogeneous motor car, built from the best materials the world's markets produce.

All working Apperson parts are made from metals especially selected for the use for which they are to be put, and the parts that bear the greatest strain are treated and tempered in the Apperson factory by a secret process known only to the Apperson Bros.

BUICK: A. G. Southworth, Manager, New York Branch—The aim of the Buick Motor Company is to produce "for the price asked" better cars than any other maker; to give every buyer a square deal, and so make every Buick owner a Buick advertiser. The sale of 18,000 cars in 1909 proves that they have hit the mark.

A Buick car is the best possible automobile investment, because it is backed by a strong company that makes, with few exceptions, everything that enters into the car. They are sold in every civilized country; you can get a part or find a mechanic that knows the car in every hamlet. Their commercial value is proven by the fact that 32,000 are running to-day; few are offered second-hand, and they bring a better percentage of the original price than any other automobile—barring none.

We feature points that have quickly placed Buicks at the head of the motor car procession, viz.: simple, standard construction, overhead valves, self-contained oiling system with circulating pump, and full elliptic rear springs. Silence, ease of operation, economy of upkeep, accessibility of parts and completeness of equipment are combined to a degree seldom found in other cars, while in comfort, design, finish and riding qualities, in which so many cars are deficient, they surpass all other medium-price cars.

Regardless of price, horsepower or number of cylinders, Buick stock cars have won more important stock car races and made more world's stock car records in 1909 than all other cars combined.

We issued through the press a fair challenge. It was never answered. A demonstration in a Buick will show you why.

Hundreds of Buick cars are in daily use that have run over 60,000 miles. Three Buicks purchased three and a half years ago to carry U. S. mail between Torrance and Roswell, N. M., have run 110,000 miles each, covering 110 miles a day on an average of 300 days a year—they are still in active service, with the probability that they will round out five years in Uncle Sam's employment.

Buick customers are satisfied automobile owners. Buick reputation is established; we are not experimenting at your expense. Ask your neighbor—he has one.

CADILLAC: W. C. Leland, General Manager—In a car having a carrying capacity for five passengers or less, the Cadillac "Thirty" is beyond question the most judicious purchase, because it offers greater value than any car made, regardless of price.

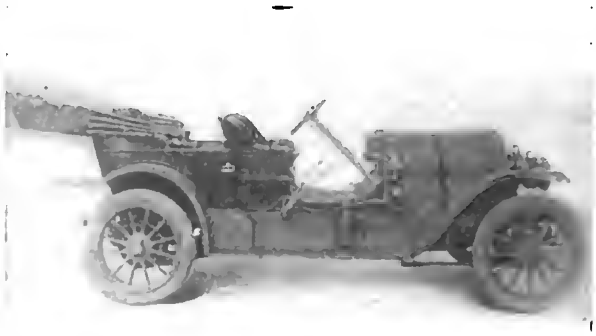
The construction of the Cadillac "Thirty" has for its foundation a half-century's experience in the manufacture of the finest machinery and machine tools. Its materials are selected only after the most careful analysis of the duties they must perform. The workmanship is of the highest type. It is manufactured according to designs, methods, principles and practice which the Cadillac Company has followed for seven years, and which have proven themselves to be as near correct as engineering science has been able to accomplish.

As proof of this statement I may simply point to the all significant fact that there are now approximately thirty thousand cars in use throughout the world. We have yet to hear of a single one which has been discarded because of being worn out or unfit for use, although the first year's output, some two thousand cars, made in 1903, has seen seven years' constant service. I believe that the desideratum of the great majority of automobile buyers is: service, reasonable speed, ample power for reasonable requirements, comfort (both mental and physical), absence of "automobile troubles," dependability and economy. I believe that he gets these to a greater extent in the Cadillac "Thirty" at $1,600 than in any other car at any price.

COLUMBIA: H. W. Nuckols, General Manager—Refinement of detail of design, I believe, first distinguishes the Columbia four-cylinder gasoline car for 1910. With the model first evolved in 1906 there has been opportunity to raise each unit of construction to a very high place and for the year at hand the new car will first interest veteran motorists for a number of little niceties which have been incorporated. Friends have said that it contains more clever features than any car of current building, and I believe it to be true. Also, I think it fair to state that no new car in its first or second year could have been worked out to a state of such high efficiency.

We are building the car as well as Columbias have been built in the past, which means to a fine point of machining accuracy. Further we are provided with a higher quality of raw material than the market has ever previously held. These and what seems to be a fortunate selection of body styles have made for a strong interest in the car. It is most flattering. We are appreciative. It has all along been said that Columbia cars have led in each year but it is patent that the leadership was never so marked as during the present season. Our roadster design merits the praise of being generously copied.

Alco Six-Cylinder Toy Tonneau



Apperson Jack Rabbit Speed Car

Also interest has been exhibited in our new electric, a two-passenger landaulet, for open or closed driving. Changes in electrics are few, which may account for the interest manifested, but further than this, this new landaulet provides, in one vehicle, a carriage for all sorts of weather for shopping, calling, and city and town driving. Our production was at hand fairly early this season, has enjoyed a large sale, and we are making deliveries according to schedule.

CORBIN: L. Goss—Everyone should buy a Corbin car because of the fact that a car is no better than its poorest and weakest part. This matter is governed solely by the standing and backing, which a firm has, since this (if very good) allows the company to make every component part in its own shops. Beyond the ability to do so, the worth of a car lies in the number and character of the component parts actually made under the one factory roof.

The Corbin Motor Vehicle Corporation, of New Britain, Conn., is one of the very few concerns in the automobile industry that designs and manufactures the parts that enter into the makeup of their car. Without an exception, the only parts that this concern is not responsible for are the twenty-two imported annular ball bearings, which are manufactured by Fichtel & Sachs, of Germany. The reason for using these bearings needs no explanation, for it is a well-known fact that these bearings are the best the world affords.

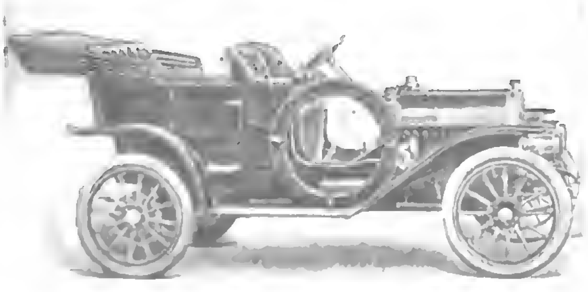
It is not a surprising fact that the Corbin car has reached such a high state of perfection, when you consider the facilities and backing the car has had. The Corbin Motor Vehicle Corporation is one of the leading companies forming the American Hardware Corporation, the other members being P. & F. Corbin Company, Russell & Erwin Manufacturing Company, Corbin Screw Corporation and the Corbin Cabinet Lock Company. Take the combined energies of these concerns and any manufacturing scheme is sure to be successful and will uphold the name "Corbin" the world over. The Corbin car is no exception to this. Starting in a small way, then increasing their production, and still holding to the same general ideas, making changes to the extent of refinements until the Corbin is now considered "The Perfect Car."

ELMORE: Theodore F. McManus, Advertising Department—Speaking of the reasons why a man should buy an Elmore automobile, perhaps the simplest and shortest answer that could be given to this question is contained in the statement that the Elmore represents the only perfect type of the valveless two-cycle engine in existence.

Our devotion to the principles embodied in the Elmore valveless two-cycle engine leads us to believe that if this engine were universally understood, that the public would decline to accept any other type.

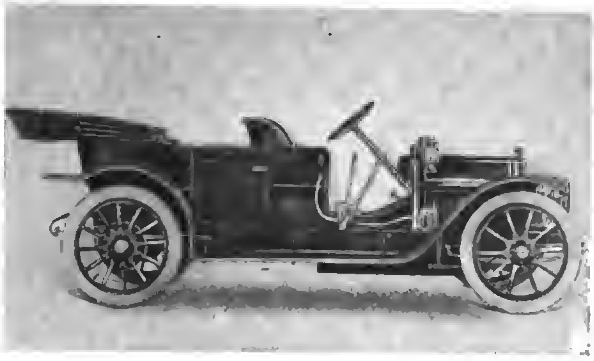
We believe that the Elmore valveless two-cycle engine is the most perfect engine in the world, because it is the simplest engine and because it furnishes that quality of operation to be desired above all others, to wit: an unbroken and continuous flow of power.

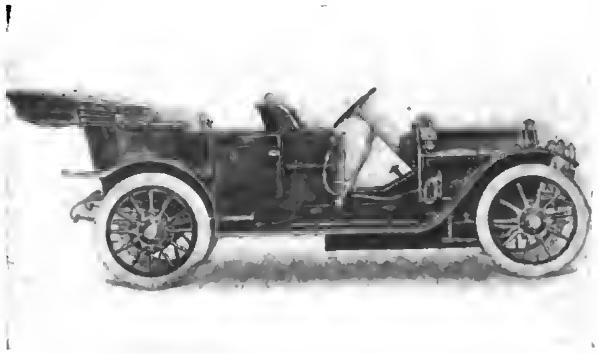
The four-cycle engine, in its very highest development, cannot escape the evil consequences of an intermittent application of power, because that evil is inherent in the four-cycle principle itself, and therefore, all four-cycle engines must incorporate it.



Autocar Type XXII Touring Car

Buick Model 19 Touring Car


Chalmers-Detroit "30" Touring Car


Chalmers-Detroit "40" Touring Car

We believe that the universal acceptance of the principle incorporated in the Elmore valveless two-cycle engine is simply being delayed.

The tremendous impetus that it has acquired in the past five years is being steadily increased.

Manufacturers of six-cylinder cars are filling the public prints with admissions of the inadequacy of the single and four-cylinder four-cycle engines. They justly say that the single-cylinder four-cycle jerks itself alone, and that the four-cylinder four-cycle only differs from the single cylinder, in that it has four times as many jerks.

They announce the change to the six cylinder as a cure for the evil. The error of intermittent power, however, is not in the numbers of cylinders, but in the four-cycle principle itself.

Elmore owners could not be persuaded to exchange the superiorities and advantages of their car for the disadvantages of the four-cycle type, no matter what inducement might be made to them in the matter of price.

As this knowledge spreads—as individual after individual learns that in the Elmore, and in the Elmore only. can he secure the smooth, even, economical operation resultant from the continuous application of power——the abandonment of the four-cycle engine and the adoption of the Elmore valveless two-cycle engine will be multiplied in hundreds and hundreds of cases.

The past eight years have recorded a steadily increasing conversion to the Elmore valveless two-cycle idea, with which it has been manifestly impossihle for even our large and constantly increased equipment to keep pace.

We believe that every man should own an Elmore, because of its valveless two-cycle engine; because it has the simplest motor in the world; because it costs less to keep and maintain than any other car in the world; because it has a motor that never wears out, and runs better after a year's use than when it is new; because this motor starts from the seat oftener than any other; because it has the most economical of all ignition systems, and last, but not least, because the even, rhythmic motion, which results from a continuous application of power, insures a saving on tires, which cannot be paralleled by any car of the four-cycle type.

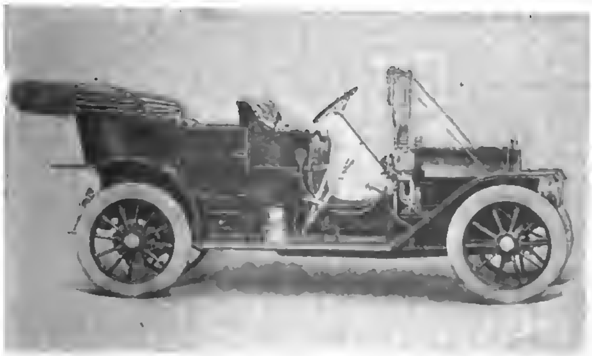
FRANKLIN: Sales Department, H. H. Franklin Mfg. Co.—The purchaser of a Franklin motor car buys riding comfort, road ability, and long service, and he gets an air-cooled motor that is free from the troubles which are common with water-cooled engines. In these two facts center the reasons why a buyer will find it to his advantage to secure a Franklin.

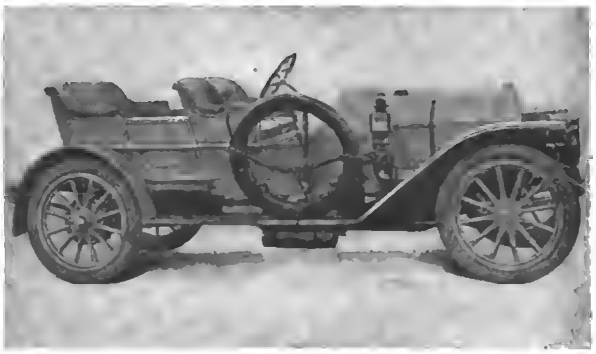
He must first make sure of easy riding, and that is an inevitable accompaniment of light weight, which in the Franklin is effected by consistent construction methods throughout the automobile. Strength and quality are secured without bulk.

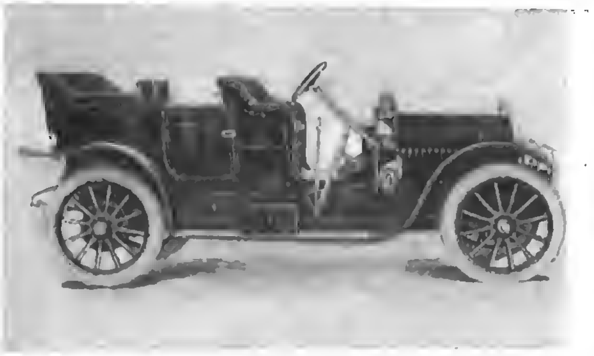
The Franklin is built throughout with a view to absorbing road shocks instead of transmitting them to the passengers. The cushioning effect starts with large tires and large wheels, and is augmented by the use of full-elliptic springs and a laminated-wood chassis frame.

The tires are specially large for the weight which they carry, and this results in greatly prolonging the life of the tires.

This construction keeps the occupants of the motor car from feeling the jolts of travel, which, in view of the light weight


Cadillac "30" Four-Cylinder Touring


Columbia Model 29 Toy Tonneau



Elmore Model 46 Touring Car

Elmore Model 36 Landaulet

of the Franklin, are much less of themselves than are the jolts made with a heavy, hard-riding, steel-frame automobile.

It is the judgment of many automobilists that three-fourths of the trouble with the average motor is due to the cooling system. In hot weather, the water-cooled engine has a tendency to boil dry and in winter to freeze and burst the water pipes and connections.

With the Franklin air-cooled motor none of this is possible. There is no water to either freeze or boil dry. Like the rest of the automobile, the motor is light and simple. Unnecessary parts are eliminated, and the engine is reduced to the minimum of what is essential for efficient power production.

The buyer of a Franklin secures a comfortable, easy riding, efficient motor car. In body design and appearance, it is all that a high-grade automobile should be. The sheet-aluminum panels of which the body is made are so fashioned as to produce a grace and beauty in harmony with the construction merits of the motor-car.

KNOX: Knox Automobile Company—For the season of 1910 we offer a line of models and types that are unsurpassed. They are designed and equipped to meet the approval of a most exacting public and we have every confidence in their mechanical perfection.

Our aim has been to produce strictly high grade motor cars embodying the most advanced ideas in material and methods of manufacture.

Knox water cooled motors have, ever since their introduction in 1907, proved their superiority over all makes, whether foreign or American. Having this, the most important factor toward the perfect motor car, we have endeavored in every way, regardless of cost of material or expense, to bring every detail beyond a point of criticism, either from a mechanical or selling standpoint. Every part of the construction in Knox models receives months of abuse in actual service before it is considered worthy of adoption.

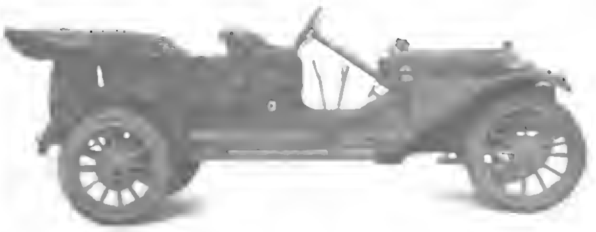
We include three models for 1910: Model "R," four-cylinder, 40-horsepower; Model "M," four-cylinder, 48-horsepower; Model "S," six-cylinder, 60-horsepower.

All have the same general design and construction and all the different types are up-to-date and fully equipped at their selling prices. The quality of material, finish and equipment is of the same high order, whether a Model "R" selling at $3,250 or a Model "S" Limousine at $6,000, quality has been first considered.

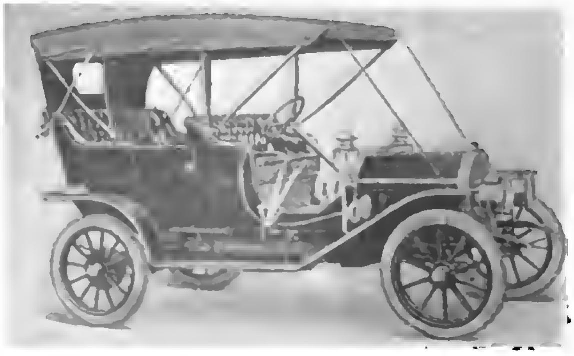
A careful study of Knox construction and a comparison of ability, quietness, accessibility, easy riding, and all that goes to make the up-to-date high grade motor car will easily prove Knox superiority.

LOZIER: C. A. Emise, Publicity Department—The prospective purchaser of an automobile who will study the trend of design in automobiles will be convinced, after an examination of the Lozier, that this car will suit his purposes as well, if not better than any other large high-powered car on the market, and for the following reasons:

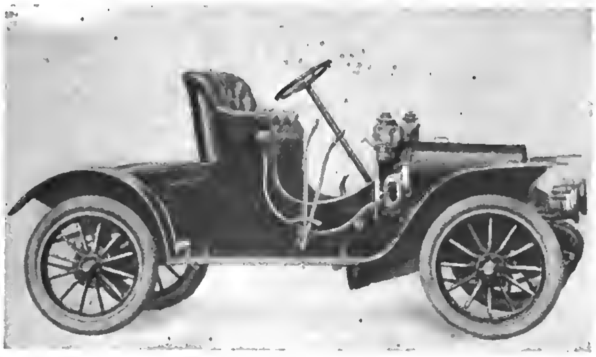
He will find on investigation and by comparison that no desirable improvement as exemplified on other cars is found wanting in the Lozier. A few years ago many features on cars (which features are now recognized as standard) were in dis-



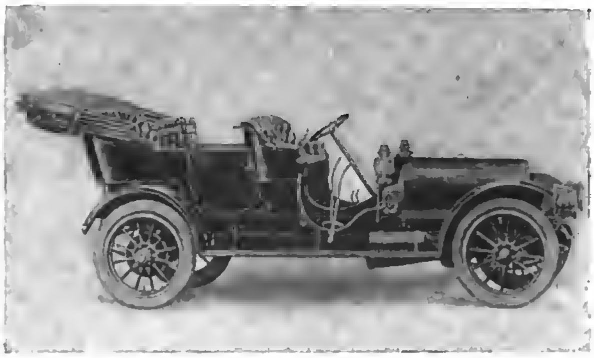
Corbin Four-Cylinder Toy Tonneau



E-M-F "30" Four-Cylinder Touring



Franklin Model G Four-Cylinder Runabout



Franklin Model H Six-Cylinder Touring

pute. For instance, there was discussion as to the relative merits of the progressive or selective type transmission; large or small wheels; long or short wheelbase; ball bearings or plain bearings; low-tension or high-tension ignition; magneto or storage battery ignition; automatic valves vs. mechanically actuated valves. Most of these questions have been definitely settled, and in every instance it will be found that the Lozier has been on the winning side, the features adopted as standard having been incorporated from the first in the Lozier models.

At the present time there are still differences in constructive features of various cars regarding the respective merits of which there is dispute, but with the record of having always been right, it is reasonable to presume that the construction advocated by the Lozier will in the future again prove to be correct. These features refer to ball bearings in the motor, multiple disc clutch, full floating type of rear axle, method of spring suspension, oil systems, narrow turning radius, elimination of numerous universal joints, etc., together with numerous minor points, lack of which might occasion troubles and difficulties which heretofore have been looked upon as necessary.

Among these latter details might be mentioned accessibility of gasoline strainer, accessible position of all oilers and oiling points, accessible adjustments of mechanism, demountable rims, electric lamps, dustless bodies, protection against mud splash and other details of this kind which many designers and purchasers overlook, but which if taken into consideration by the manufacturer assist greatly in the perfect satisfaction which it is possible for a car to afford its owner, and which every one should.

No purchaser of an automobile can possibly find the time to investigate in detail every automobile, and therefore the car and maker enjoying the reputation of never having made a serious mistake in design, construction, or the selection of material should inspire the confidence that impels the selection of that car in preference to the car that has been right some of the time but wrong occasionally, or at best has only adopted improvements a year or two after they have become accepted features of other cars.

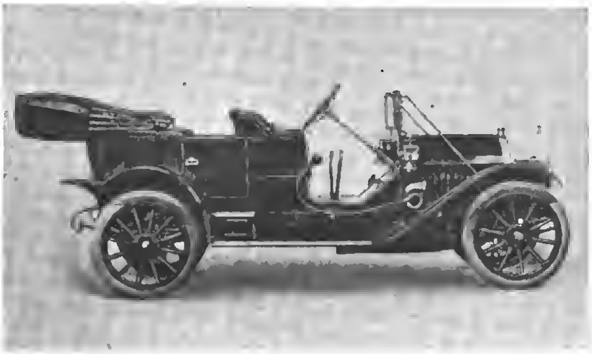
The name "Lozier" is a name that counts for something.

Of course, a car may be perfectly designed and embody practically every desirable constructive feature, but be lacking in strength and durability. There can be no question in the mind of any fair-minded person regarding the durability of the Lozier car after the splendid achievement of this car in endurance contests. The longest races ever run have been 24-hour races. These races in the past three years have been participated in by the most noted cars and drivers of the world. The majority of these 24-hour races have been won by Lozier cars.

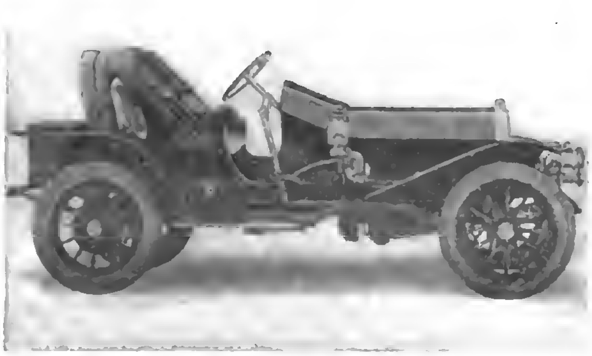
Five times have Lozier cars exceeded former world's record figures, and the Lozier car at the present time holds the world's competition record of 1,196 miles for 24 hours. This is a supreme test of durability, for while a car may perform creditably one, three, five, or even ten hours, it has been demonstrated that any car which can run at full speed for 24 hours must possess endurance and be able to withstand strain and abuse far beyond the requirements of any form of touring work.

OLDSMOBILE: John T. Cutting, Manager of New York Branch—The brief I hold for the Oldsmobiles is a simple one. In its gist, the most pertinent argument that I could put forth, which would convince the man that our cars may best suit his

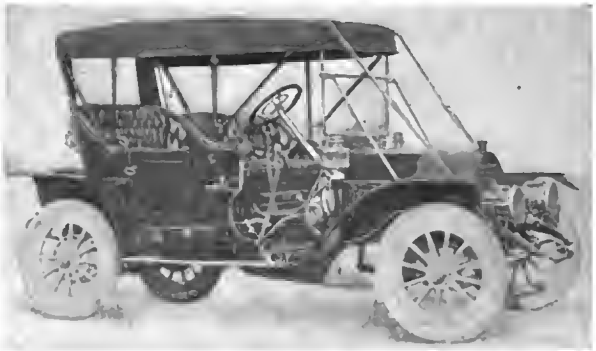
Hudson "20" Four-Cylinder Roadster



Hudson Four-Cylinder Touring Car



Knox Four-Cylinder Sportabout



Knox Model R Close-Coupled

purpose, is that they are "Sui Generis," a Latin expression, which freely translated means, "The only one of its kind," something which has made, and is the occupant of, a class by itself, for no other automobiles have ever made such records for roadability.

A few years ago the statement was made very generally in England, that with the launching of the battleship *Dreadnought* the other navies of the world became obsolete.

With still greater truth it may be said that with the application of big wheels to Oldsmobiles, 36-in. wheels on the "Special" four-cylinder, 40-horsepower model, and 42-in. wheels on the "Limited" six-cylinder, 60-horsepower model, the limitations of all other automobiles using smaller tires became self-evident.

Oldsmobile cars thus removed the last remaining criticism that could be made upon the automobile, by supplying a comfortable and economical need that had hitherto been recognized in all automobiles.

It is still useless to expect to find on other automobiles these features which have given the "Special" and "Limited" Oldsmobile models their high standing among the few great automobiles of the world. The big wheel features are exclusive, and, while other manufacturers may imitate them later on, at present they are original and unique, because used only on the Oldsmobiles.

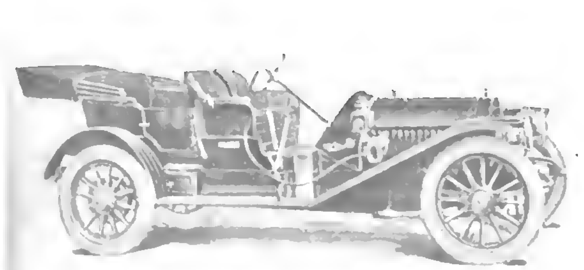
PACKARD: S. D. Waldon, General Manager—There is nothing we might say concerning the desirability of purchasing a Packard car which would be as pertinent and valuable information as our customary suggestion to "Ask the Man Who Owns One."

PALMER-SINGER: Charles A. Singer, Jr., Sales Manager—To a prospective purchaser of Palmer-Singer cars we desire to call particular attention to the following: General design and construction, material used in construction, power and price.

There are no "distinctive features" on Palmer-Singer cars. Every detail and part has been tried out, and after a careful examination of the imported and domestic cars we have taken the best parts of each and embodied them in the Palmer-Singer. Nickel steel is used for the front axle, steering connections, driving shaft and driving axles, also the gears. F. & S. annular ball bearings are used throughout. The radiator is of the honeycomb type—one of the most expensive and efficient on the market. The motors in each model conform to the most approved form of construction and the workmanship and finish cannot be excelled.

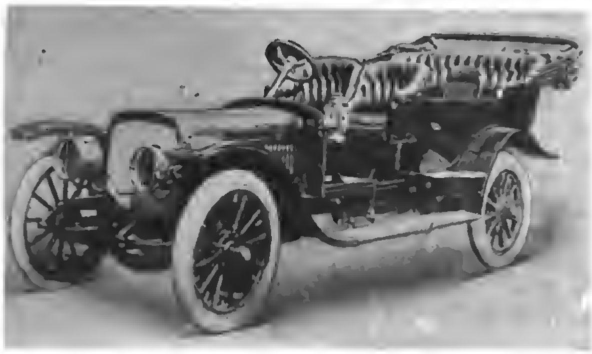
We call particular attention to the power of Palmer-Singer cars. By power we do not mean speed, although we have that too. In touring, power is invaluable and with a four-speed transmission, with which all Palmer-Singer cars are fitted, the combination is ideal. Some owners of three-speed cars do not object to climbing a hill or going over a sandy road on second speed, but the general public is becoming educated and is beginning to appreciate the comfort of a fourth speed, using third for city driving and rough country work.

At the price at which they are sold, Palmer-Singer cars cannot be excelled; in fact, our smallest model at $2,150 compares favorably with any car on the market selling at $3,000 or over, and our six-cylinder model at $3,500 cannot be duplicated for $6,000. In closing, "see for yourself" and do not be misled by clever salesmen.

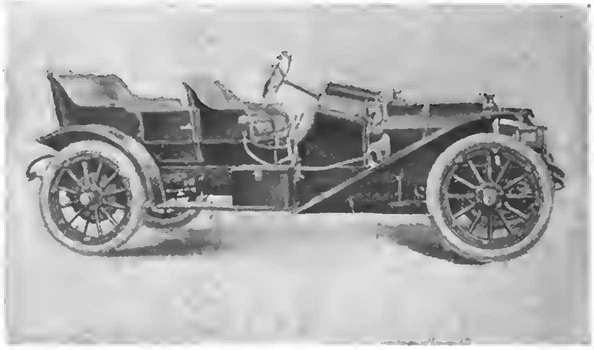


Locomobile Model L Baby Tonneau

Locomobile Model I Limousine



Lozier Six-Cylinder Touring Car



Mercer Model B Toy Tonneau Body

PIERCE-ARROW: R. O. Patten, Sales Department—The unrivaled Pierce-Arrow factory assures the purchaser a product in keeping with all that the best materials and brains can produce. Six-cylinder motors alone are produced, each identically the same excepting dimensions. Careful inspection of raw materials, again, as a finished part, and in the completed vehicle, means that every car is uniform in its perfection, performance, and durability under any and all conditions as proven by a succession of victories in the Glidden and Hower tours.

Able designing and intelligent distribution of weight, combined with the flexibility of six cylinders and the possibilities of lightness, give large tire mileage and long life to the mechanism.

The employment of cast aluminum for body material in every model is a safety factor, combining the elements of lightness and great strength. Individuality and detail are pronounced in the Pierce-Arrow in color and equipment, an art department having been created for that purpose.

Automatic oiling system, with ability to know at all times the available supply, continuous and positive to all bearings, prevents any part from suffering for lack of lubricant distribution.

Dealers' organization in case of any necessity while touring affords prompt and efficient relief at all times.

Three horsepowers and many standard bodies allow a wide range of selection of open and enclosed cars, each combining the most modern and accepted principles of sound engineering design, with ever in mind the comfort of passengers, ease and safety of control, and at the same time, producing a car of beauty as well as unfailing utility.

Nine years of experience with one end in view—the perfect car.

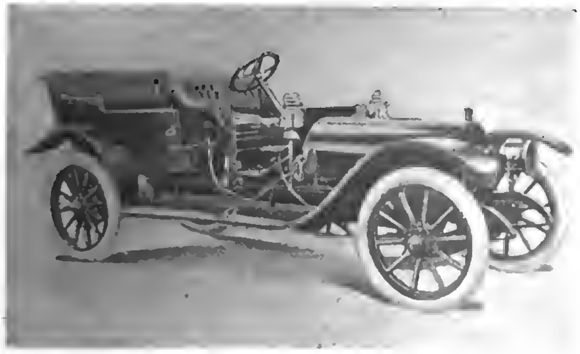
POPE-HARTFORD: H. A. Linehard, Assistant Secretary—The tremendous stimulus to inventive and mechanical genius has developed automobiles which at the price of $2,750 approximate in quality and performance other cars selling at much higher prices. The Pope-Hartford, a conspicuous representative of this class, is a large, handsome car of unusual power, smooth-running qualities and remarkable flexibility. It is reliable, comfortable, a great hill climber, and possesses speed far beyond normal requirements.

Moreover, it is strictly a 1910 car in every respect—not the 1909 car "with refinements." The new lubricating system, giving 750 miles or more with one filling, the remarkably ingenious and effective torque and radius rods, and other distinctive Pope-Hartford features stamp it as a car modern to the highest degree.

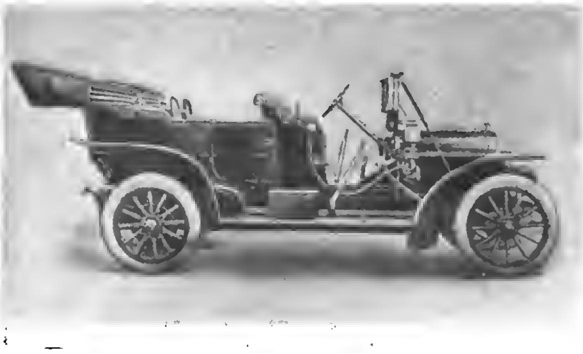
Here is a car of good wheelbase, with a large, handsome body of the latest, straight-line effect, seating comfortably five passengers, and whose engine of 40-horsepower is powerful and flexible enough for every purpose, whether for touring, city use, or racing. A car that can climb stiff grades on the high gear and, as regularly equipped for pleasure driving, is capable of speed over 60 miles an hour on the level.

It long ago proved itself the best hill-climber in its class, and this year a regular stock chassis car made the best time ever made in this country in a long-distance race. It can maintain reliably all day long, up hill and over rough roads with the engine working smoothly and normally, a speed as fast as it is wise or comfortable to travel. In appearance, it is the equal of any car, while in finish and quality of upholstery it could not be excelled.

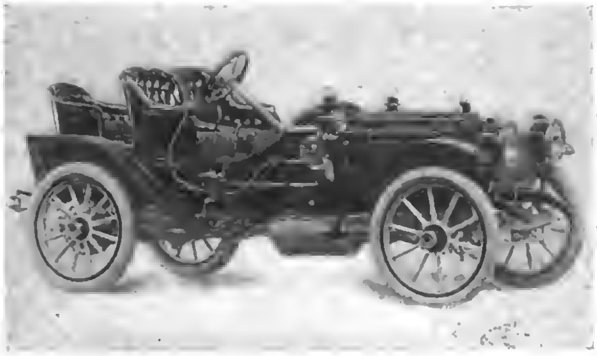
Be it particularly noted that the Pope-Hartford is the selection



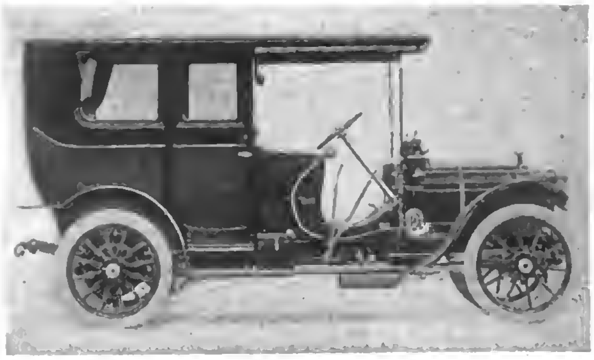
Matheson Model M Six-Cylinder Touring



Matheson Four-Cylinder Seven-Passenger



Packard "18" Four-Cylinder Runabout



Packard "30" With Limousine Body

of owners whose purse has not limited them to the price of $2,750, but whose investigations have led them to know that in all essential requisites the car is the equal of cars costing in some instances nearly twice as much.

ROYAL TOURIST: Hobart M. Adams, Advertising Department—I believe that the purchaser of an automobile should demand that the best of materials as well as the very highest grade of workmanship should be employed on every part of his machine. The other points to be considered are: The motor, the economy of the carbureter, the balance and easy riding qualities of the car, the cost of up-keep, which also includes the possibility of tire trouble. Next come brakes—upon their efficiency depend both life and money.

The day when a motorist confines his driving to city pavements and macadam roads has long ago been relegated to the past. For this reason the present day automobile to be of any great value to its owner must have that durability which only comes from the best material, the highest grade of workmanship and the maximum of motor efficiency.

In the Royal Tourist motor, we believe we have attained the ideal in point of strength and workmanship. After much study we have installed a carburetion system which continued tests have proven the most economical. As to ease of riding, we have demonstrated to the most skeptical that our system of spring suspension, as well as the manner in which the car is balanced, insures to the passengers the maximum of comfort.

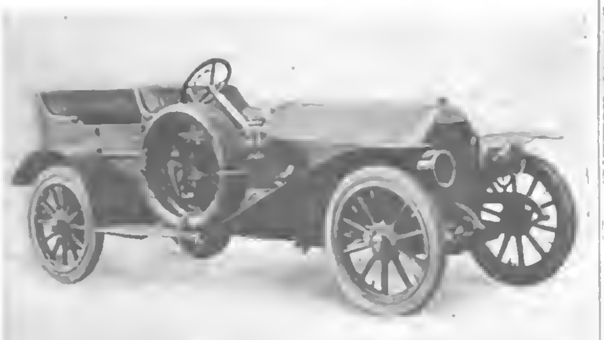
In fact, in the 1910 Royal Tourist we are confident that we have so carefully considered all details that we are ready to make any kind of demonstration that any kind of high-grade car would be called upon to perform. While the Royal is built with the greatest care by the best workmen it is possible to secure, we have also produced a car that the average motorist, with a little study can master—because we have built a car, which, after all, is simply constructed.

SIMPLEX: John G. Dale—A feature which is very important as well as interesting to the prospective buyer, is the fact that our Simplex cars are made in New York City, where any necessary repairs can be promptly made and an abundance of spare parts always on hand. Also, that the material used in the car is not found in any other make of American car, being Krupp chrome nickel steel, which makes it necessary for us to import this material from Germany.

Another strong argument in its favor is the speed and reliability of the car, which has been proven time and time again in road races, 24-hour endurance contests and hill climbs. Although an intending purchaser may not at all be interested in racing, still a favorable impression must have been made by the fact that the Simplex car won in 1909 every speed and endurance contest in which it was entered by this company, showing without any doubt the dependability of the car. In fact to win three consecutive road and 24-hour races is a feat which has never before been accomplished by any make of car, whether foreign or American.

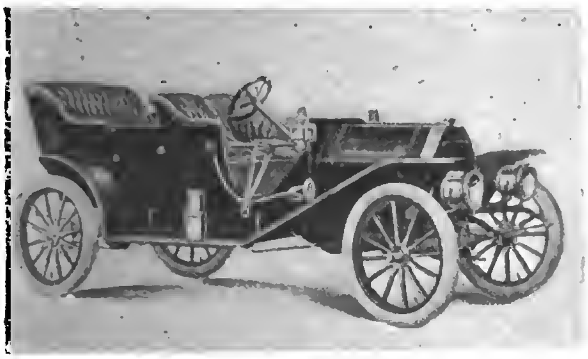
Our final argument would be a reference to all of our customers, which is the best advertisement that any concern may ever expect.

STEARNS: Roy F. York, Vice-President—Long life, easy riding qualities, minimum weight commensurate with power de-

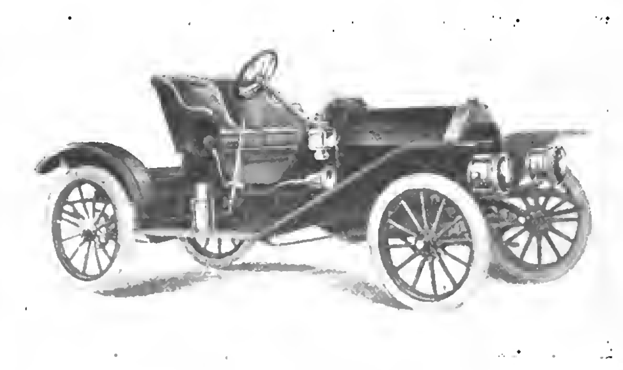


Palmer-Singer Six-Cylinder Touring

Peerless Model 27 Four-Cylinder



Overland Model 42 Touring Car



Overland Model 38 Runabout

veloped and the quality of materials used in the construction of Stearns motor cars are among the most urgent reasons for the purchase of machines of this make.

The long experience of the F. B. Stearns Company—1896 to 1910—coupled with the fact that yearly models are no longer placed on the market, safeguards the purchaser. No Stearns model has ever been withdrawn from the market—a sure guarantee that design and construction are absolutely correct to the minutest detail, and have been from the first.

In buying a Stearns, the purchaser has the satisfaction of knowing that he is securing a car capable of extreme speed when desired—attested by the many records made by Stearns cars in the past ten years. Although the F. B. Stearns Company has never built a racing car in any sense of the word, many records made years ago have withstood all efforts to break them. For over two years our company has refused to enter contests, being followed in this by many leading manufacturers, yet scarcely a month passes that contests are not won by Stearns owners driving their own cars.

In the construction of Stearns cars, the factor of safety has always been of the utmost consideration. It is the belief of our engineers and designers that a motor vehicle should be as safe as possible, regardless of expense of materials or additional cost of workmanship. The Stearns steering gear has often been called "the safest in the world" and not without reason. In driving at high speeds, the life and safety of the occupants of an automobile are absolutely dependent upon the reliability of the steering mechanism, and flaws or weaknesses, either in design or construction of the machine, can well place the lives of those in the car in jeopardy. For this reason the aim has been to render the car as safe at a 65-mile-an-hour speed as at ten.

STEVENS-DURYEA: A. W. Barber—With most of the characteristic features in the design of Stevens-Duryea motor cars motorists are already thoroughly familiar, and it only remains, therefore, to draw special attention to some of the time-tried details of construction for which the Stevens-Duryea Company has an enviable reputation.

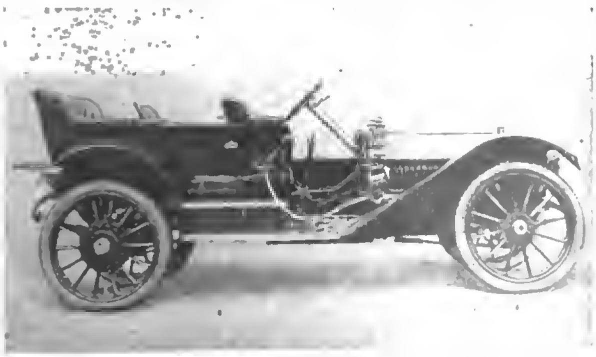
Accessibility not only covering the operating levers, but the component parts of the chassis as well, clearly shows the attention that the engineers have given to the entire car.

The unit power plant, supported on three points, allows for a most compact construction of the motor, clutch and transmission, there being not one section of the unit which cannot be inspected or removed without disturbing body or dash.

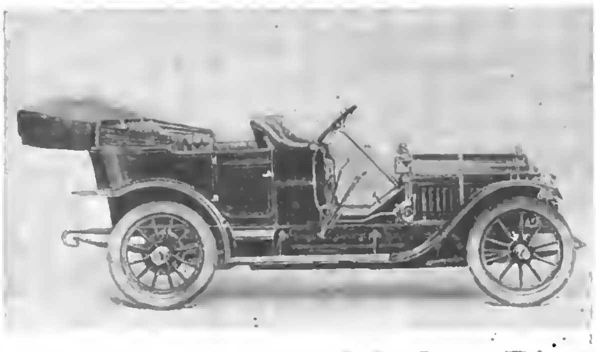
Motor section has an exclusive feature, the removal of one or all pistons without removing the cylinders, crankshaft, or breaking the water or oil connections. By simply removing the lower half of the crankcase the pistons may be withdrawn for inspection or cleaning.

The clutch, which is of multiple disc type running without oil, is of unit construction, directly at the rear of the engine. This clutch has proven eminently successful in all touring cars since 1904, not only because of its simplicity of design and ease of operation, but also due to smoothness with which it applies power of engine to rear construction.

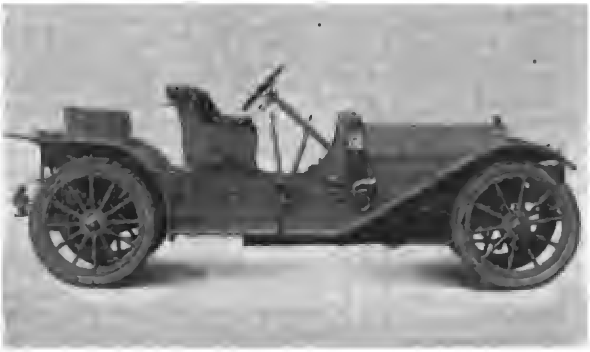
Removal of complete clutch does not necessitate the loosening or displacement of a single nut or bolt of power plant, excepting the aluminum cover and connection with engine and transmission.



Oldsmobile Limited Six-Cylinder



Pope-Hartford Model T Touring



Pierce-Arrow 6-36 Runabout

Pierce-Arrow 6-66 Touring Car

A transmission of the sliding gear type in simpler form could not be incorporated in any motor car. The case is cast without the usual central horizontal division, making it absolutely oil tight, only a cover plate attached by three thumb nuts has to be removed to allow the entire gearing to be inspected, while a complete removal of gears, shafts and bearings may be accomplished by removing oil retaining caps and withdrawing the parts through large opening at top.

Clutch and transmission are directly below the front-seat floor boards. This very accessible location is appreciated as it affords the possibility of a thorough inspection and ease of oiling, so much desired by the tourist.

As a detail in refinement, the keyless construction of the entire drive line is representative of the very highest engineering skill. This emphatic statement is worthy of careful consideration, as this structural feature is exclusive and found only in Stevens-Duryea motor cars. The design used is a series of squares and taper squares at connecting points, making a drive line that runs perfectly true and adding a marked degree of ease in the removal or replacement of a section.

A vibrationless power plant with a wonderful degree of flexibility and power at all speeds, mechanically correct in its design of mounting in chassis frame, has been standardized in all Stevens-Duryea motor cars.

The unit power plant, multiple disc clutch and shaft drive are milestones in motor-car history, and to these features the Stevens-Duryea Company points with enthusiasm, as original with and successfully marketed by them since 1904.

Even a casual glance at the entire line of cars for 1910 boldly brings out the fact that scientific design is synonymous with the name of Stevens-Duryea.

THOMAS: E. R. Thomas, President—Aside from the old reliable Thomas Flyer, which won the New York-Paris race, with which everybody is familiar, we have three other types of cars, known as the Thomas 6-70 Flyer, or Big Six; the new 6-40, Long-Stroke Flyer Model "M," and the Town car.

Each of these models has its strong features, for instance, if I were a man who wanted a large car, I would buy the 6-70 Flyer, because it is the largest, most luxurious, most powerful, easiest riding, most completely equipped automobile constructed.

It is, therefore, in a class by itself—it has no competitor.

On account of the wonderful flexibility of its six-cylinder motor and its excessive power, it is not necessary to "rush" hills or travel fast over bad stretches of road.

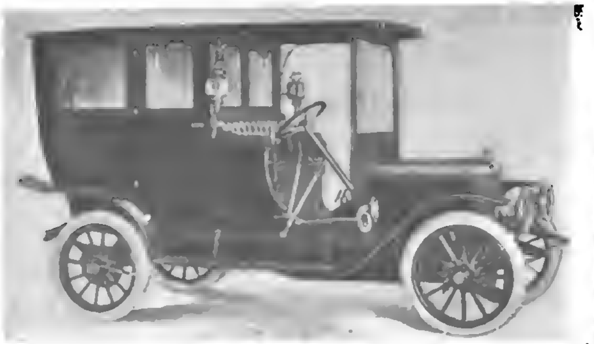
Due to its long wheelbase and splendid spring suspension, this car rides over the worst roads and hills without discomfort.

Then, too, it is possible to travel a greater distance in a day's run, because being a powerful car you avoid the frequent necessity of slowing down to change gears. This car will take almost any hill on high gear.

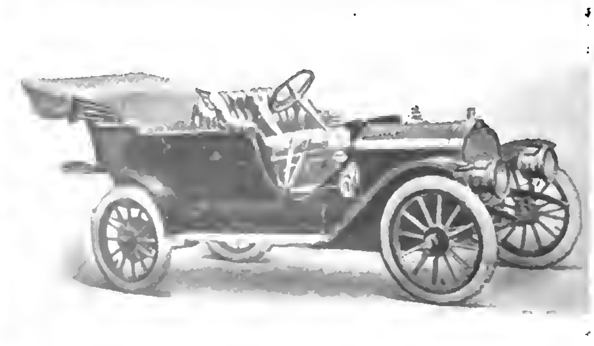
Except for its reserve power, caused by the addition of two cylinders, it is practically the mechanical duplicate of the car that won the 22,000-mile endurance contest around the world with which everybody is familiar.

I think the winning of that event proved that the Thomas Flyer was reliable.

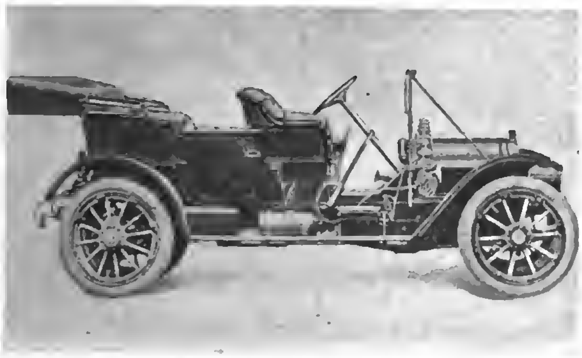
Its price of $6,000 include a complete equipment, including a top, glass front and every accessory that the average owner needs.

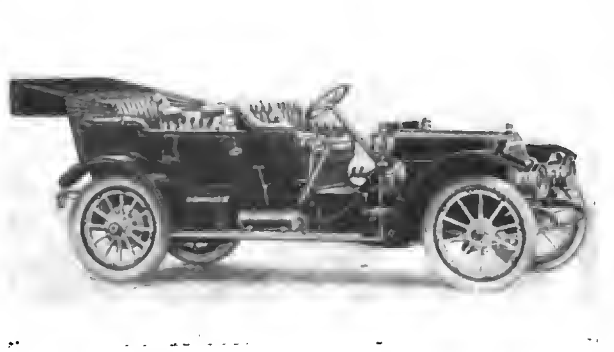


Selden Model 29 Limousine Body



Selden Model 35 Touring Car


Stearns 15-30 Four-Cylinder Touring Car


Stearns 30-60 Four-Cylinder Touring Car

The new 6-40 "Long-Stroke" Flyer is the best buy on the market for the man of moderate means for three reasons.

First, while it is rated at 40, it actually develops 60 on test, so you can see that it has plenty of power for its weight.

Its six-cylinder long-stroke motor has a flexibility which is wonderful. You can run from two to sixty miles an hour on high gear, and that's something which I think no other car can do.

The price of $3,500 includes nearly $500 worth of equipment, consisting of a beautiful silk mohair top, folding glass front, speedometer, shock absorbers, acetylene headlights, oil side and tail lamps, horn, robe rail, tire irons, Prestolite tank, and a complete set of tools, not to mention the tire equipment which is larger than that used on a great many cars of greater weight and higher price.

WHITE: Windsor T. White, President—The design of the White gasoline car is at least one year in advance of any other American machine. At the recent automobile show in London the White was classed with five or six of the leading foreign makes as being of the most advanced design among the cars exhibited. The White is the only American car which has the true "long-stroke" motor and is the only American car wherein the intake and exhaust passages are contained within the engine casting. The "long-stroke" motor is being adopted by the leading foreign builders, as it has been settled beyond all question that a "long-stroke" motor gives increased power, increased efficiency, and far better fuel economy.

There are many advantages of including the intake and exhaust passages within the engine casting. First of all, the design is greatly simplified and this construction gives an unusually neat appearing engine, for the reason that there are no external manifolds.

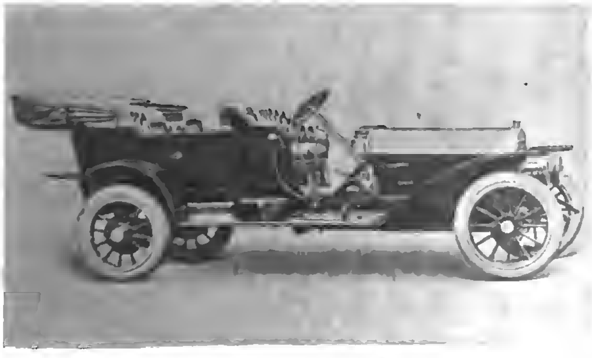
There is but a single intake pipe leading from the carbureter to the engine, and but a single exhaust pipe leading from the engine. The intake gases are heated while on their way through these passages to the cylinders, with the result that there is no condensation of the charge, and, therefere, every particle of fuel is used efficiently.

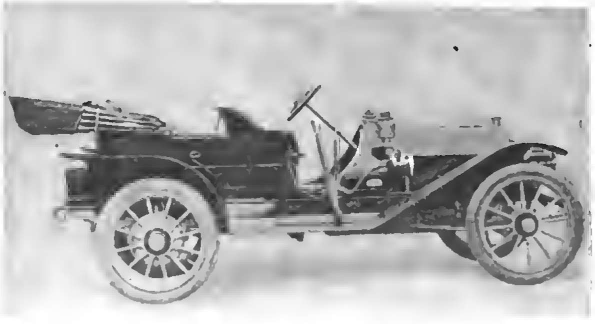
Exhaust passages within the engine casting are surrounded by water-jackets, with the result that the exhaust gases are cooled as soon as they issue from the cylinders, and there is, therefore, a considerable reduction in their pressure. This reduction of back pressure is another factor which tends toward unusual economy and efficiency.

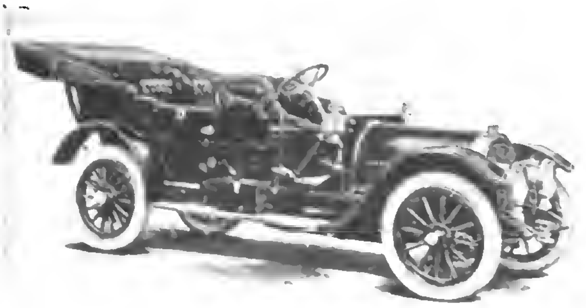
Another feature in which the White differs from all other American cars of moderate price and moderate power, is that it has a four-speed transmission with direct drive on the third. The third gear is utilized for running around town and for the average touring conditions, while the fourth speed is used whenever conditions permit of very fast running.

These two purposes cannot be properly combined in a single gear and the attempt to make a third gear answer for both moderate speed and for very high speed is not good engineering and has not proven satisfactory.

The materials used in the White car are the best which money can buy. For many of the materials used we pay just twice what is ordinarily paid for materials entering into cars of moderate size and moderate price.


Stevens-Duryea Model Y Six-Cylinder


Stevens-Duryea Model XXX Four-Cylinder



Royal Tourist Four-Cylinder Touring

Studebaker-Garford Model G-7 Limousine

WINTON: Charles W. Churchill, Sales Manager—Among the reasons why a prospective purchaser should decide upon the Winton Six rather than any other car are:

It is a six-cylinder car, the type now ranking as highest in motor car construction.

Its motor starts from the seat without cranking, thereby obviating physical labor of an objectionable and sometimes embarrassing kind.

Its cost of up-keep has proved it to be the most economical car to maintain.

Its purchase price more nearly represents actual physical value than does the price of any other high-quality car on the market.

TOO LATE FOR REGULAR ARRANGEMENT

CHALMERS-DETROIT: Carl H. Page, Metropolitan Selling Agent—The 1910 models of the Chalmers-Detroit cars require little, if any, explanation. We have nothing to defend because nothing untried; nothing to argue about because no theories to advance. A year ago perhaps the situation was a little different. Then we were announcing a revolutionary innovation in automobile making—a strictly high-grade, five-passenger car for fifteen hundred dollars. The value we claimed for this car at the price above was enough to insure that the car would be given the most careful scrutiny by the public and the trade. The unusual value offered, taken with certain features of construction new to this country, gave rival manufacturers and dealers an opportunity for adverse criticism—an opportunity which many embraced and held.

A two-bearing crankshaft, cylinders cast *en bloc*, the unit power plant, one-pedal control, ball-bearing construction—all came in for bitter attack. They said we had a theoretical car that could not make good. Now after watching it in use by owners all over the country—after reading the marvelous records for speed and endurance it has set after all kinds of contests for a year—everybody is forced to admit that if it was a theoretical car from the beginning, then the theory must have been right, for no car in use has given more complete satisfaction.

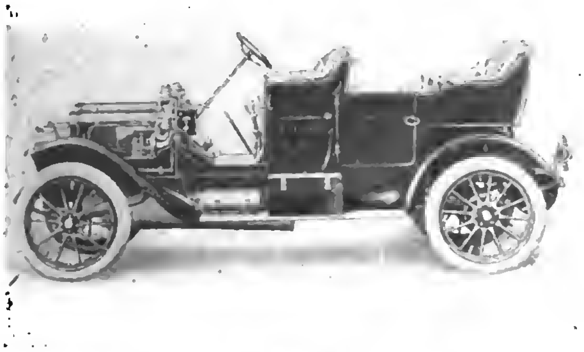
Greatest among the things we or anyone can say about any car we might build is simply that "it is a Chalmers-Detroit." That name means more than any single feature—more than any one part—more than any argument or opinion. It is the sum total of all the good points—it is the stamp of genuineness—a badge of merit and superior excellence.

For 1910, the general policy of the Chalmers-Detroit Motor Company is unchanged. It has been our policy always to give the greatest motor car value for the price asked. We do not want any prospective buyer of an automobile to believe these things merely because we say them—make your own investigations. If you do not know, yourself, ask someone who does. The more a man knows about automobile construction, the easier it is for us to sell him a Chalmers-Detroit car. "The utmost value at the price" is our ambition, and we let Chalmers-Detroit owners say whether we realize it.

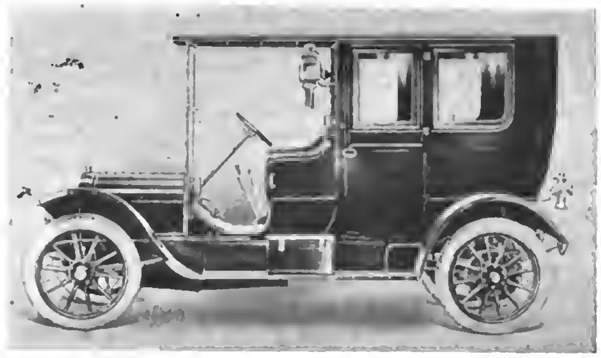
MATHESON: C. W. Matheson, President, Matheson Automobile Company—Almost every Matheson customer has previously owned one or more automobiles of other manufacture. The percentage of Matheson customers having previously

Thomas Flyer Model M Six-Cylinder Touring

Winton Model 48 Six-Cylinder Touring



White Model O-O Steamer Touring Body



White Model G-B Gasoline Limousine

owned other cars was so large, that we undertook to determine, if possible, how many Matheson owners had ever changed to any other car after purchasing a Matheson, with the following results: Out of all the returns received from customers who had bought Matheson cars as far back as 1905, only two had ever changed to any other car; one expressed regret for having made the change and the second changed back to the Matheson again this season after having driven one season with another car. Over 90% of Matheson owners have previously owned other cars. The above facts indicate a degree of reliability in Matheson construction which apparently was not equalled by any other make of cars which our customers had previously owned.

Further statistics gathered from Matheson owners resulted in the following showing: Average mileage per car, 12,840 miles; average repair expense per 12,840 miles, $36.41; average miles per original set of tires, 4,086, and average miles per gallon of gasoline, 11 miles.

The average prospective customer readily understands the meaning of the above records.

Finally we sum up our claims when we publish in our catalogue that the 1910 Matheson Six is guaranteed to be better constructed, swifter, more economical in fuel consumption and tire wear, more comfortable and to have more thoroughly mechanical and approved features of design than any other six-cylinder car on the market, European or American, at any price.

Three thousand dollars buys the Matheson Six and $5,000 buys the Matheson Four, both cars being the most indestructible cars of their respective types on the market according to our claims and guaranty, and according to the freely-given testimony of our hundreds upon hundreds of satisfied customers.

SELDEN: Charles Van Horne, Sales Manager—When George B. Selden built his first automobile and secured from the Government his famous Patent No. 549,160, he offered the world the best the times afforded; it was a practical working automobile, but it was in advance of the age; people were not ready for it; capitalists whom he tried to interest in the business thought him visionary, chimerical, impractical, a dreamer.

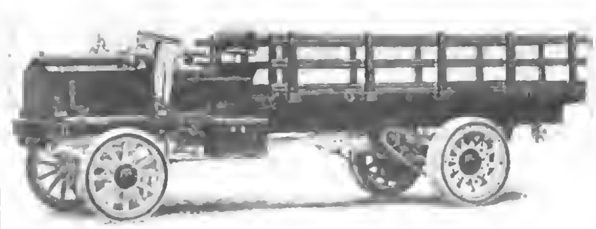
Yet the car built at that time was really the prototype of the car built to-day, just as the first locomotive that pulled a train was the prototype of the modern giant of the rails, but it took time, counted by years, to improve and refine it and standardize its lines.

Of later years the car, most carefully designed by Mr. Selden, with the aid of a corps of expert engineers, after years of further experimentation and study, was as vastly superior to the earlier type as the modern locomotive is superior to Stephenson's primitive engine of 1814. And the analogy is plain and true.

In both cases the earlier creations ran all right, but not as they run to-day. In both cases the essential principles were there, but the improvements and refinements were evolved only with the advance of time. It is perfectly fair to presume that if Elias Howe were now alive and in vigorous health, and at the head of a sewing machine manufactory, he would certainly see that no competing machine could be built better, or embody more good features and improvements than his.

It is in this position that Mr. Selden is placed to-day, when many other good cars are being made by licensees under the

Autocar Model XXI Two-Cylinder Commercial Car



Packard Three-Ton Truck with Platform Body

Selden patent and sold in active but friendly competition, his pride alone in his pet creation, to say nothing of his commercial interests, would make it unnatural and impossible for him to father anything inferior in mechanical features or quality.

This is the spirit which animates his entire factory and selling organization. And it is all so fundamental and so forceful in its logic as to constitute, in my judgment, the best possible reason why the public should have every confidence in and buy the Selden car. There are a great many good reasons why people should buy the Selden car, and this is the reason there are so many good reasons.

COMMERCIAL CARS

ALDEN-SAMPSON: P. H. Breed, Chief Engineer—During the comparatively short time since the Alden Sampson Manufacturing Company, of Pittsfield, Mass., developed and placed one of its four-ton trucks under test in their Motor Transportation Company in Boston, the trucks have excited a tremendous interest among our industries, whose engineers saw at once that here was a truck which embodied ideas and points in design neglected in others, and which seemed to have been designed with the idea that a truck, though doing rough, heavy work, was yet necessarily a machine of fine parts and fine materials, which ought to be protected in their workings to insure economy.

Considering the short time since its development the sales have been most gratifying and the interest shown through inquiries is constantly increasing.

The few points of design and workmanship outlined below will show that the effort to build the best and to greatest advantage of the user is always of universal interest. The engine is of 5-in. bore by 5½-in. stroke, and is governed to run at about 925 r.p.m. It is designed and built by the Alden Sampson Manufacturing Co. especially for truck severity, its main bearings, 2⅛ in. by 4¼ in. and 2⅛ in. by 5¼ in., give an idea of the general design and show that nothing but an engine designed and built especially for truck work will stand.

Other features noted in the engine are thermo-siphon water circulation with 2½-in. pipes, forced oil system through crankshaft, large inspection doors and magneto ignition. A large, lubricated, box-type of universal joint with auxiliary bearing surface for the blocks (patent applied for) transmits the torque of the engine to the transmission case.

This transmission is designed and built especially for the truck, has gears of 4 pitch and about 2-in. face, and the shafts run on Hess-Bright ball bearings, transmitting through hardened 3-pitch bevel gears to the spur gear differential, thence through floating side shafts and roller chains to the rear wheels.

The differential is provided with a simple interlock, which enables its operator to lock both wheels together thus avoiding difficulty if one wheel loses traction or a chain should break.

The chains are enclosed in oiltight, sheet steel cases, which act also as distance members and brake torque supporters, and which insure a continual high efficiency and long life to this most important part of a truck's mechanism.

As the chain case fits down to the small diameter of the hubs, the wheels are built on false hubs, which allow them to be removed without disturbing chain or chain case.

The frame is either reinforced channel section or pressed steel and is hot riveted throughout. Axles are drop forged, of I-section, and carry plain wheel bearings of bronze in steel, the most reliable wheel bearing ever used and of highest efficiency. Every part of the "Sampson" truck is designed and built at the factory of the Alden Sampson Manufacturing Co., and built to jigs and fixtures which guarantee every piece interchangeable.

GENERAL VEHICLE: C. W. Squires, Jr., Sales Department—Of the total number of commercial electric vehicles in use the General Vehicle Company have manufactured over 1,600.

These vehicles embody the adoption of all the valuable features that make for reliability, economy, durability, general excellence in simplicity of design, and highest class workmanship and materials. The rejection of hundreds of ideas that have been found impracticable, or that for any reason would in some detail have reduced the value of the machine to its owner, is best evidenced by the readiness of the General Vehicle Company to give to its customers a guarantee contract limiting the annual cost of upkeep for a period of years within a fixed sum; thus eliminating at once all uncertainty on the part of the owner as to the cost of maintenance of tires, wheels, bearings, steering gear, controller, motor and battery.

There is a growing appreciation of the economic value of the cardinal features of excellence of the electric commercial vehicles of the General Vehicle Company. These salient points are the one motor drive, roller bearings, enlarged battery capacity, and a conservative rating based on a liberal factor of safety throughout all details of the vehicle.

The combination of these features results in a marked reduction in weight, an increased mileage per battery charge, reduced battery maintenance and not less than 50 per cent increase in efficiency over all electrics using two or more motors.

HEWITT: Edward R. Hewitt, President—We have been a long while in the commercial business and have had cars out on the road for four years and a half. In this time a vast amount of experience has been accumulated and the older cars have been carefully observed and their defects noted and corrected in the newer models. We have built cars, from the "light delivery" carrying 1,000 pounds up to the 10-ton truck, in six or seven models.

In all cases we have used the planetary gear with interlocking pedals, and have become assured of the fact that a control in this way is easier to drive and safer in operation in big cities than one controlled by means of a shifting gear box and clutch pedal. This arrangement enables the driver to have both hands on the steering wheel at all times, which is a matter of great importance in heavy cars which often requires considerable effort to control them.

In many cases customers wish to break in their horse drivers or other factory employees to drive the trucks. With this simple pedal control anyone can learn to drive the car in a few minutes, and we have large numbers of cars out which are operated by men who are not skilled automobile drivers. These cars are in most cases working fully as satisfactory as those in the charge of skilled men, especially when the cars are properly inspected on their return to the garage.

We can give our customers cost sheets of maintenance costs of all different types of cars, made out by our customers when the cars have not been in our control. We can refer prospective customers to many of the largest concerns in New York who have been using our cars for a considerable time and have given us repeat orders. This seems to be very good evidence of the value of the cars.

Our motors are constructed with specially large bearings and of very strong materials so that they show a minimum amount of wear, and the whole car is designed so that the maintenance costs will be reduced to the lowest possible point.

We have been pioneers in many of the newer improvements in commercial cars which have been adopted by nearly all our competitors, such as the block tires, the fixed spark with high-tension magneto, the radiator suspended on springs, etc. We can show fully as good gasoline economy with our planetary two-speed box as other manufacturers can show with three and four-speed boxes, thus proving the superiority of our motors. We are doing the same work with the small motor that other manufacturers are doing with the large motor, which means less expense in every way and less wear and tear on the car. Our greatest claim for our cars is the report from every user.

·Distinguishing · Features · Found · In · 1910 · Product ·

By Thos. J. Fay

PRODUCTION in quality will be on a solid basis in all probability, because, in an establishment devoted to production in a large way, the equipment must be on a high plane. For this reason the automobile plants in America have outstripped the foreign producers, the latter devoting themselves, principally, to the limited manufacture of automobiles, using a surfeit of cheap labor, however skilled, in lieu of precision of method, as dictated by automatic machine tools, jigs, fixtures and gauges.

Skilled labor is an absolute essential—and a well conducted establishment counts for much, but, nevertheless, if all facilities afforded depend upon manual labor, even of the highest type, which is not aided or guided by fixtures of precision, then the finished product will be a miscellaneous assortment so far as interchangeability is concerned. This latter much desired quality is absolutely impossible in any plant where men must lay out the work by hand and where they are unaided by appliances which insure accuracy.

This year marks the turning point in the history of American automobiles, and noiseless performance is now regarded as an absolute necessity. The average autoist, while wishing to possess a noiseless performer, merely because the noise is disagreeable, may possibly overlook the basic reasons for noiselessness as a desirable acquisition. Noise is the most certain indicator of lack of harmony as it reflects absence of perfect fit. There is no instrument of precision devised which will so quickly and accurately indicate absence of proper relation as will an ill-contrived arrangement which produces noise, even though it may work.

When noise is present, power is absorbed, and the energy so taken up is dissipated as heat and noise. The noise hurts the feelings of the owner of the car, but it is the heat which does the most damage to the parts. That the noise is a manifestation of a condition which does damage to the parts, is a matter, however, which should not be overlooked. Noise follows vibration, which in turn sets up stresses in the parts vibrated, and in fine, the life of the members may be measured in terms of vibratory value in a testing machine contrived for the purpose. It is now a well-established fact that the vibratory life of ordinary steel is alarmingly short, whereas the same value in the finest alloy products, now to be had, is not high enough to warrant the builder of automobiles to wholly disregard the consequences.

Silent Performance a Sign of Quality—In the successful struggle to avoid noise, the makers of 1910 automobiles have done more by way of introducing quality, than was ever managed in any other way and it has been necessary to concentrate effort on certain units in connection with well-defined parts in order that success might attend the effort. It has always been extremely difficult to make gears so that they will perform noiselessly. Broadly speaking, noise in gears has always been tolerated, and it was the claim of designers that this particular source of noise was not necessarily an indication of a short vibratory life of the parts. They were justified to some extent in this belief, on the ground that the noise was made by the clatter of the teeth in contact.

Unfortunately for such reasoning, the hammer blows, which resulted from this clatter of teeth, were transmitted to the section of metal in the members, and the vibratory ills resulting made it difficult to predict the length by normal life of the parts affected. However, it was fairly well understood that the depreciation was of a serious nature. Two or three years ago, when this phase of automobile building was concluded to be of serious import, it was observed that in painting the chassis, the painter was sometimes inclined to kill noise by allowing the paint to migrate into the bearing surfaces, and as a matter of fact, the painter's carelessness became the maker's method; paint served very well to kill noise, and it served a very good purpose in some of the earlier, indifferent efforts.

This information, together with experience and the improvement of methods, has enabled the high-class builder of automobiles to limit the painter to his legitimate zone of activ-

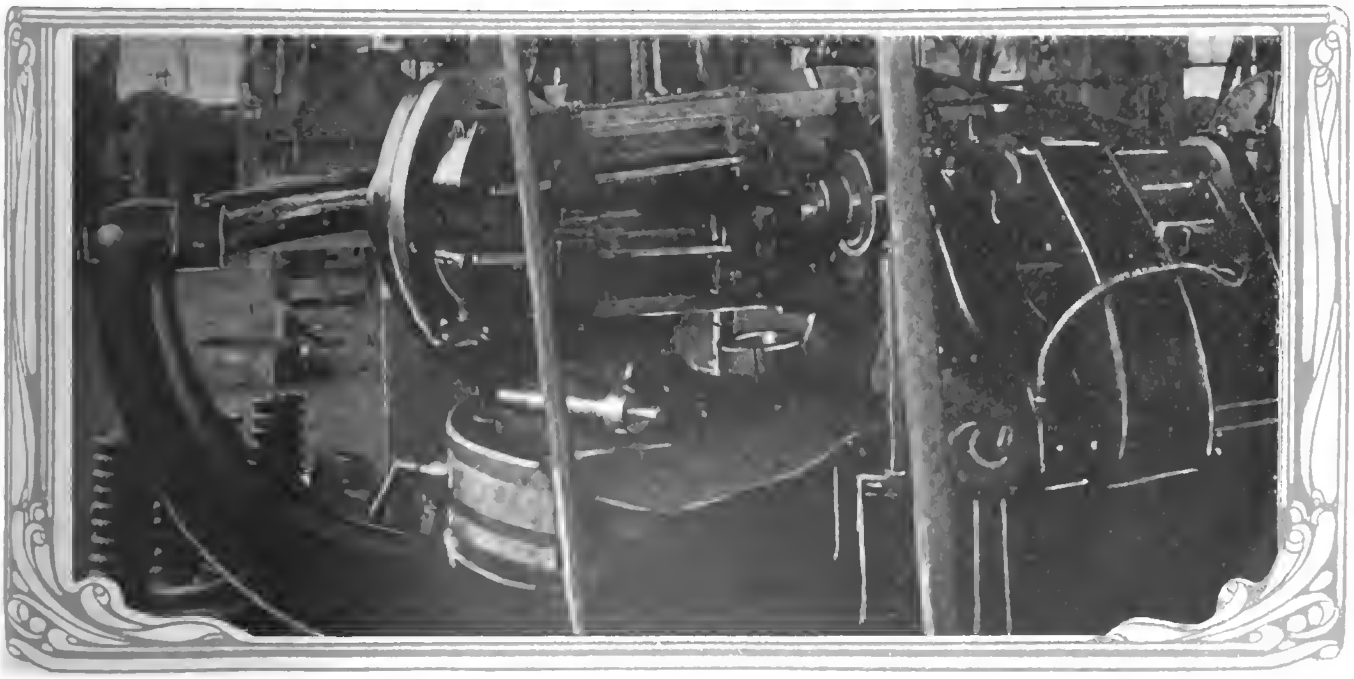


Fig. 1—Gleason planer, used in the Thomas and many other plants to produce noiseless bevel drives

Fig. 2—Fellows shaper, by means of which transmission gears are cut to exact size

ity, by the simple process of making parts so closely to size that noiseless performance is a normal expectation.

BEVEL GEARS

In the production of bevel gears of a 4:1 ratio, which is not uncommon, the gear must have a large number of teeth in order that the pinion will have enough teeth to conform to good practice. It would be the very best practice, were the pinion made with a minimum of 18 teeth, but a minimum of 14 teeth is the absolute limit. With 18 teeth and a 4:1 gear ratio, the gear would have 72 teeth, and would be over 15 inches in diameter were the teeth 5 pitch. In any event, the pitch must be fairly coarse and is frequently 4, whereas it is very rarely finer than 5. These limitations indicate that the gear wheel in the bevel drive must be relatively large in diameter, and designers have learned by experience that it is necessary to fashion them so that they will not deform, either in the machining process, in the planer or while being heat treated.

The first effort towards noiseless gears is made in the engineering office. Here the shape for noiselessness must be devised, and the materials for use selected, in view of the service to be rendered—also the process devised through which the gears are to be put, considering the facilities available in the shop in which they are made.

Bevel gears are in constant mesh, avoid clash and the resultant shock. Consequently they are usually made of die forging, cementing steel, in which it is the aim to limit the carbon content to that which will afford a soft dynamic core as the foundation, thus assuring desired service.

Repeated Annealings During Forging.—In the forging process, which, for the large bevel gear, may require three operations, it is the practice to anneal between operations, partly to save the dies, and finally, to prevent deformation in the after machining and treating processes. To be sure, however, that the gears will not hold internal strains, they are reannealed after sand blasting. This latter process quickly removes the oxided surfaces, and renders the final annealing process more effective. Pickling, which was the former preferred method of removing oxide, has been supplanted by the sand blast in this work, not only because the sand blast is quicker and less expensive, but also on account of the aid it gives the inspector, who, with a little experience, is enabled to locate at a glance blemishes in the metal if they are present.

After the sand blast and the inspection, the forgings are machined to exact size and then copper plated. The copper plating is of considerable depth, it having the facility of shielding the metal, excepting, where the copper is cut away, during the tooth-planing effort, so that in the cementing process only the surfaces which are necessarily to be hard are carbonized.

It has evidently been the experience of the makers who resort to this copper-plating process that gears are more likely to warp if they are carbonized on all surfaces, as is the case in the absence of copper plating. After cementing, considering the copper-plated gears, it has been found that they warp but slightly, and as to strength it would seem to be quite in accordance with the requirements. In this instance, the armor, which is entirely over the toothed surfaces, performs a dual operation, *i. e.*, rendering the surfaces glass hard, and so preventing abrasion and adding strength to the teeth to the extent they adhere to the body with greater tenacity than would be true in the absence of the hardening process.

Matching Up Done Afterwards—In some of the earlier efforts to attain noiselessness, the Packard Company, for illustration, introduced a measuring machine, and by a process of matching up, was enabled to pair off from 55 to 60 per cent. of all the gears made as coming within the standard represented as noiseless. The balance of the gears, while they were thoroughly good in every way, excepting as to this one difficulty, were discarded on the ground that noise was objectionable from too many points of view to be tolerated in Packard automobiles.

The companies which passed beyond the point where noisy gears will be tolerated in their product have introduced the finest types of gear shapers and planers, one of which is shown in Fig. 1. This is a Gleason planer, the photograph having been taken at the Thomas plant in Buffalo. In many of the practices the teeth are gashed in milling machines, or by a hobbing process before they are put in the Gleason planer, or the "builder and shaper." This latter machine is much used in many plants, and the idea of gashing is to "rough out" the excesses of metal in order that the precise tooth-forming machines may do their work with greater speed and unquestioned accuracy, and without damaging the tools, which are relatively delicate and rather high priced.

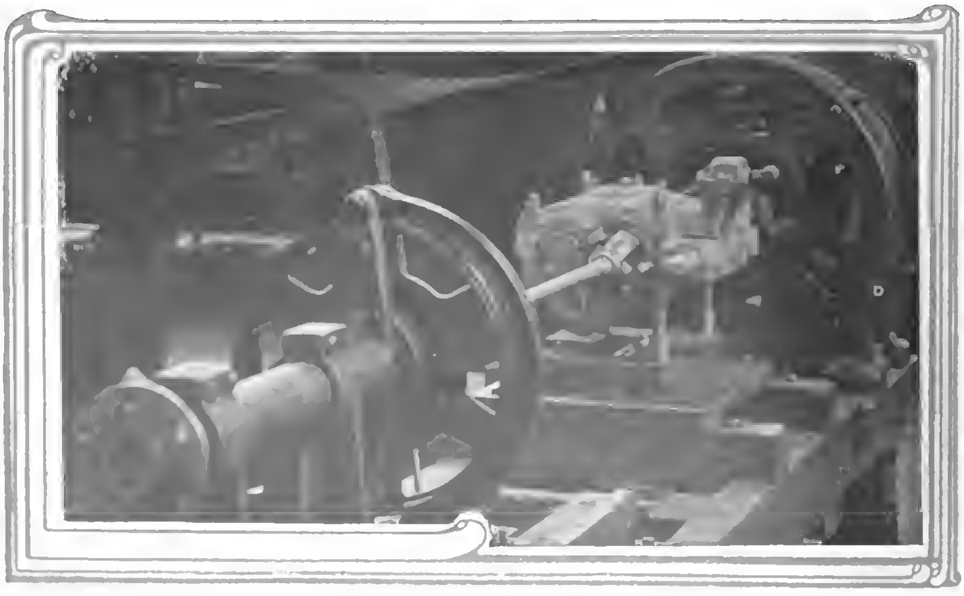


Fig. 3—Pierce-Arrow testing machine, used to load transmission gears to try them out

SQUARE CUT GEARS ARE ACCURATELY MADE

Fig. 2 shows a Fellows shaper working on sliding gears after they are machined to size, and before they are forwarded to heat treating and hardening process. This shaper represents a principle much in vogue—one capable of shaping the teeth to approximately the right theoretical contour. By a strictly shaping method, involving the process of cutting away progressively a little metal at a time, over the faces of the teeth, each tooth in succession being operated upon so that the final cut for the finished surface is the same over every tooth. In this process the shapes conform to theory very nearly.

After the teeth are cut, the gears are set up in a special machine devised for milling the wedge-like contour on the clashing ends; this work was formerly done by hand, but it is now universal practice in America to employ automatic contour milling machines because they reduce cost enormously, besides increasing quality perceptibly, since each tooth is in precise accord with the other—and also the amount of bearing surface of the meshing mates on the pitch line is increased considerably.

Fig. 3 shows how the Pierce-Arrow gear sets are tried out in a testing machine after the whole is assembled. Here the purpose is to first adjust the relations of the matting gears to noiselessness, thereafter ascertained through actual loading, if the system as a whole is strong and to determine the mechanical efficiency, thus proving that there are no undue losses, pinched bearings, or cramped parts, and sweet running qualities are normal expectations without undue care.

This testing equipment shows very clearly in the illustration, and in one way or another tests are made involving the same principle in the better class of plants, to prove out qualities of transmission gears and live rear axles.

Probably one of the distinct advances of recent times in automobile work lies in the fact that testing equipment is afforded, by means of which gears, shafts, and relating members are tested to the absolute limit of the work that will have to be done in practice, with the expectation that they will show competence. This competence, besides involving the use of excellent grades of materials, takes into account special methods of heat treatment and facilities such as Figs. 4 and 5 depict.

These precise methods are the result of accumulated knowledge, due to the effort of many advanced investigators, and in the absence of system it would be utterly impossible to maintain production and quality on the sufficiently high plane desired. This same system, to which all men must become slaves, if they partake of the method, emanates from a supreme and knowing head, ramifies in beaten paths, and is best appreciated when the product of the effort rolls silently away.

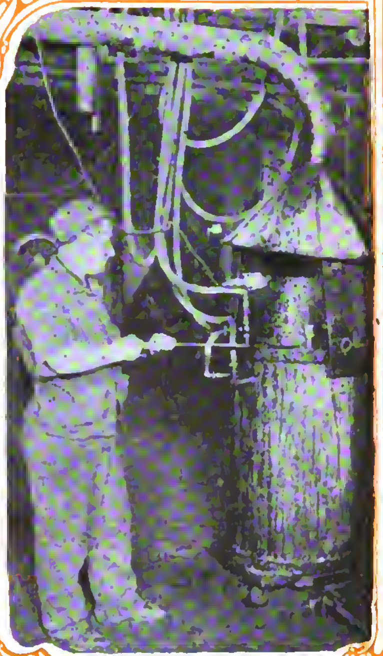


Fig. 5—In the Woods plant, showing one unit of the quenching equipment in which air is used to refrigerate and agitate

Fig. 6 represents a group of brains, brawn and equipment, laid out in a "schematic" sort of a way, with the expectation of accentuating the point to be made. In this group:

(A) Represents the executive head of the establishment, taken at the plant of the Warner Gear Company.

(B) Is the intercommunication system utilizing a central station telephone system.

(C) Represents the executive, stenographic and clerical forces, taken from actual life, at the Rambler plant, Kenosha.

(D) Is emblematical of the engineering office, showing a battery of designers in action at Warner gear plant under the direction of the chief engineer.

(E) Is a testing machine in the laboratory ascertaining the ability of steel to withstand alternate shock components. This view coming from the Woods Motor Vehicle Company, Chicago.

(F) Shows a large press in drop-forging work at the Rambler plant, Kenosha.

(G) Presents a roughing process in the manufacture of crankshafts as used in Excelsior motors.

(H) Shows grinding work in the establishment of the Woods Motor Vehicle Company, Chicago.

(I) Shows a hydraulic press as used in the Pierce-Arrow plant at Buffalo, in the production of high-grade wheels.

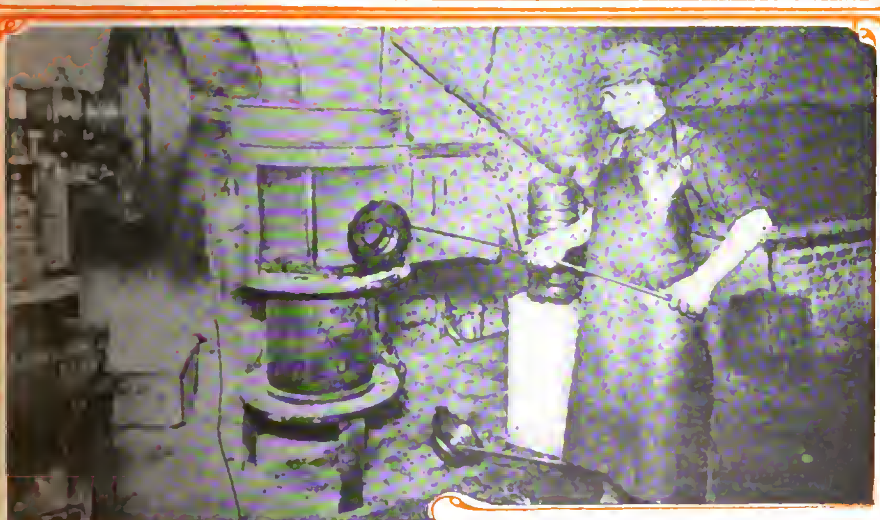


Fig. 4—A corner in the heat-treating department of the Woods plant, showing electric salt baths in the heating process

(J) Shows a disc fan, as manufactured in the McCord plant at Detroit, and, as will be observed, all blades, including the flanging portion, come from a single piece of sheet steel.

(K) Shows the woodwork complete of a wheel as used in a Pierce-Arrow car.

(L) Is a view of the assembling room at the Chalmers-Detroit plant.

(M) Depicts a testing machine with a transmission gear in place, the photograph of which was taken at the Thomas plant in Buffalo.

(N) Shows a special machine with a revolving platen, mounting a number of chucks around the periphery, and the work feeding down from a hopper, thus establishing a continuity of the operation, since the workman feeds the empty chucks during the tooling operations, and as one chuck is invariably in line with the tool, the work goes on uninterrupted.

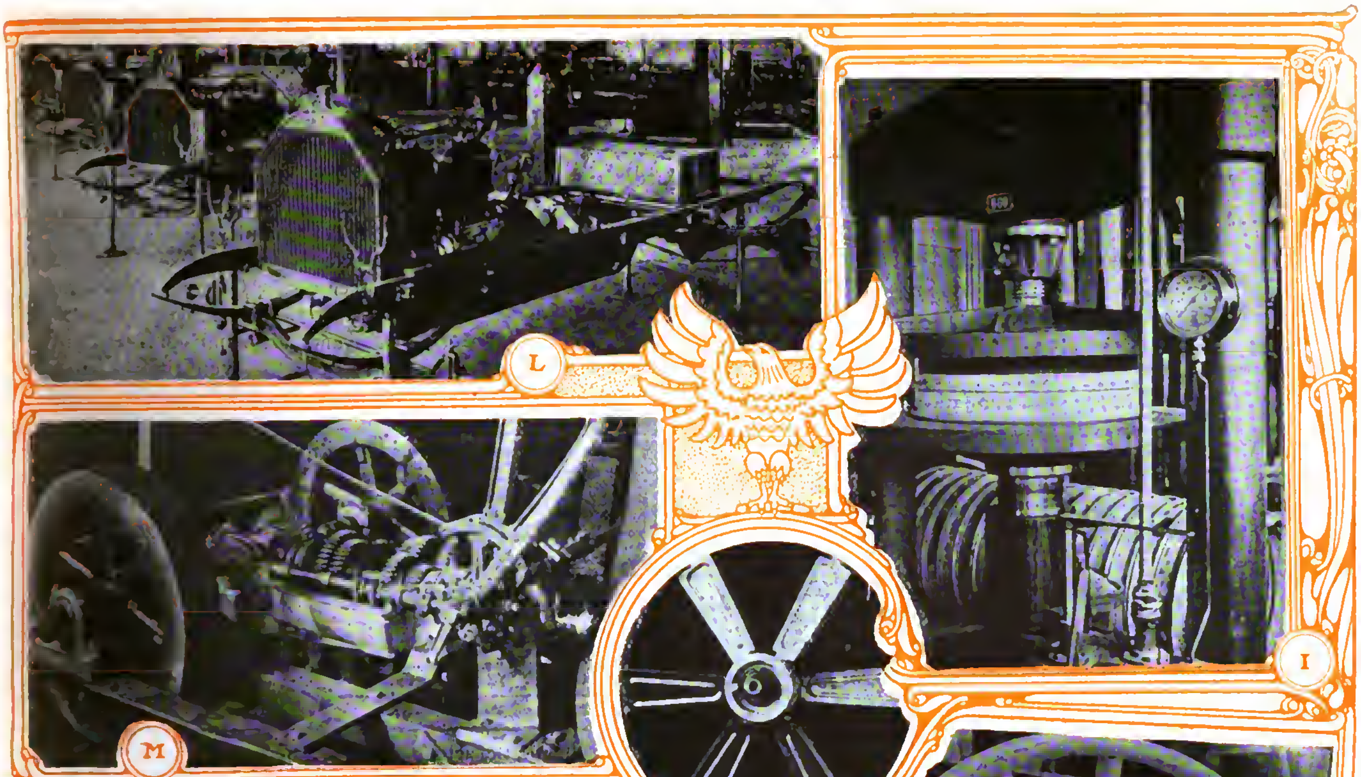
Fig. 5—A series of views clustered to autom

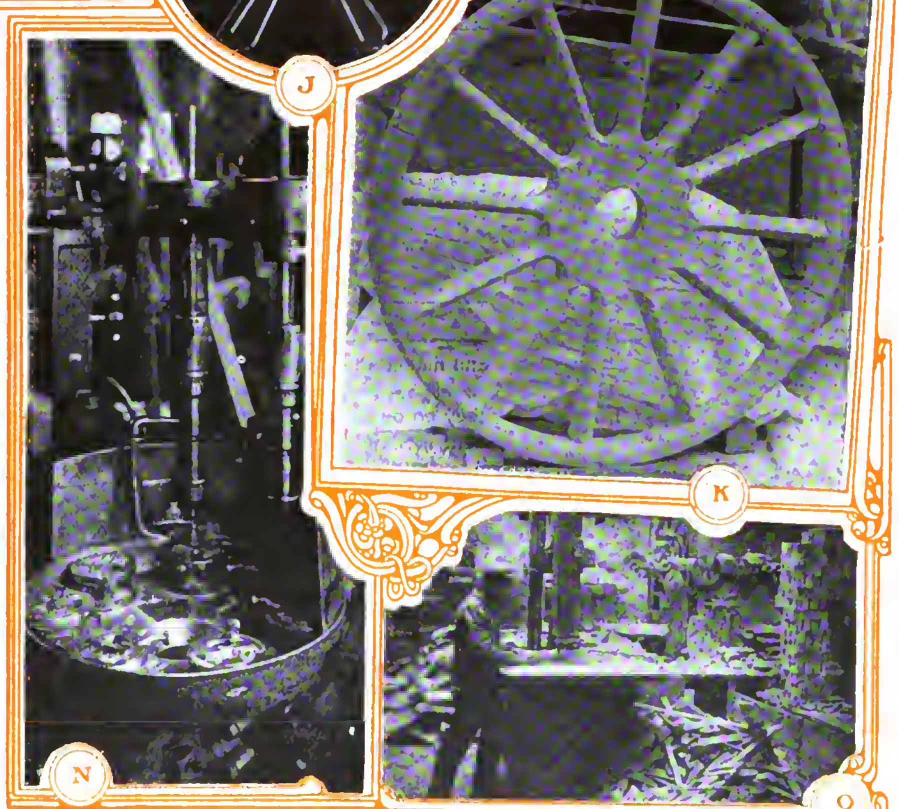
(O and P) Presents details in the process of making the woodwork of wheels, which was taken from foreign practice.

PRODUCTION

The grouping of the illustrations, as shown in Fig. 6, was made with the idea of indicating that there must be a definite connection between the executive head of the business office and the various production departments, in order that the manufactured product shall be representative of, and express the will of, the board of directors. From the executive head rapid methods of intercommunications are necessary, and in the larger plants in which system is regarded as of vital importance communication is direct:

(A) To the chief engineer, who directs the forces in the designing office, and in some cases directly to the production department. In other plants communication is back to the source of all authority. In the Cadillac plant, at Detroit, for illustration, no move of any importance is made excepting as voiced by the president of the company, after a conference is held in which all the principal departments have representation. In other plants, for example, Chalmers-Detroit, drawings are sent out from the designing department directly to the production department through H. E. Coffin, chief engineer. In the Regal plant this question of system is handled in quite a novel way, in that the general manager is in direct communication with every department at all times. In this plant a chief engineer ranks as chief of the designing staff, under the direction of the general manager, and, while he has charge of designing in all its phases, he is, nevertheless, limited to just these functions, and drawings are moved out only in accordance with instructions which emanate from the general manager's office. As an exception, certain routine matters are handled automatically. The system in the Regal plant works extremely well, and, in proceeding, everything is done on a basis of 100 cars, representing a lot going through at one time. Every operation necessary to the completion of 100 cars is made in unison, and, if there is a laggard anywhere, he is smoked out, for the simple reason that the lockstep is broken. At 10 o'clock every morning the executive head is in full possession of information relative to weak spots only. Things which progress on time do not have to be investigated.





Illustrate system in the production of
obiles

(B) In the process of production in the several shops, as a general rule, this important matter is under the head of some one man. The production superintendent, if such he may be called, generally takes instructions directly from the president or general manager, but in some plants the production head takes instructions directly from the chief engineer. At all events, there are very few, if any, automobile establishments which are run without the services of a production manager, whose duties are administrative, and to whom the superintendents or foremen of departments go to for instructions.

(C) In some plants the production manager has charge of the storeroom and warehouses, so that the foremen look to him also for materials with which to carry on the work. As a general rule, however, the materials come in through the action of a purchasing agent, who is in direct communication with the president or general manager. In such instances the storeroom has its own foreman, who works under the direction of a purchasing agent. The foremen in the shop, while they take their instructions through the production representative, go directly to the storeroom for materials, and, in the accounting system, a check is run against the production through the purchasing agent, he being in contact direct with the head storekeeper, and the president of the company, who has reports from the production manager, on the one hand, is able to compare them with reports bearing on the materials being utilized. This constitutes an excellent checking system.

(D) The heads of departments ranking as superintendents or foremen (depending upon the extent of establishments), while taking instructions, in some shops, through the production manager, sometimes receive their instructions directly from the chief engineer. The production head, in such cases, becomes, as it were, a clerk, merely recording from day to day the work done, just as the timekeeper keeps track of the time put in by the men.

(E) Inspectors usually work independently of the heads of departments, and report in some cases to the chief engineer, whereas in other plants reports of this character are forwarded directly to the president or general manager. At all events it is the desire to maintain a certain independence of action of the inspecting force no matter how it is directed, to assure results.

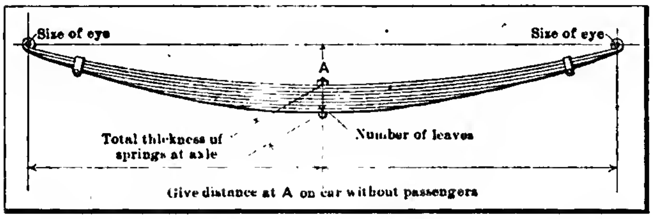


Fig. 6—Half elliptic spring, indicating data required by maker

It is now a fairly well established fact that quantity production on a quality basis is only possible under an operation inspection system. Interchangeability of parts, a factor present in all well-made automobiles, depends upon the accuracy of finishing of each individual piece, and not upon the mere fact that a unit as a motor or a transmission gear will run when it is made. This interchangeability depends entirely upon the inspection of operations, and in plants such as the Pierce-Arrow, for illustration, operation inspections require the services of from twenty-eight to thirty men and a room possibly 50x100 feet in area. All the work, as the operations are completed, must go into this room, be checked with the drawings, have records made, and go out again with

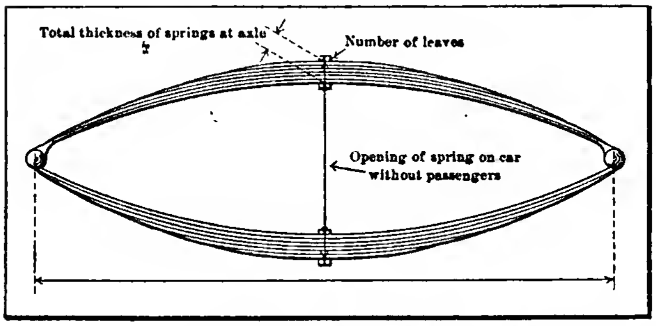


Fig. 7—Full elliptic spring, with forged eyes and maker's indications

such rapidity that successive operations, as they go on in the shop, will not be interrupted for a single moment. Should the inspectors fall behind in their work, the machine tools in the shop will be affected, and the cost of production will go up enormously, to say nothing of delays in delivery.

Besides parts inspection, involving the checking of the goods on every operation, the unit inspection and test is carried on in the several plants, utilizing special equipment and methods, but, as shown in Fig. 3, it is the idea to load the units to some predetermined excess beyond the normal rating, adjust the relating parts to a silent and free-running condition, and thereafter for-

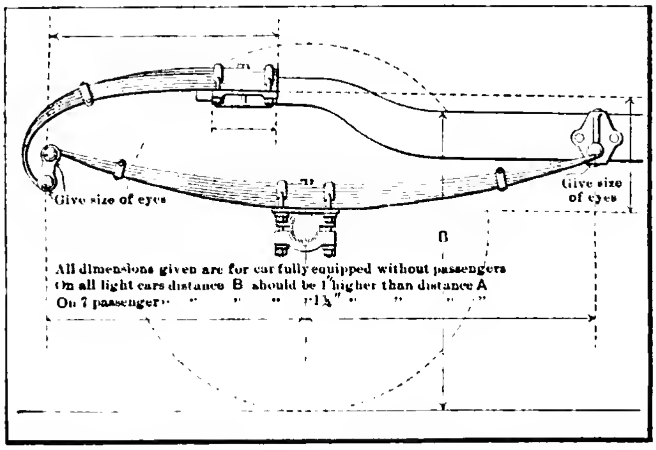


Fig. 8—¾ elliptic scroll spring, showing methods of fastening and H-swivel for flexibility

ward the assembled units to the final assembling department, where, after final assembling, further tests are made before the abuse or road test is taken up. These and many other carefully conducted details in the manufacturing process are reasons why automobiles, as they are to be seen at the Garden, are capable of sustaining under all the conditions of American roads, also why, after running for several years, under normal conditions of depreciation, they are in first-class shape, even though the care afforded them falls far below a desired level.

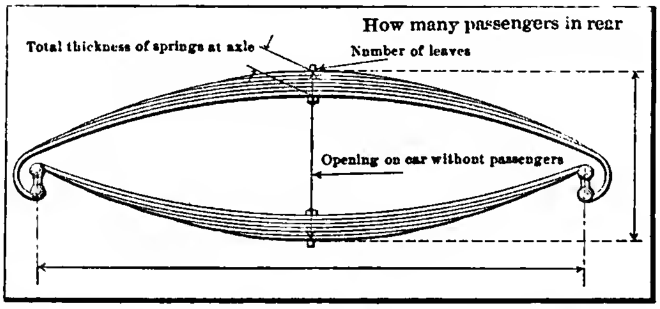


Fig. 9—Full elliptic scroll spring as used on rear suspensions to afford easy riding qualities, taking care of fore and aft oscillations

HIGH AVERAGE OF QUALITY IN PRODUCT

Just what is to be regarded as the particular advance of the year, when reference is made to the quality of the cars exhibited, is a matter which will have to be left to the patrons of this industry. Be it known, however, that an automobile, like a locomotive, is a kinetic machine, in that the stresses and strains partake of diagonal characteristics, whereas, in static work, there are no diagonal efforts, and gravity rules. Before automobile designing reached its present state of perfection it was suspected that the life of material would be shortened under kinetic conditions and that a crankshaft, for illustration, would disintegrate as surely as it revolved in its bearings after a certain time. The only question was, "how long will a crankshaft last?" Automo-

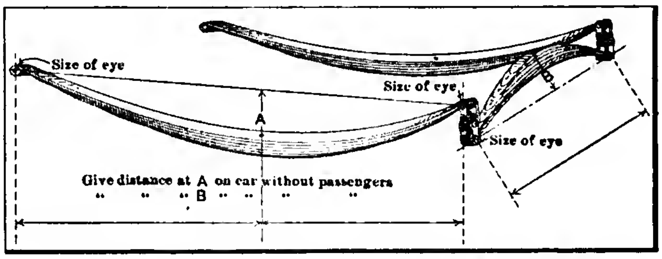


Fig. 10—Example of platform type of spring, showing cross member at rear; may be in front

bile engineers, after having devised divers forms of kinetic testing machines, reached many conclusions which now augment the life of automobiles in which these conclusions are reached.

In a kinetic sense, then, with two phases to consider, the makers of automobiles sought for highly kinetic material, and used the same to satisfy one of these phases. They went further when they designed for flexibility, a matter of the proper utilization of springs on one hand and the suitably placing of universal joints on the other. Equally important is the principle of the three-point suspension, which makes it impossible to transfer a torsional effort from one member to another.

THE SPRING SITUATION CLEARED UP

In the earlier efforts, many of which were copied from foreign cars which were designed to run on Roman roads, half elliptic springs were used, they being rather short, with narrow and relatively thick plates. When these cars were tried out under American conditions the vertical bounce was at a disagreeably high frequency in response to severe road conditions. This reflected but a short pendulum action and a certain inherent inability on the part of the springs.

American designers naturally have had more experience with spring work under severe road conditions, and as soon as they decided to depart from foreign practice they entered upon the half-way which leads to success, and the automobiles which may now be seen have this success embodied in them.

Considering the springs in a general way in the cars of the present year, it will be found that half-elliptic types, when they are used, are pretty generally confined to the constant load conditions such as obtained at the front end, inasmuch as the motor and accessories represent probably 90 per cent. of the actual load carried on the front springs. This is particularly true this year, since the old idea of a "front overhang" has been eliminated, meaning that the radiator is either on the center line of the front axle or back of it. The radiator does not extend to the front of the front axle.

When half-elliptic springs are used at the rear—this being perfectly feasible without fostering trouble—the plates are wide, relatively thin, and there are so many of them that the energy which has to be dissipated, represented in foot-pounds, is within the allowable limits. Consider now that it is well understood that the amount of steel required in the springs is at least one pound of material for five foot-pounds of energy dissipated. Fig. 6 represents the half-elliptical spring idea, and in all the spring illustrations as here afforded it is deemed a good idea to show how the spring-maker is informed as to the requirements, in order that he may do his work with certainty, conditions and the class of material covered by the specifications considered. These illustrations were taken from drawings which were placed at the disposal of the author by the Perfection Spring Company of Cleveland, Ohio.

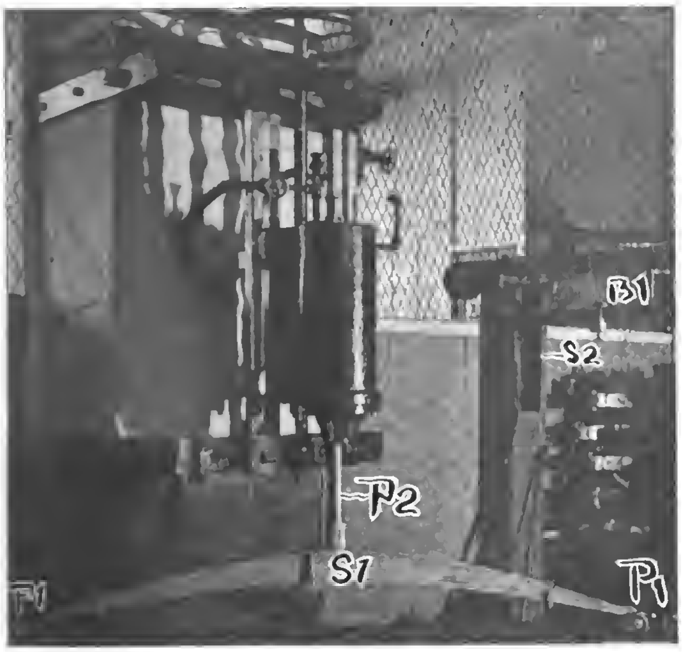


Fig. 11—Spring-testing machine, showing the spring before pressure is applied, and platform scales for registering

Some designers prefer to interject additional flexibility to the spring suspension without having to use long spring plates. These resort to the use of full elliptic type of springs, as shown in Fig. 7. It has never been shown that the total weight of material used in the springs would be twice as much, merely because the full elliptic type is substituted for the half-elliptic form, and, as before stated, it seems to be necessary to use about a certain amount of spring material almost irrespective of the form. The license which designers take in utilizing full elliptic type of springs is justified, and if they prefer to use this same type at the front end as well as at the rear, it has its further justification as a matter of style.

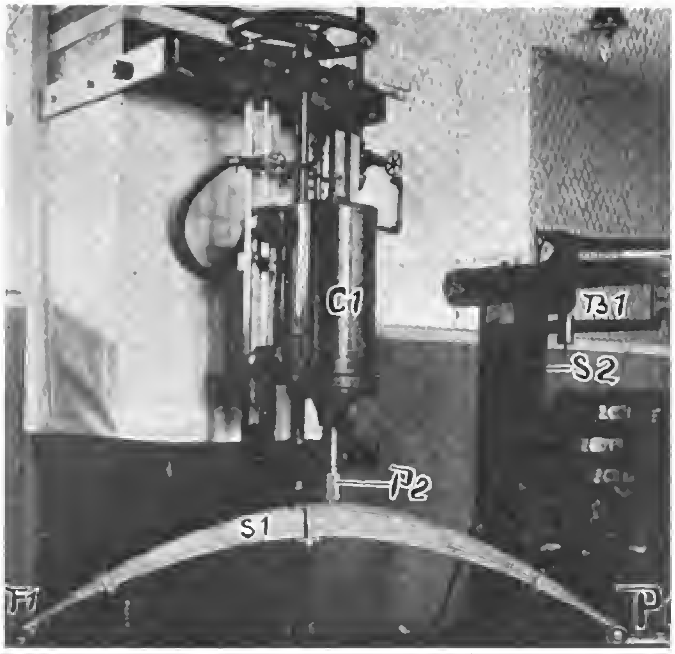


Fig. 12—Spring-testing machine, showing the spring depressed to the limit, and the scales recording the load

FORE AND AFT OSCILLATIONS RECOGNIZED

The general introduction of scroll types of springs followed the recognition of fore and aft oscillations as well as vertical bounce. It was also considered that great flexibility in the vertical plane could be arrived at in two ways, i. e., (a) with long half-elliptic types of springs; (b) with scroll types of springs. It was found that very long half-elliptic type of springs required the use of extraordinary quality of materials, and even then the life of the members was uncertain. Some types were too short in many cases, due, in a measure, perhaps, to the adaptation of inferior grades of materials or to experimental products, which may not have proven to he good.

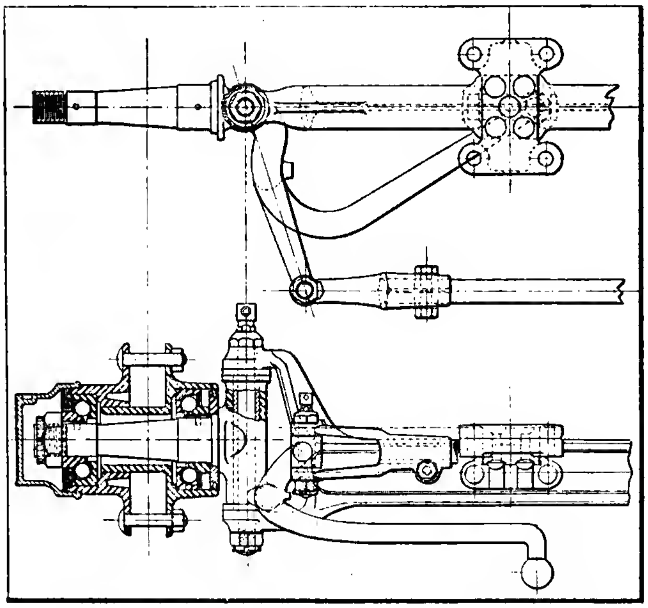


Fig. 13—High section front axle of the Waverley Electric, presenting a well-designed spring perch

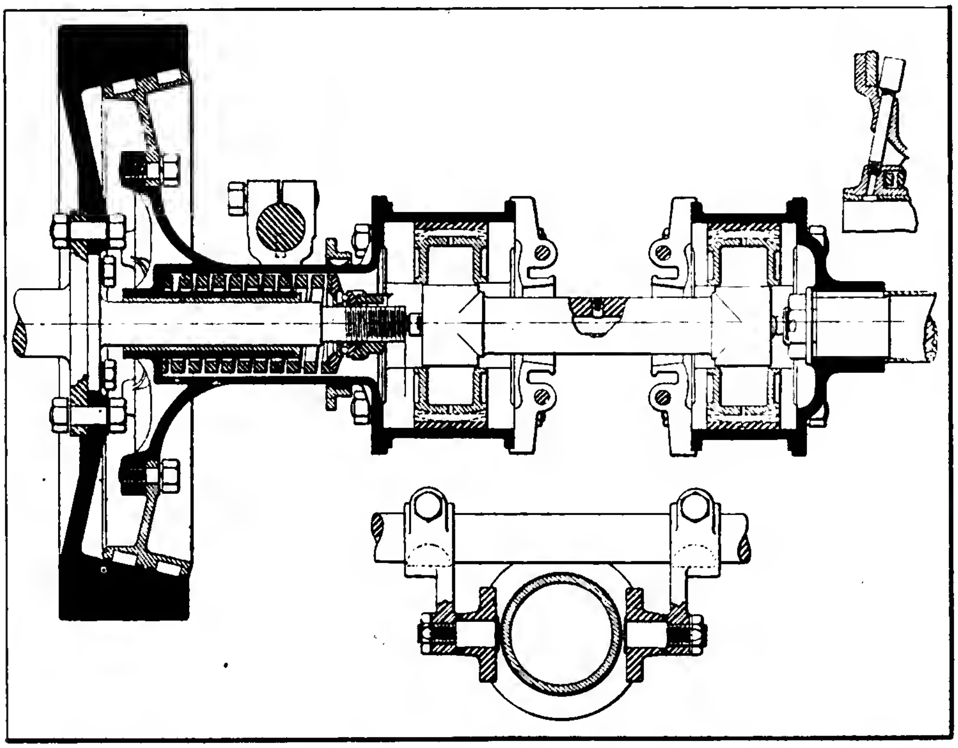


Fig. 14—Alden-Sampson cork insert type of cone clutch with full universal joint connection

Three-quarter elliptic scroll types of springs, as shown in Fig. 8, came into vogue in recognition of fore and aft oscillations and the desire for more easy-riding qualities, with a further expectation that the performance would be soft, and the pendulum effect would improve easy riding qualities. Experience seems to be in favor of the retention of these springs. In rear suspensions in particular full elliptic scroll types are used, they being substantially as shown in Fig. 9.

Platform types of springs, of which there has been a goodly sprinkling for several years, are still much in vogue. They represent extreme flexibility under severe conditions of service, and, in a measure, they are proof of the contention that it takes a certain amount of steel to do a certain amount of work, and realize a full measure of dynamic life of the material present. Fig. 10 illustrates the platform type of spring with the lateral member to the rear—a common practice, but not at all universal. The lateral member is sometimes placed to the front, but full platform types of springs are the exception rather than the rule.

ALLOY STEEL THE PRIME FAVORITE

Some of the earlier efforts, because they involve the use of open-hearth high-carbon steel, were a little less satisfactory than was the wont, brought about through the earlier practices in connection with animal-drawn vehicles. It was soon found that the service demanded of springs in automobile work was of a much more vigorous character than that of the drawn rig, and the kinetic life of the high-carbon steel fell short of the actual demand. In the A. L. A. M. laboratory, and under the direction of outside laboratories, it was ascertained that the kinetic life of steel decreased with increasing carbon, and was lower in embasic products than in acid steels.

With the introduction of vanadium, chromium, nickel and tungsten, under suitable conditions and in appropriate percentages, the fabricators of spring steel were enabled to increase kinetic life in a measure, due to lowering carbon, which was rendered feasible by the introduction of alloying elements.

In the springs, as they actually obtain in the cars which will be on show at the Garden, the generic types of steel may be set down as follows:

(A) Silico-manganese steel, in which the silicon runs about 1.6 per cent., but the manganese is not much higher than that which obtains in other steels of the same carbon content. In this type of steel the carbon covers around 60 points.

(B) Vanadium steel, in which the vanadium is held at a fairly low limit; 18 points or under, the carbon is maintained at substantially 60 points, and chromium may be present.

(C) A tri-alloy steel holding chromium nickel and tungsten with carbon at 60 points.

(D) Specification carbon steel, usually a basic product, with carbon regulated for 100 per cent. pearlite, when the steel is in the normal state. This steel is necessarily from pure ores, and the metalloids are maintained at .03 for sulphur and phosphorus as a maximum.

Spring makers in the manufacture of automobile springs, in view of the hard surface to which the springs are necessarily subjected are equipped in a most elaborate way, this equipment including special gas or oil furnaces provided for purposes of heat treatment, and temperature is regulated with great precision.

The spring plates selected are relatively thin, considering former

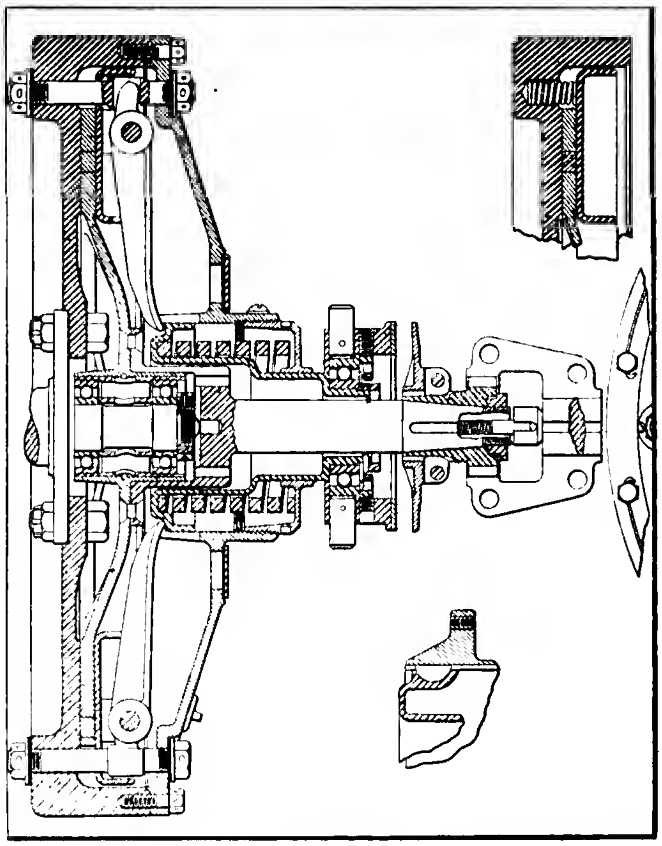


Fig. 15—Thomas flat plate clutch with cork inserts and adequate surface for service.

practice, and the width of the plates is also greater. It is the idea to so design the springs that they will dissipate the greatest possible amount of energy without increasing the fiber strain in the extreme section of the plates to a point which will endanger the life. Unfortunately, it is necessary to design springs so that the fiber strain will be relatively high under normal working conditions. For this reason spring makers have to design in such a way as to limit the increase in fiber strain which will follow when the springs are depressed. In a practical sense, the whole situation is simple enough, since the plan involves the use of wide plates, and the relatively increased number of them, which means thin plates, and these are bowed to a common radius, so that the fiber strain will be the same in every place under normal working conditions.

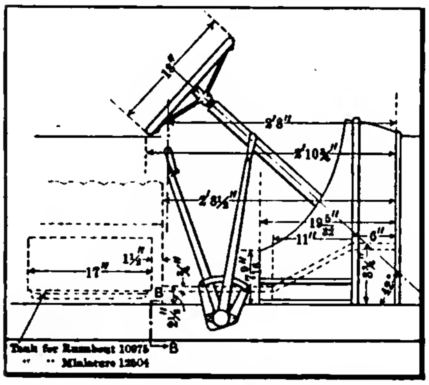


Fig. 17—Pierce-Arrow Runabout type, showing dimensions of body

As a rule the plates are rolled with round edges, and the flat surfaces are concave, so that the plates bear on their edges. This is an excellent idea, partly because it increases the pressure per square inch, and in some measure the friction, but it also affords pockets in which lubricating oil may hide, and, in accordance with the law of the flow of oil, it will migrate upwards to the high points and gradually feed lubricant to the pressure surfaces

SIZES OF FLAT PLATES USED IN SPRINGS

B. W. G. Numbers.	Thickness in Inches.
0	0.34
1	0.30
2	0.284
3	0.259
4	0.238
5	0.22

SPECIAL SPRING TESTING MACHINES DEVISED

Spring making is an empirical undertaking to a very considerable extent, and skill is necessary to a greater extent than might ordinarily be supposed. In automobile work, in view of the large number of cars turned out, and the importance of good springs, it was found desirable to supplement the personal judgment of the spring-maker by the introduction of testing machines, it being true that the personal equation in connection with the quantity undertaking influences for trouble. Fig. 11 shows a spring S1, on a fulcrum F1, for end of the spring and resting on the platform P1 at the other end of the spring. A hydraulic cylinder, C1, with its means of control, is centrally located so that the piston rod P2 presses against the center of the spring, and the amount of the pressure is recorded on the beam B1 of the scales S2. Fig. 12 shows that the spring S1, under pressure interpreted by the piston rod P2, is straightened out. The amount of deflection may be noted by suitable markings on the piston P2, and the pressure exerted at P1 will show on the beam B1 of the scales S2.

The method of control is perfectly simple, and the piston P2 moves down with great deliberation, thus enabling the inspector to arrive at a fair conclusion of the competence of the respective springs, he knowing beforehand how much they ought to deflect to satisfy the given conditions under which they are to operate. Systems of this character, varying in some slight particulars in different cases, were found in the various establishments devoted to the manufacture of springs, and the makers of automobiles, as a general rule, are equipped for testing springs also, these particular illustrations having been taken for the author at the Thomas plant in Buffalo.

SOME PRACTICAL CONSIDERATIONS FOR THE AUTOIST

In the cars with live rear axles the spring purchases are, as a rule, free to rotate. The springs, therefore, do not have to take a tortional effort of the live rear axle, and a matter of greatest importance in maintenance is to maintain a tight clamping of the springs to the purchase. Fig. 13, which is a front axle of a Waverley Electric, shows a perch with the wings for the U-bolts far enough out to enable the assembler to apply wrenches, and the pressure which may be exerted on the nuts of the U-bolts will therefore be sufficient for the purpose.

In almost every case a leather pad is skived to the proper curvature of the springs where they rest on the purchase (wood is sometimes used), and the pad thus placed serves a double purpose, in that it permits the U-bolts to be drawn up tightly, and, the coefficient friction of the leather or wood being far greater than that of metal to metal, the springs are clamped into secure relation.

DRY PLATE CLUTCHES USED THIS YEAR

While there is a general improvement in clutches all along the line, the fact remains that the one distinct advance, if such it may be called, is in the utilization of dry-plate clutches, of which the new Packard is an excellent illustration. This type of dry-plate clutch differs from multiple disc clutches primarily in the use of from five to eight plates, instead of from 40 to 60 thin discs. The plates are relatively thick, and the friction members are in the shape of "asbestos fabric," which is riveted on to the plates; lubricant is excluded. There are several advantages claimed for dry-plate clutches, among which is the self-evident fact that the bearing surfaces at the splines are much more liberal, and the plates will therefore remain free in their action. It is also said that they do not act "fierce," but that they take a hold gradually, bring the car to maximum speed smartly, and hold in hill climbing under the most severe conditions of surface.

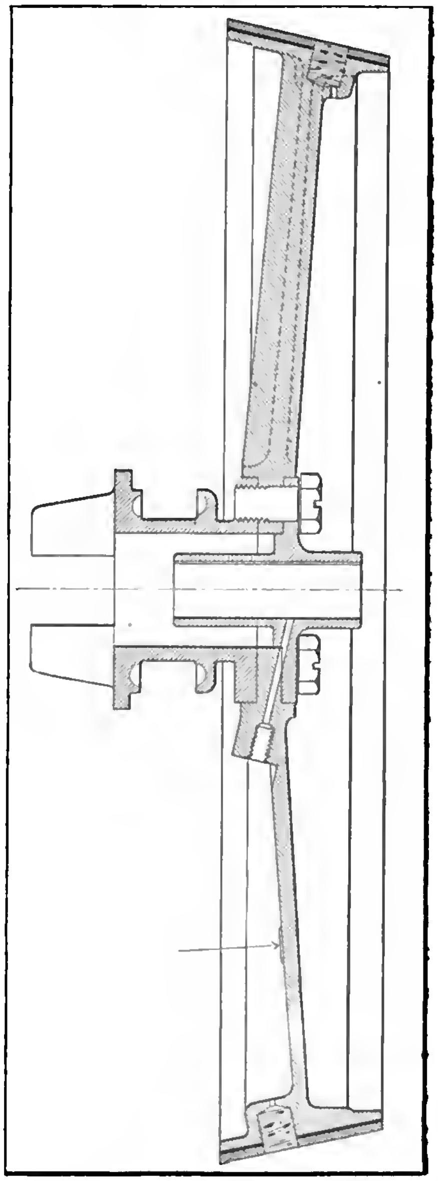


Fig. 16—Section of Pierce-Arrow cone clutch leather faced with cork

Dry-disc clutches are, to some extent, as an evolution;

"cork inserts," as used in some types of clutches, offer substantially the same advantages, and the experience of several years with "cork-insert" clutches seemed to indicate that, in the long run, the absence of a lubricant eliminates a certain class of troubles. Fig. 14, which is the clutch assembly in the Alden-Sampson truck, shows a type of cork-insert clutch which has given excellent service under the severe conditions involved in trucking work, and it is true of this type of clutch that it is not rendered *hors du combat* if a little oil smears over the surface.

Incidentally, Fig. 14 shows some other details which throw light upon some other phases of the commercial problem, as, for illustration, the clutch spring is square and offers close to 1,000 pounds pressure in the engagement of the clutch. The crankshaft flange is of considerable diameter, and the flanging bolts are liberal in size. The bronze bearing on which the clutch is centered and rotates is very long, and a ball-thrust block takes the unbalanced portion of the spring pressure. Back of the thrust block a pair of universal joints transmit the power from the clutch to the transmission gear, and there is evidence of strength and symmetry at every point. This figure rather goes to show that the old stricture, to the effect that commercials were mere adaptations of pleasure cars, no longer holds.

In the Thomas car, as shown in Fig. 15, a three-plate clutch is used, aided by cork inserts. The general scheme of the design is such that the flywheel is faced off to form a bearing for the middle member in the three-plate system. This bearing is far out towards the rim and is relatively wide. The outer member of the plates, which interprets the cam action of the lever system, has an equivalent area, and is made quite thin so that the ills of inertia are eliminated. This clutch, as the suction drawing shows, is engaged through the good office of a stout, square section spring, rolls on annular-type ball bearings, and is adjustable in every way. One very excellent recommendation for this clutch lies in the length of time it has served.

Multiple disc types of clutches are just as much in vogue as in the past, having increased in a ratio which makes it possible to say that they are holding their own. It might even be proper to say that in the low powered cars, in particular, multiple disc types of clutches are well in the ascendency.

Cone clutches are very much improved in every way, they being lighter, hence less likely to impede the sliding of gears, which trouble was, in former times, the real objection to the cone type of clutch. Fig. 16, which represents the Pierce-Arrow cork insert cone clutch, shows a very light but stout design, a rather wide face, covered with clutch leather, and the row of cork inserts, they being staggered around the periphery, registering with the disc structure of the clutch. In this design it seems to be the idea to reduce weight in every possible way, and, as was ascertained in the A. L. A. M. laboratory, the thinner the aluminum the stronger it will be. This is one example of the great utility of aluminum in the hands of competent designers. This material is initially rigid, which is a desirable clutch spider characteristic, and it is amply strong for the purpose, when it is properly dished and suitably ribbed. The inertia of the moving mass is reduced to a low ebb, due to the small value of the specific weight of aluminum as it is alloyed for clutch-spider work, and, coupling this design with a well-directed angle of the cone face, considering the use of a proper grade of friction leather, supplemented by cork inserts, it was a matter of no moment at all as to whether oil smears over the faces, nor will the clutch act "fierce."

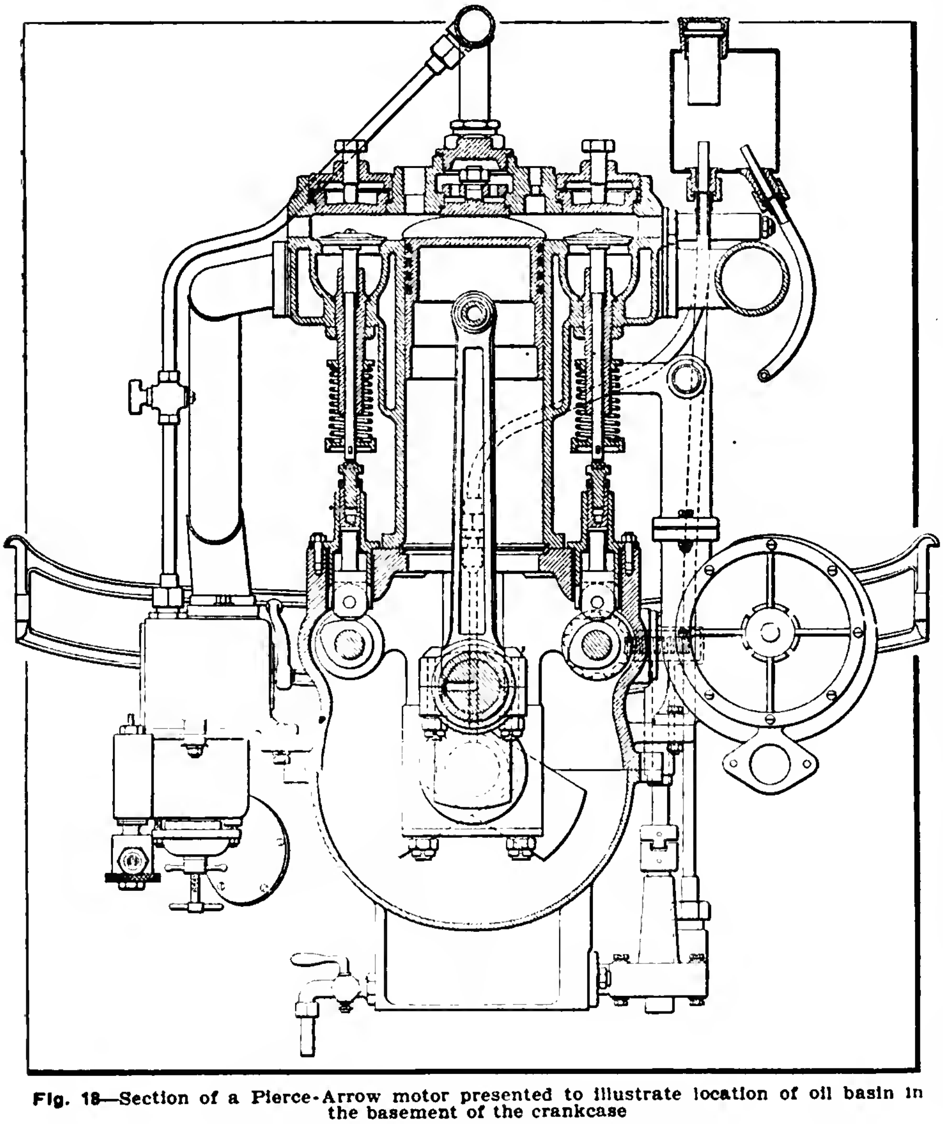


Fig. 18—Section of a Pierce-Arrow motor presented to illustrate location of oil basin in the basement of the crankcase

MOTOR DESIGNS ON A STABLE BASIS

Perhaps it will be of the first importance to point out that, to a very considerable extent, gray cast iron is being used in motor cases, especially in the smaller sizes of motors, to the exclusion of aluminum. This departure from a former fixed practice is due in some measure to uncertainties in aluminum, and again to the improvements wrought in gray iron work, which permits of the use of relatively thin castings, so that, for a given weight, it is actually possible to substitute cast iron, although its specific weight is approximately three times.

In the larger and more pretentious automobiles it is still the custom to use aluminum, and this material probably will be continued, certainly until something better is found, but every effort is made to employ pure grades of aluminum in the process, eliminating scrap, and preventing contamination in the foundry. The shapes of crank cases in silent-performing cars are looked after with the utmost care, and thick walls are used to prevent noise. Cylinder castings are now so thoroughly well made, and of such fine grades of material, that the results are thoroughly good.

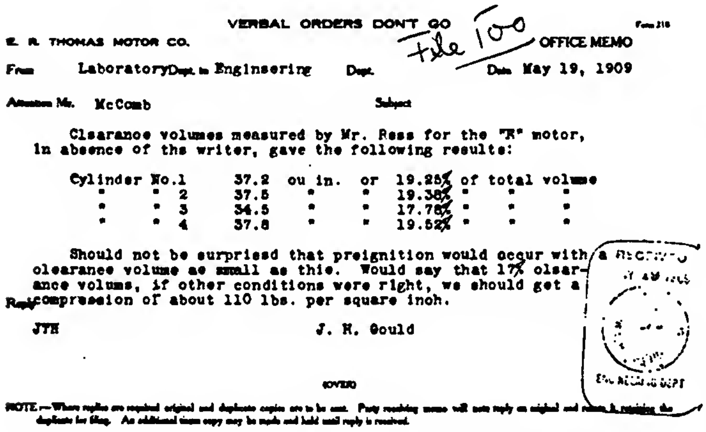
· Precision · in · Production · the · Theme ·

· By · Thos · J · Fay ·

ASSOCIATION for the common good which is the idea of the A.L.A.M., must, if anything, lead to precision of production, which, if it results in standardization of manufacture, ends in interchangeability of parts. Quality, under such conditions, will be at a fair price. This question of quality, as it relates to price, is a matter of the gravest concern, inasmuch as a machine may be extremely high in price, yet low in the scale of utility, showing that price is not all.

If the methods in vogue in a shop obtain in the absence of suitable instruments of precision, or, if the machine tools are of an antiquated vintage, then bench hands will have to be depended upon for results, and, while these may be men of skill and judgment, still they will not be on an exact par with each other, and the output from them will fall below any reasonable standard, even under conditions of liberal limits of tolerance.

If the machine tools are of the class which once served very well, so to speak, in the manufacture of machinery of the kind built up principally of cast gray iron, with perhaps machine steel as the hardest material to work up, then the tools will not be sufficiently rigid for the newer work, and accuracy will fall off in proportion as the tools deflect under the work.


VERBAL ORDERS DONT GO

E. R. THOMAS MOTOR CO. — OFFICE MEMO

File 100

From Laboratory Dept. to Engineering Dept. Date May 19, 1909

Attention Mr. McComb Subject

Clearance volumes measured by Mr. Ress for the "K" motor, in absence of the writer, gave the following results:

Cylinder No. 1	37.2	cu. in.	or	19.28%	of total volume
" " 2	37.5	"	"	19.38%	" " "
" " 3	34.5	"	"	17.78%	" " "
" " 4	37.8	"	"	19.52%	" " "

Should not be surprised that preignition would occur with a clearance volume as small as this. Would say that 17% clearance volume, if other conditions were right, we should get a compression of about 110 lbs. per square inch.

Reply

JTH J. H. Gould

NOTE.—Where replies are required original and duplicate copies are to be sent. Party receiving memo will note reply on original and return it, retaining the duplicate for filing. An additional tissue copy may be made and held until reply is received.

Fig. 1—Form of laboratory report used in E. R. Thomas plant to assure precision

If instead of a laboratory, rule of thumb methods have to be relied upon, it follows that the materials purchased will be up to the standard of the furnisher thereof and it may be that this standard will be lower than the aspirations of the purchaser.

If the designer of an automobile or parts locks himself up in a room; fails to take heed of the progress being made around him; inveigles himself into the belief that he has a monopoly of brains, and endeavors to purchase all the "cardinal virtues" in the simple process of paying workmen $15 per week to do his bidding—it is not supposable that the automobiles, if such they may be called, will compare favorably with the class designed and built after the undertaking has had the advantage of the enlightenment emanating from associated engineers, who, in turn, must satisfy the business establishment in all essential particulars.

INDIVIDUALITY IS NOT STIFLED IN THE PROCESS

The willing horse, the genius, and the innovator, all representing the graces of the engineering office, will still be there, and they, being irrepressible, will chafe in gear until their claims of better things find a safe abiding place in the maw of the management, and it is not likely that a real improvement can be resisted for long. In combining effort, it is possible to see advantage, especially when reference is had to innovations, for by this very association the members are enabled to keep abreast of the situation; feel the pulse of the supporters; determine merit, and ascertain the best way to launch a new idea.

In view of the close association of the exhibitors (the Association of Licensed Automobile Manufacturers), and in connection with a comprehensive discussion of the automobiles, as they will appear in Madison Square Garden, New York, it will be more to the point to review methods in vogue in the shops, taking an example here and there, rather than to write about some one shop. In this way, there can be presented a "birdseye view," reflecting, in measure, the inherent qualities of the products as a whole, leaving it to purchasers to ascertain for themselves the particular points of merit in the respective cars which appeal most to them.

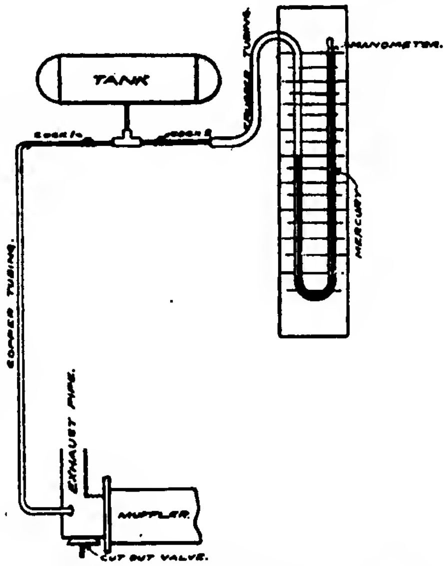


Fig. 3—Plan contrived to test mufflers on the road under regular conditions of service

SOME EVIDENCES

In order to fully appreciate the advantages of association, it will be necessary to illustrate clearly the points to be made. Table I affords enlightenment as to the front area of radiators as they are used on several of the well-known makes of automobiles, this data having been compiled in the laboratory of the E. R. Thomas Motor Company, Buffalo, N. Y. In order to keep out confusion, in this laboratory, all orders are given in writing and answers must also be in writing. One is reproduced here in Fig. 1. This report, requiring no further explanation, holds information of a character which should be noted. It reveals two things to the reader, one of which is that the clearance volume in motor cylinders, unless they are most carefully made, will not be alike in all. In addition, the question of pre-ignition is a live matter.

EFFECT OF ANNEALING ON SIZES OF CYLINDERS

In annealing cylinders, in order to relieve strains which are likely to reside in them as they come from the foundry, a new source of trouble confronts the designer, and in order to ascertain the extent of deformation in the annealing process the test, as

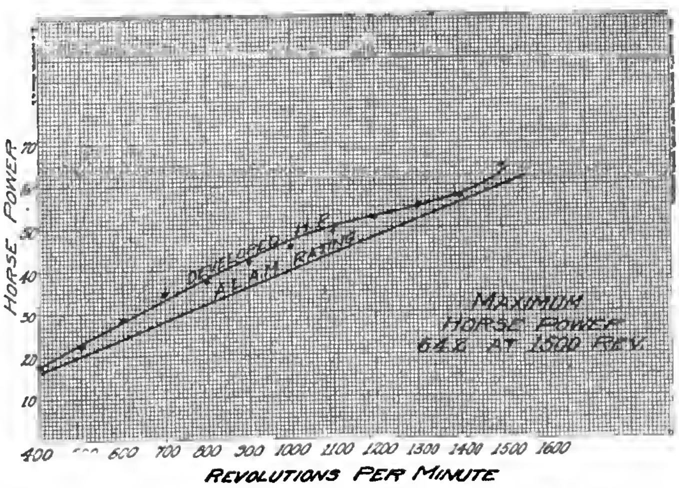


Fig. 2—Model M Thomas motor which exceeds A.L.A.M. rating as the curve shows

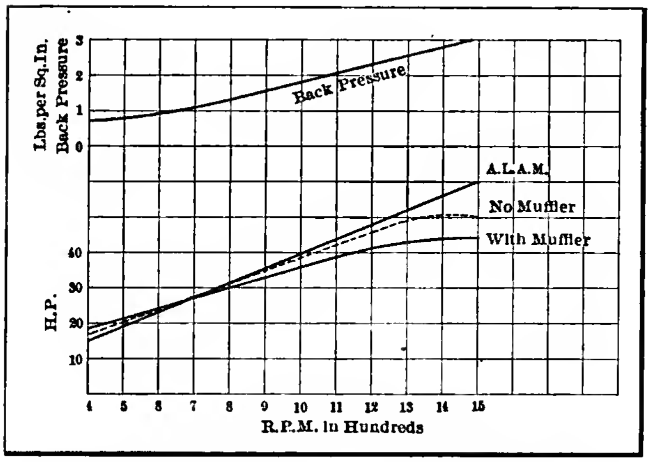


Fig. 4—Curve showing how curve of back pressure falls away under high speed

here given (see Table II), was made in the Thomas laboratory. A study of the table will disclose considerable variations, and the results suggest that annealing must be done before cylinders receive the finish bore. This annealing process, as the author now sees it, indicates to a degree the extent to which internal strains reside in cylinders as they come from the foundry. If this is so, annealing is necessary for the best results, it being proper, apparently, to choose the propitious time for the process.

THOMAS MODEL "M" MOTOR PERFORMANCE

Perhaps there is no better illustration of the value of exact methods than that of the curve of performance of the Mdoel "M" Thomas motor, in which, as the curve Fig. 2 shows, the power of the motor, which is a "six," exceeds the A.L.A.M. rating at all points in the speed range between 400 and 1,500 revolutions per minute. The same curve also shows an upward tendency from 1,400 to beyond 1,500 revolutions, and it would be interesting to have the results of a further investigation of this phase of the test; perhaps the results may be had at some later date, when the carbureter problem is followed to its ultimate conclusion, it being the case, in all probability, that the change noted (in the curve) is one involving carburetion.

INVESTIGATING BACK PRESSURE IN MUFFLERS

If a pound per square inch is equal and opposite to a pound per square inch of back pressure, this back pressure, due to the use of a muffler, is a very serious matter, and the Thomas company, appreciating this, investigated quite a number of mufflers for the purpose of finding a solution to the difficulty. One very interesting test, made with a car on the road, required the use of an equipment, a diagram of which is given as Fig 3, and the report of the engineer who conducted the test:

TEST OF A REED EJECTOR MUFFLER

"This special Reed ejector muffler has been used on all the K cars since August. One of the load test cars was fitted with a small pressure tank and manometer, as shown in Fig. 3, and in the top of the body of the muffler cutout a small hole was drilled and tapped for 1-8-inch pipe union. A 5-16-inch O. D. copper tube was used to connect the muffler to the tank. Proper valves were provided, as shown, and the manometer mounted vertically on the dash. Mercury was used as a means of measuring the pressure, the manometer back being calibrated to read inches. The object of using the tank was to act as a reservoir until the pressure could be measured. The car was equipped with a Warner 100-miles-per-hour speedometer. The throttle quadrant was graduated into eight divisions so as to form an index of throttle openings.

"The tests were made near Williamsville. With a given throttle opening when the car had arrived at a certain speed and had remained so from 30 to 40 seconds, the valve was turned off, thus entrapping the gas in the tank at the same pressure that had previously existed in the exhaust chamber during test. The car was then brought to a stop and reading of the manometer taken. The different speeds with constant throttle opening were obtained by either running the car uphill or holding it down with the brakes. Tests were made at every eighth until full throttle was reached. Similar tests were made with the muffler cutout to bring out the difference in performance."

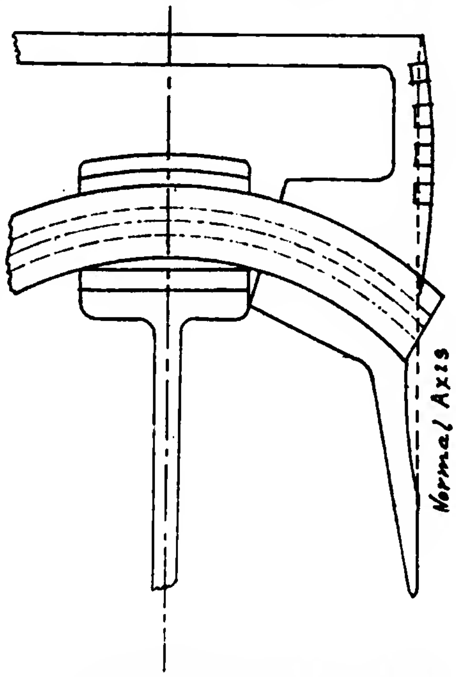


Fig. 6—Diagram devised to show how pistons deform when pressure is applied

As one of mercury equals 0.49 pound per square inch, then, by multiplying the manometer reading by this factor, we reduce to pounds per square inch.

From the data obtained curves were drawn, and it will be seen that the back pressure depends upon the throttle opening (*i.e.*, the amount of gas passing) as well as upon the velocity. Fig. 4 shows that 73 miles per hour for 3-4 opening, the curve rounds over. At this speed the car was running downhill. The engine speed was so high that the combustion was imperfect, thus producing less exhaust pressure.

The car was driven on high gear during tests:

Bevel pinion on main drive shaft	30 teeth.
Bevel gear on jackshaft	45 teeth.
Drive sprockets	30 teeth.
Driven sprockets	48 teeth.

which makes the gear ratio 2.4 to 1.

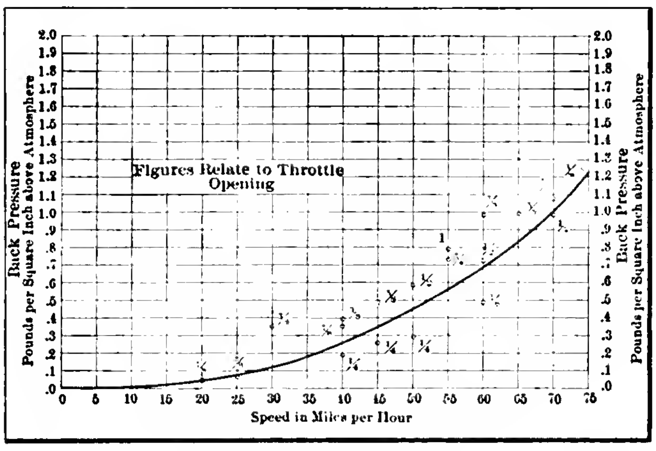


Fig. 5—Curve of back pressure when an inefficient muffler was substituted for that of Fig. 4

"It will be noticed that the first position for curves, 1-8, 1-4 and 3-8, are low, which would bring the intersection of the curve with the speed axis at a point before zero. As to whether this is correct or not, cannot be determined without further testing.

"With the muffler cutout data obtained curves have been plotted and a curve showing in a very general way the increase of back pressure with increase of speed due to opening the throttle on the level."

MUFFLER DEPRESSES POWER DELIVERY

By conducting a series of experiments on various types of mufflers in connection with a Thomas motor, it developed that power is materially reduced if the muffler offers much back pressure, and Fig. 5 is a curve of results of one of these experiments made by using a somewhat inefficient muffler for the purpose. Fig. 2 was given to prove that Thomas results are better than A.L.A.M. ratings, whereas Fig. 5 presents contrary evidence in that the power delivered by the particular motor used in this test fell well below the A.L.A.M. rating when the back pressure due to the muffler used was increased, whereas the Reed ejector muffler regularly used in Thomas work offered no such resistance to the flow of the exhaust.

Table III, which is given in this article, shows some of the series of readings taken in the road test, from which the curve Fig. 4 was plotted. This series of data will help materially in the process of following up the test, especially if the reader is not skilled in such reading diagrams as Fig. 4.

PISTON DEFORMATION UNDER LOAD CONDITIONS

Considering perfection of design of automobile motors the end is not as yet, and this is to be looked upon as a hopeful sign rather than with a despairing eye. In order, however, to advance the work, facilities, inclination, and time in which to accomplish the tedious tasks must be available. As an indication of the underlying situation, refer to Fig. 6, which shows, theoretically, and in an accentuated manner, how pistons do deform in service, and, as to the extent of this deformation, it is enough to examine Table IV, connected with the report of the test, in conjunction with the report of J. M. L. Howe, of the E. R. Thomas staff, as follows:

HOWE REPORT OF PISTON DEFORMATION

The idea in this test was to determine under various loads the distortion of the piston from a true cylindrical form. A straight ground piston of .003 clearance was used and measurements taken as follows, both at an angle and parallel to the piston pin of the four bridges, and space between clearance and fourth bridge. The lower portion of the piston was measured in two places, *i.e.*, near the top and near the web. Wristpin clearance groove is 1-2 inch.

A wristpin and straight connecting rod were used. Then the crankshaft bushing on the rod (a short piece of shafting) was slipped and box tightened up. The piston and rod were next put under a 30-ton hydraulic press, the piston being up and a piece of blotting paper being interposed between the piston head and the plunger. The shafting was supported by two V blocks. Care was taken that the axis of the combined piston and rod coincided with that of the plunger. This is a fine illustration of the futility of theorizing in a garret and building on paper; it takes facilities, experience and persistence if the product is to be thoroughly good in every way.

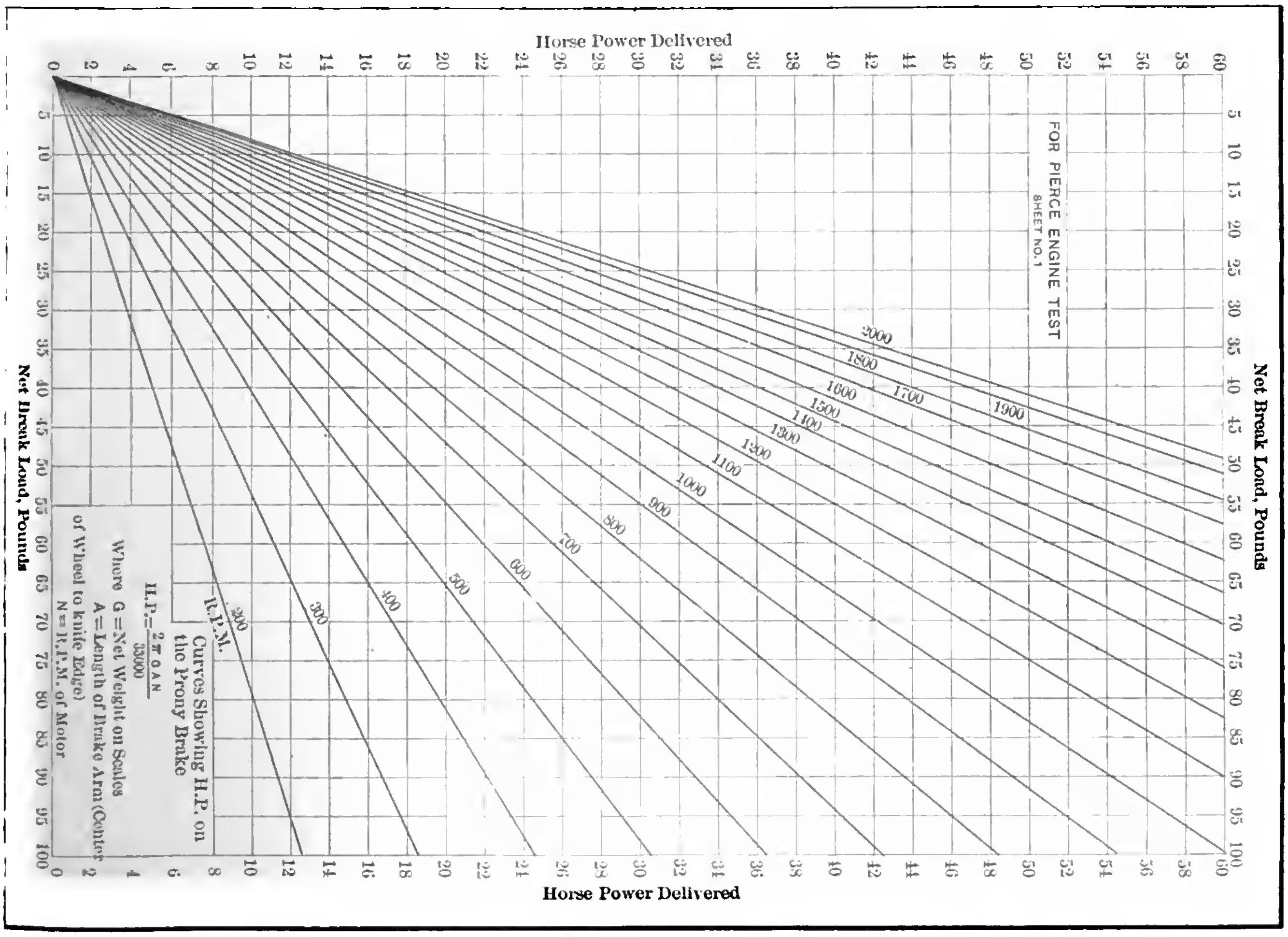


Fig. 7—Chart contrived for convenience in testing motors, showing horsepower at various speeds and brake loads

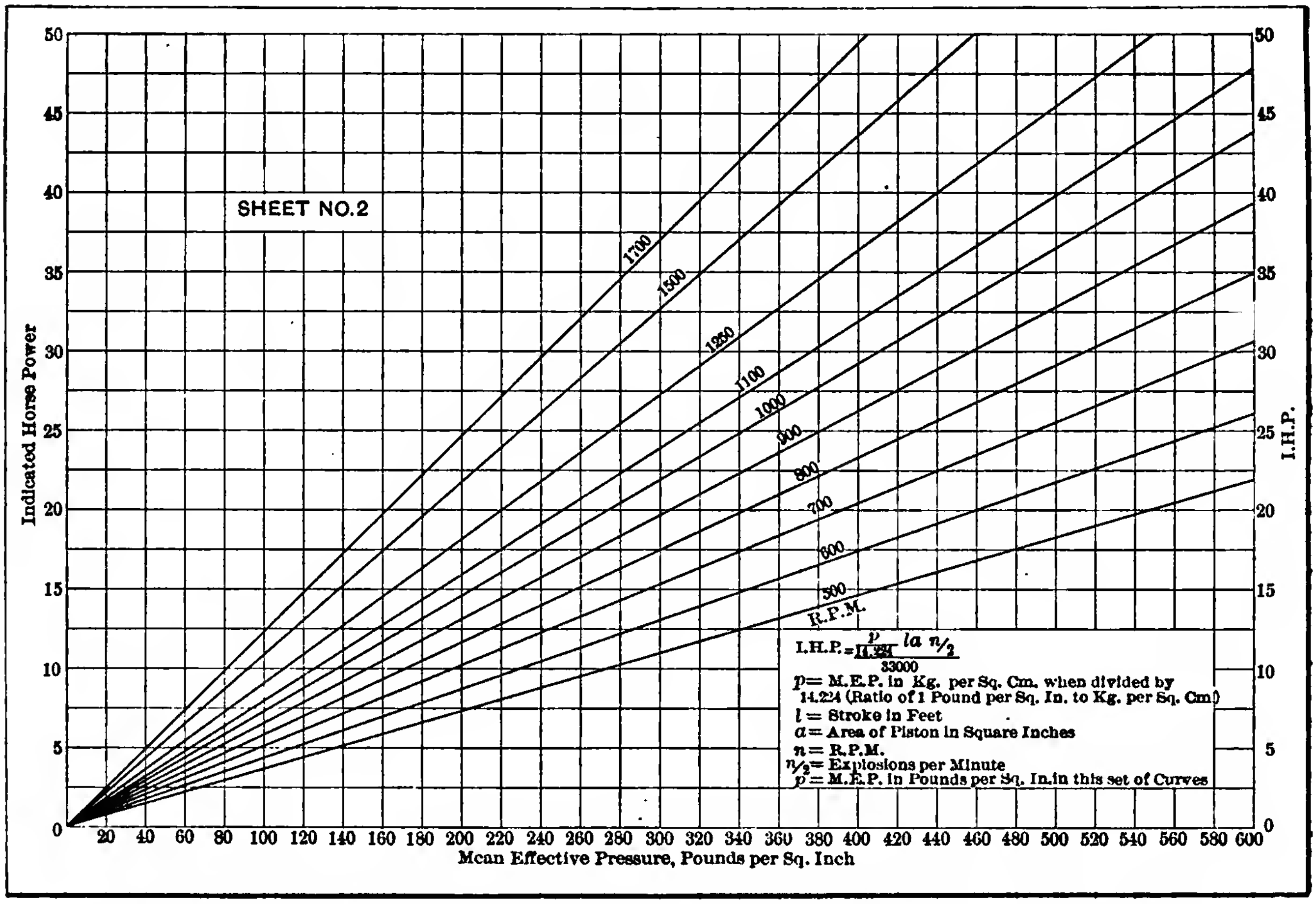


Fig. 8—Chart contrived to show mean effective pressure under different loads as measured in indicated horsepower

The claim is frequently made that a piston is lighter than all others; it is ribbed, or it is without ribs, and that the fit is within some fraction of a thousandth of an inch. If the ribs are not properly placed, or if the walls are not suitably designed, there is every likelihood that warping will be far in excess of any allowed fit allowance and the piston will stick in the cylinder every time it reaches the top of the stroke, in which event the result will be disastrous, and it is in this way that many of the failures of the past can be readily traced. There are divers points of this character to be settled in connection with proper designing, and it is a serious question if the work can be properly done in the absence of tools devised for the purpose and in the hands of men of proven competence.

A weight of two tons was applied and piston measured up while under pressure. This gives the maximum explosion load approximately as from the manograph cards on the "L" motor. The maximum explosive force was from 375-400 pounds to square inch of piston area.

$$P_m \times A = \text{force of piston.}$$
$$= 400 \times 3.625^2 \times .7854.$$
$$= 4{,}140 \text{ pounds.}$$
$$= \text{approximately 2 tons.}$$

The results are shown on the data sheet. It will be noticed that the cylindrical form of the piston is changed to an ellipse with the major axis parallel to the piston pin, or, in other words, the axis of the piston pin and the major axis of the ellipse lie in the same plane for above pin. The greatest deformation of decreased diameter occurs at portion between fourth bridge and wristpin clearance. The positive deformation lessens from here to top of piston. In space below clearance the deformation is slightly negative and the axis of the deformation has swung to one side slightly, but at portion near web the axis again assumes parallelism.

Next, a load of 5 tons was applied and measurements taken. These measurements show the characteristic distribution as previously given, but are increased about directly proportional to the load, *i.e.*, 2 to 5.

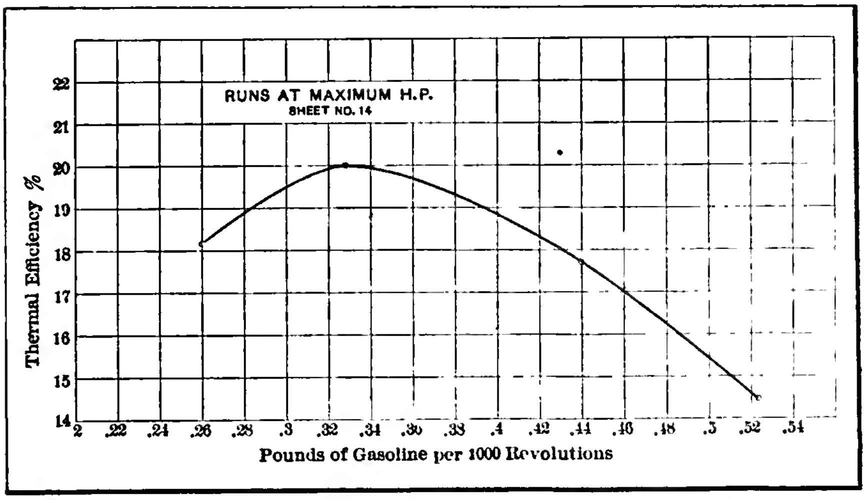


Fig. 9—Curve of thermal efficiency with a motor running at maximum load in horsepower and a speed of 1,000 revolutions per minute

The pressure was next carried up until the connecting rod collapsed, as shown. The pressure was approximately 7 tons, which gives a factor of safety of 3 1-2. The rod failed at what is known as the "square"-ended column failure," which means that the two ends were fixed in contrast to a pin-ended column. The connecting rod, if it had failed in a plane at right angles to the piston pin, would have failed in a "pin-ended column." It is a peculiar fact that the square-ended column is four times as strong as a pin-ended one. The failure in actual practice, if these excessive pressures were used, might lie in a plane at right angles to the present failure, due to the whipping or inertia forces which are added to the piston load.

The permanent deformation of the piston is given. It will be noticed that the major axis now runs at right angles to the pin. On taking the wrist pin out it was found to be bowed upwards approximately .02 inch. The wrist pin is made of 3-4-inch x 3-16-inch wall steel tubing, 3 7-16 inches long, hardened and ground down to .7192 inch.

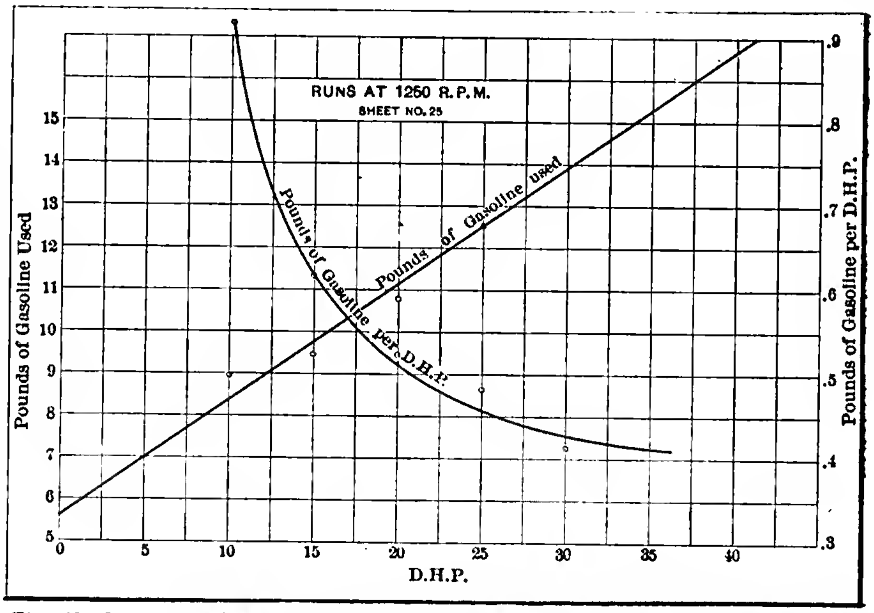


Fig. 10—Curve showing fuel per delivered horsepower and total fuel used under different conditions of power

For a theoretical consideration on strength of wrist pin, the custom is to treat it as a beam held at both ends and loaded at the middle instead of by a uniform load. The reason for the deformation is shown by the following sketch. As the piston pin bends, the walls of the piston, being very light, are forced outwards, and the walls below the pin inwards. As tests have been made on the heating of the "L" cylinder and piston, and these tests have shown that there is no appreciable deformation, the cause of scoring is due to weakness of the wrist pin.

Proper webbing in plane at right angles and perpendicular to pin across head and following down to bosses would greatly decrease deformation.

WITHIN THE PIERCE-ARROW LABORATORY

While there is a certain similarity between the laboratories in the several automobile plants, it remains that severally specialized methods prevail in them to a vast extent. As to these methods much depends upon the progress previously made and there is something to be attached to the objects sought. Characteristic of the line of investigation conducted in the Pierce laboratory, or in connection therewith, is the system of motor investigations pursued for the express purpose of ascertaining the exact facts in relation to fuel economy, power of range and flexibility.

Referring to Fig. 7, which is a curve plotted to show horsepower on the Prony brake, it will be observed that by a series of diagonal lines, each one of which represents some one speed of the motor, they, in conjunction with ordinates reading "net brake load in pounds" and "abscissa," afford a means for determining the horsepower of the motor at any one of the respective speeds when the net brake load in pounds is known. Referring again to the figure and to a net load of 90 pounds, the point of intersection of the speed diagonal representing 1,100 revolutions per minute is at the abscissa line representing 60 horsepower. In other words, if the motor during test shows a pull of 90 pounds on the brake arm when the speed of the crankshaft is 1,100 revolutions per minute, the motor will be delivering 60 actual horsepower. By proceeding as above for any other pull in pounds at any other speed the actual horsepower delivered may be determined quickly and without calculation, the chart being sufficiently extended to cover the whole range of performance for any motor.

When a manograph is used for the purpose of investigating the condition of the motor, the manograph readings, suitably interpreted, may be resolved into indicated horsepower. However, this information is of small value in the absence of more

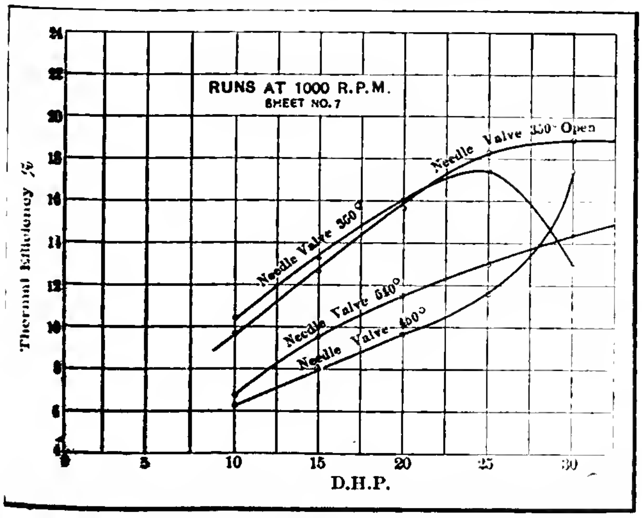


Fig. 11—Series of curves showing performance at different needle valve adjustments and effect on thermal efficiency

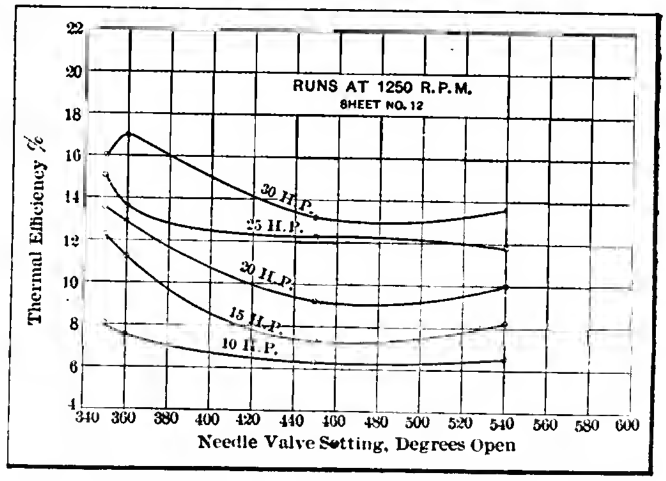


Fig. 12—Thermal efficiency under different conditions of carburetion and for different conditions of power

Fig. 13—Tire-testing machine as used in the Woods plant at Chicago for testing out tires

or less exact knowledge of the pumping losses in a motor. Figure 8 was contrived for convenience in testing Peerless motors. This chart will give, at a glance, the mean effective pressure in pounds per square inch, provided the indicated horsepower is known and by considering the speed of the motor at which the power may have been developed. The diagonal lines represent crankshaft speeds and the abscissa are given in terms of horsepower so that the mean effective pressure will be found as ordinates in the chart. Taking 40 horsepower for illustration, and following out to the point of intersection of the diagonal line representing 1,250 revolutions per minute, it will be found that the ordinate has a value of 440 which is given as mean effective pressure in pounds per square inch.

High Thermal Efficiency Ascertained—Perhaps Fig. 9 will show a condition which is beyond the belief of the old time engineer, who may not have followed closely investigations which were conducted by automobile engineers within the last ten years. As the chart shows, the curve of thermal efficiency, under conditions of maximum power for the particular motor, is maximum at 20 per cent. with the gasoline consumption at about .326 pound per 1,000 revolutions of the crankshaft. This thermal efficiency was unheard of in any other type of power-delivering machine and was not approached in internal combustion motors until refinements were made in automobile types—unless it be remembered that the Diesel type of internal combustion motor has delivered some noteworthy results.

Since the motor in this test was run at maximum power, it follows that the thermal efficiency varied with the gasoline consumption, bringing out very clearly the information which should be of the most use to the average autoist, *i.e.*, that there is only one right mixture, and that fuel economy is maximum when the motor is delivering its best power. This curve gives a wide range of fuel consumption, showing that the thermal efficiency fell to the low level of 14 1-2 per cent. when the fuel consumption was .532 pound per 1,000 revolutions; the thermal efficiency fell away as the amount of fuel used decreased below .325 pound per 1,000 revolutions and a decrease in thermal efficiency when the fuel is in excess or if the mixture is weak.

Relation of Gasoline Used to Fuel Economy—In still another test conducted on the same Pierce motor the data when tabulated and then plotted on a curve as shown in Fig. 10, brought out some interesting points involving the relation of the total fuel used to the gasoline per horsepower. The curved line in this chart reads "pounds of gasoline per delivered horsepower" and the amount of gasoline used decreased as the power of the motor increased, so that, considering a constant speed of 1,250 revolutions per minute, the least amount of fuel per horsepower was found when the power increased beyond 35 horsepower. The straight line in the curve shows that the gasoline consumption increased as the power of the motor increased. This is as it should be, but the point is made here in effect that the position of the diagonal line in the curve is very materially influenced by the decreasing rate of fuel consumption with increasing power.

Influence of Carburetor Needle Valve—Before departing from this phase of the subject, it will be the purpose here to reflect something more which can be construed as having a practical value to the average autoist. A needle valve when placed in the nozzle of a carburetor is there for the purpose of regulating the flow of gasoline. Through its agency the mixture can be made rich or lean at will. It frequently transpires that autoists find themselves in deep water after making a needle valve adjustment. They probably fail to appreciate just what it means to alter the relation of gasoline to air. Furthermore, it has been found that mere discussion falls short of the necessary explanation.

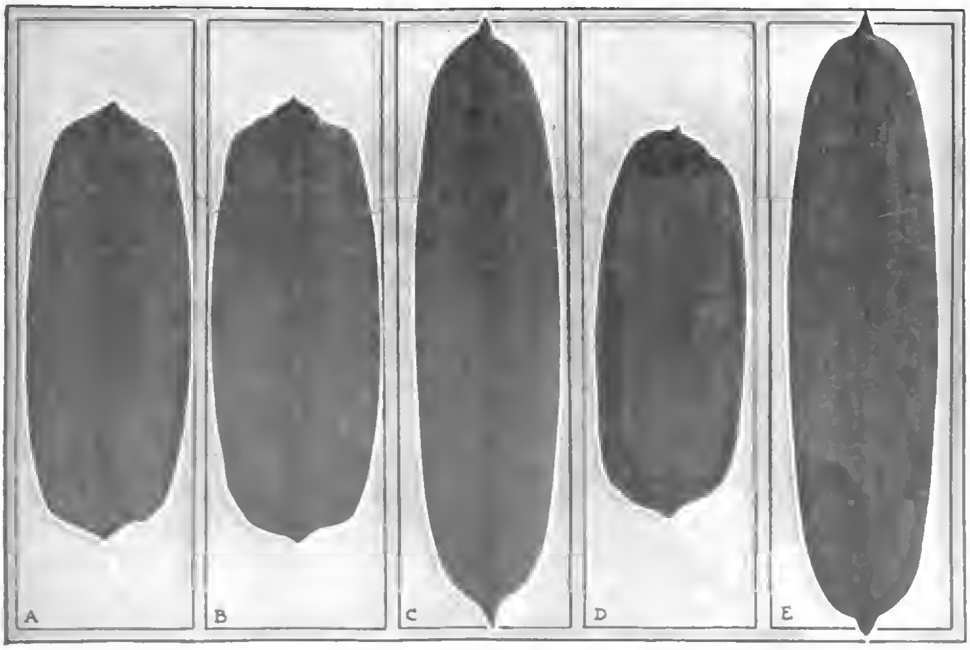


Fig. 14—Presents a set of records from the Woods tire-testing machine, giving information as to contact area under different conditions

Fig. 11 shows variations in thermal efficiency, in view of variations in power, considering different positions of the needle in the nozzle of the carburetor. The several needle valve adjustments are referred to in degrees. To be explicit, the needle was turned 360, 540, or to other positions as stated in degrees, and a curve of performance is given for each of the needle positions. The best performance noted in Fig. 11 is for the opening given as 350 degrees. The thermal efficiency resulting from the test was maximum at 30 horsepower of the motor. With the 360 degree position of the needle the performance was that which would indicate a condition of easy stalling of a motor in the hands of the average autoist; the motor with this adjustment would deliver a little more power at the lower range due to an enriched mixture, but the thermal efficiency falls away rapidly with increasing power and drops to substantially two-thirds of its best value, between 25 and 30 horsepower.

It has been shown that the power changes with the thermal efficiency and that the thermal efficiency as shown in Fig. 11, with the 360-degree needle valve adjustment would be, in all probability, attended by a change in power. Referring to Fig. 12, a means is at once afforded for checking the relations of thermal efficiency to power for different adjustments of the needle valve.

The information thus far afforded in connection with Pierce work is sufficient to indicate, in part, the extent to which matters of this sort are pursued in the well-equipped establishments devoted to the manufacture of automobiles.

TIRE PROBLEMS INTELLIGENTLY COPED WITH

Experimental investigations in wide extent have been carried on in several establishments. In view of this, it is a little difficult to sort out a few of them which can be included in a limited talk on the subject. Consequently it will be the idea here to "touch and go," as it were, for the purpose of presenting a widely diversified situation. Fig. 13, for illustration, presents a tire-testing machine, devised by F. J. Newman, Chief Engineer of the Woods Electric Vehicle Company, Chicago, used by the

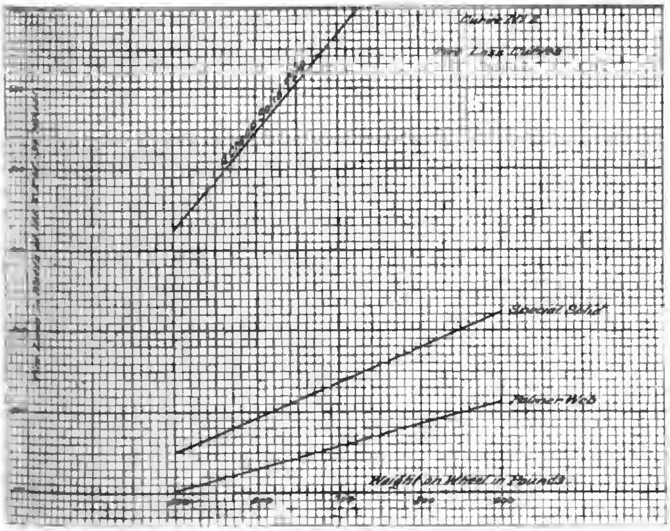


Fig. 15—Curve showing the tire loss in watts under differing load conditions

company for the purpose of determining tire losses and life. In this machine the tire to be tested T_1 is mounted upon its wheel W_1 and presses against a wooden wheel W_2. The wheel T_1 is mounted on a shaft and a pulley, P_1, being mounted on the same shaft, is driven by a belt B_1 which takes its power from the pulley P_2, the same having connection with an electric motor which is the source of power. On the same shaft with the wheel W_2 a brake drum B_2 is placed and brake shoes B_3 and B_4 are arranged to fit over and be clamped against the drum B_2, so that the Arm A_1 measures the force of the twisting moment which will be exerted through the brake drum B_2, which force is interpreted in pounds on the platform of the scales S_1

Since the wheel W_1, on which the tire T_1 is placed, is provided with an adjustment in order to vary the distance between the tire and the drum W_2, it is possible to increase or decrease at will the force which will be exerted between the tire T_1 and the drum W_2. Since the tire T_1 is driven by the belt B_1, over the pulley P_1, the drum W_2 must be rotated by traction against the tire T_1. The amount of the traction will therefore be registered on the scales S_1, through the brake arm A_1 and varied by altering the clamping of the brake shoes B_3 and B_4 against

By painting the surface of the wheel W_2 and pressing the tire

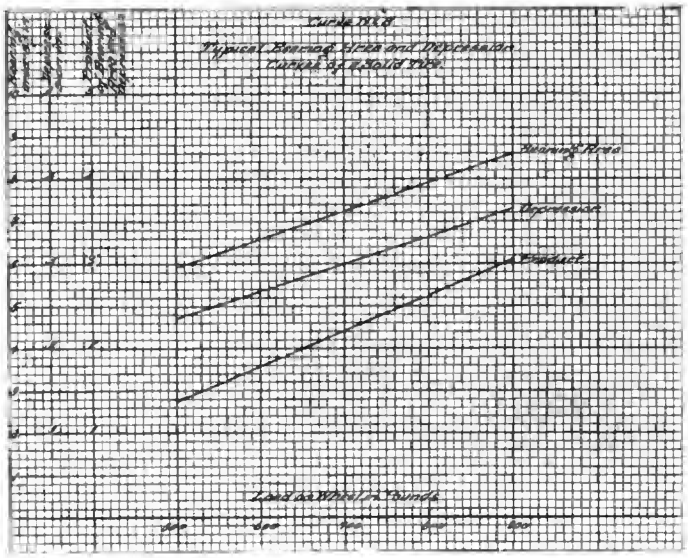


Fig. 16—Curve interpreting data as procured in connection with tests made on tires at the Woods plant

T_1 against the painted periphery of the wheel, it is possible to measure the area of contact of the tire being tested, since a piece of paper slipped in between will receive paint over the surfaces of contact and make a permanent record—which record will be characteristic of any particular tire under a given condition of inflation and for a given pressure. Since it is not the purpose at this time to reach conclusions in relation to tests of this character, it will be sufficient for the present purpose to reproduce tire contact records as shown in Fig. 14, *A*, *B*, *C*, *D* and *E*, they representing tires as follows:

(*A*) Represents an endless solid tire showing 6.8 square inches area of contact.

(*B*) Represents an endless solid tire, showing 7.1 square inches area of contact.

(*C*) Represents an endless solid tire, showing 8 square inches area of contact.

(*D*) Represents an endless solid tire, showing 8.5 square inches area of contact.

(*E*) Represents an endless solid tire, showing 5.65 square inches area of contact.

It will be seen that the performance, when reference is had to tires from the point of view of life and energy consumed, will not be the same when all of the tires do not flatten the same amount under a given load and other equal conditions of the tire on the periphery of the brake drum B_2.

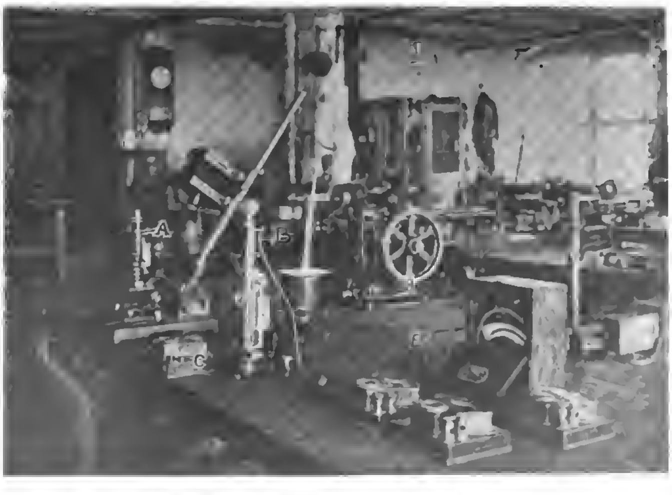


Fig. 17—A showing of instruments of precision required in the manufacture of high-grade automobiles

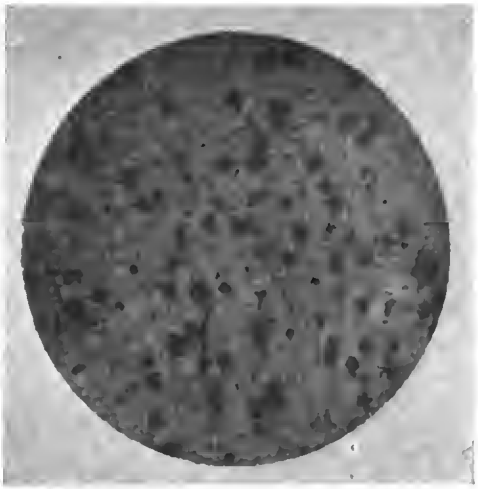


Fig. 18—Micro-photogram of malleable iron showing views at high magnification.

Testing machine offers a wide opportunity in the process of investigation. Considering the possible variations in materials and under different physical conditions, it affords a means for determining the tractive coefficient for the respective shapes.

Fig. 15 is a curve plotted to show the losses in watts under different loads considering differences in tires. There is a marvelous variation in the losses between the several tires. For illustration: The Palmer web tire on a 34-inch wheel under a load of 900 pounds shows a loss of 212 watts at 185 revolutions per minute; a cheap tire under a load of only 700 pounds shows a loss of 666 watts going at the same speed and considering the same diameter of tire; a special solid tire which was established as to its composition, after experimenting under a load of 700 pounds, on a 38-inch wheel showed a loss of only 238 watts, the speed being 185 revolutions per minute.

Referring to Fig. 16, an opportunity is afforded to observe the performance of solid tires as used in electrics, made under a wide range of loading in pounds on the wheel-bearing area, in square inches, depression in inches, and the product as given in terms of "product of bearing area and depression." This product has a certain value, in that it shows a diagonal line which is not parallel to the line of depression or that of the bearing area, but note that the lines representing bearing area and depression under changing loads are very nearly parallel. A long story is probably hidden away in the data obtainable on testing tires in this way. Some of it may be given in the future, when time and space are more favorable. For the present it will be enough to reflect the radius of possibilities by quoting from Mr. Newman:

"The process of testing a tire consists in delivering to the wheel which is equipped with the tire a certain amount of power at a given speed and measuring the amount of this power which the wheel and its tire delivers to the revolving drum.

"The difference between the power delivered to the tire and the power which the tire delivers to the drum is the power which is used up in internal or molecular friction within the tire. By varying such conditions as pressure on the tire, speed, torque transmitted, data can be obtained from which curves can be plotted showing the relation of internal tire friction to various external conditions.

"In the actual process of testing a tire, the wheel upon which it is mounted is withdrawn from contact with the drum and a Prony brake is mounted upon the shaft which supports the wheel and its tire. By means of this Prony brake the electric motor can be made to deliver the determined amount of power to the wheel shaft at the proper speed, and the input to the motor is then measured in amperes and volts by means of instruments inserted in the motor circuit."

INSTRUMENTS OF PRECISION FOR EXPLORATIONS

In a well-equipped laboratory, such as that of the Woods, the wide range of work which has to be done demands the use of a considerable equipment. Fig. 17 will give a fair idea of this:

(*A*) A metallurgical microscope with a camera.

(*B*) A "Shore Sclerescope" with which harness test are made.

(*C*) A mille-voltmeter connected to a pyrometer couple in electric furnace.

(*D*) A "Turner-Landgraf" alternate impact machine.

(*E*) A group of electrical measuring instruments.

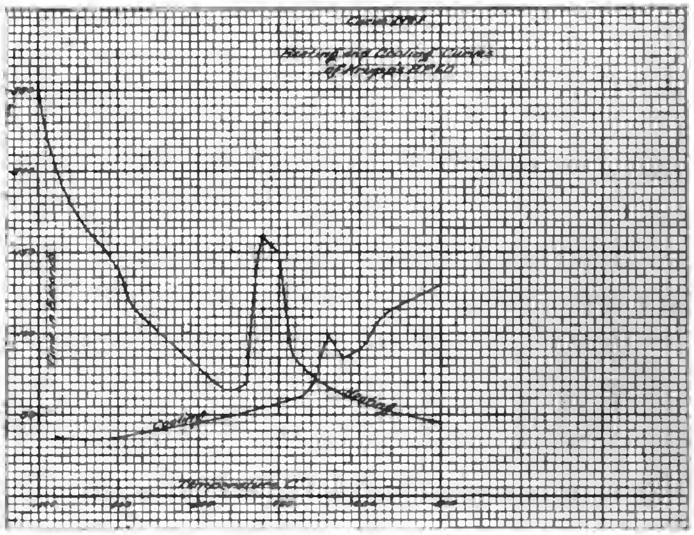


Fig. 19—Showing temperature performance of steel when it is being heated and when it cools off

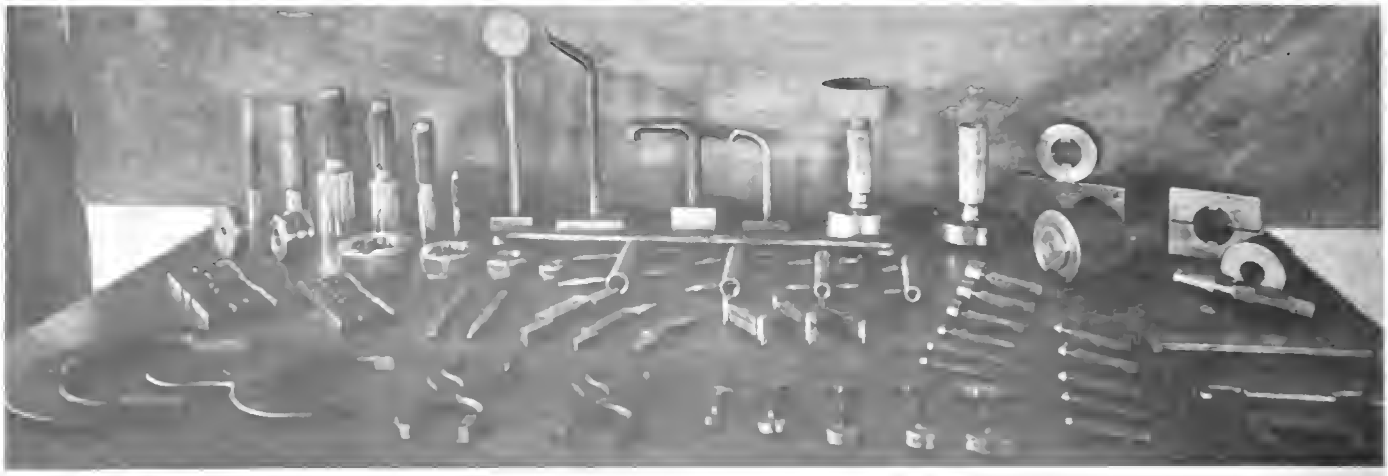


Fig. 20—A scattering of measuring instruments of the fixed order, as plug and ring gauges used by workmen in the shop

The metallurgical microscope permits the investigator to view specimens at from 100 to 1,200 diameters, thus bringing out the structural peculiarities. In steel in particular, it is possible to note if the metal is in the one or the other of the carbon states and the degrees of crystallization. When it is desired to make a record of a view through a microscope, the camera is brought into play. Fig. 18 is just such a view which was taken in connection with Mr. Newman's investigations in this case of malleable iron, the data governing the photo-microgram being as follows:

(*A*) Center of malleable casting, fully malleable.
(*B*) 2-3-inch projection.
(*C*) 1-inch eye piece.
(*D*) Etched 20 sec. 5 per cent nitric acid solution of alcohol.
(*E*) Seed process plates.

The time was when fabricators of steel had a monopoly of information in relation to the lack of qualities of their wares. This time has drifted into history. It did not take ten years of automobile building to bring out the fact that a kinetic machine such as an automobile demands qualities which do not reside in cast iron, yellow brass and Bessemer bars. Automobile engineers when they realized the condition which undoubtedly did exist on the marks of steel, then took time by the forelock, equipped their plants to make tests for themselves, and dictated quality where once it seemed to exist as a vague dream and nothing more.

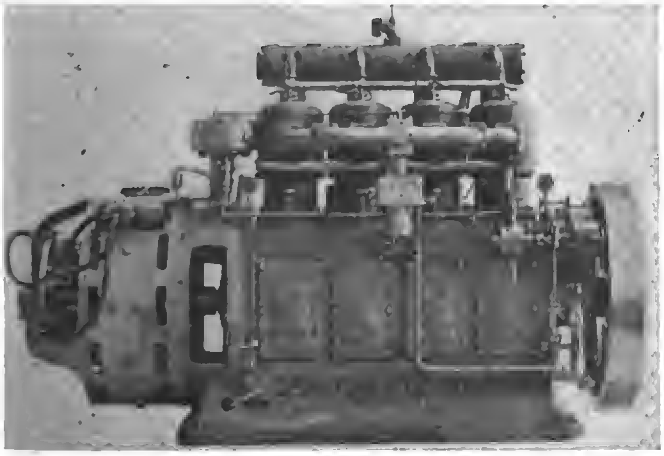


Fig. 21—Dynamo electric machine directly connected to a gasoline motor as used in charging batteries and other work

Fig. 19 is a curve which was plotted in the Woods laboratory, showing the temperatures of heating and cooling of Krupp chrome nickel steel, of the brand known as E. F. 600, as used in certain parts of great responsibility, as spindles, etc., in connection with Woods electrics. The chemical composition of this steel may be stated substantially as follows, with the understanding that there will be slight variations as between the respective heats:

Chromium	1.40
Nickel	4.40
Carbon	0.25
Silicon	0.20
Sulphur	0.013
Phosphorus	0.012
Manganese	0.36
Copper	0.006
Arsenic	0.007
Physical shape	bars.

The curve is interesting in that it shows the temperature at which a lag occurs, both in heating and cooling. This information, in itself, serves no useful purpose, but to the skilled manipulator it tells a story most necessary to know, if heat treatment work is to be done intelligently and if the results are to be on a predetermined basis. In the well-equipped plant, then, as compared with haphazard establishments, things go by direction, and enforced co-operation is the order of the day.

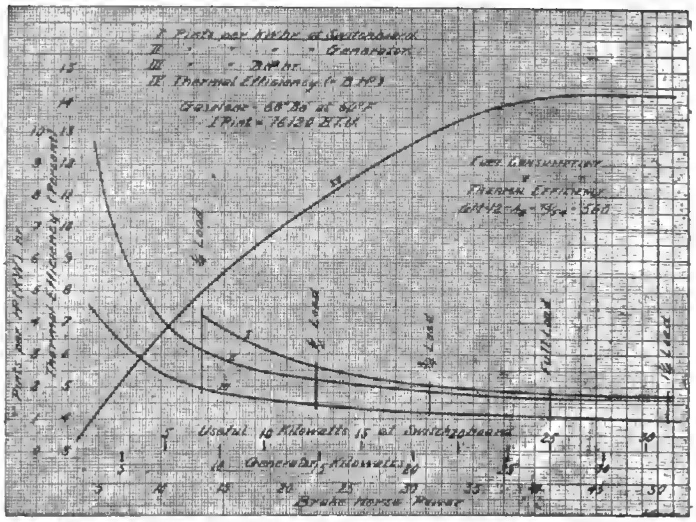


Fig. 22—Characteristic of dynamo performance, presenting evidences of great value of graphic methods

FIXED GAUGES ADVANTAGEOUS IN THE SHOP

The system of go-gauges as manufactured by Brown & Sharp and other makers of instruments of precision are probably quite well understood in a general way, and yet it remained for establishments like the Cadillac Motor Car Company, Detroit, to bring the system to the highest state of perfection, producing exact work, invariably without excessive augmenting cost.

By way of illustration, in the Cadillac plant this system of go-gauges is utilized in a secondary way—that is to say, a system of master plug and ring gauges are kept in the tool room, they being precise as to dimensions and sufficient in range to cover every measurement required to be made in connection with the building of Cadillac automobiles. In the shop, each workman is provided with plug and ring gauges which are precisely sized to measure the very operations the workman is required to perform, and all that he has to know is that the gauge will or will not go. A plug gauge in this system takes advantage of the

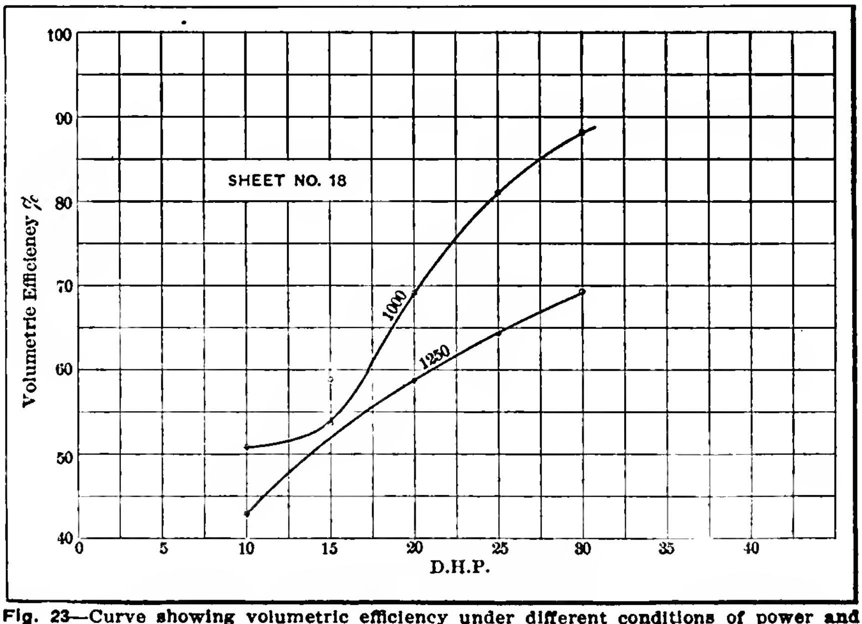


Fig. 23—Curve showing volumetric efficiency under different conditions of power and speed of a Pierce motor

allowable limits of variation in that one end of the gauge is just a little too big for the right-sized hole, so that it will not go, and the other end of the gauge is as much smaller as the limit of tolerance fixed for the work indicated. If the work is ground to the right size the gauge will go. If the work is a shaft or other part to be measured over its diameter, ring go-gauges supplant plug go-gauges. The accuracy thus arrived at in the hands of men of sufficient caliber is made possible by the go-gauges, and the gauges of course are as accurate as the company cares to have them. Interchangeability does not demand a neat fit of parts, but it does indicate narrow limits of tolerance. Fig. 20 represents an assortment of gauges of this character, they being but a few of the many in common use.

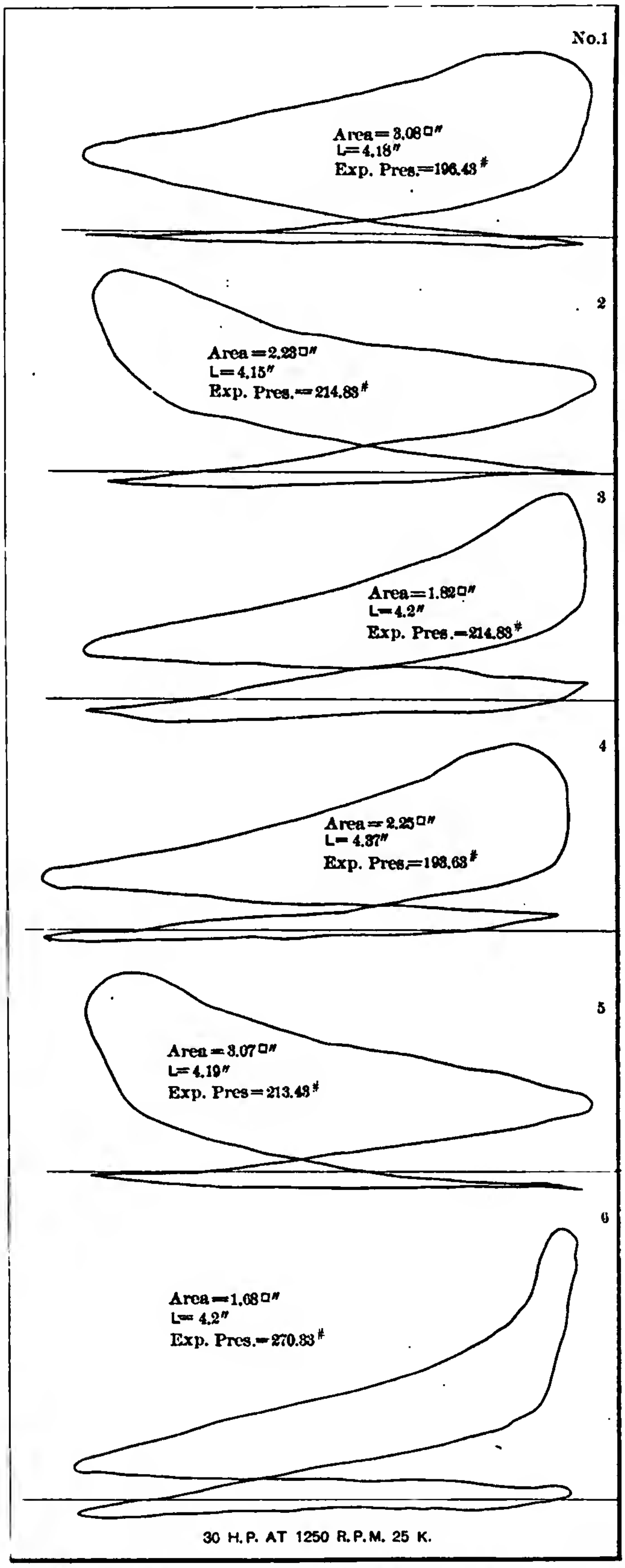


Fig. 25—Manograph card from the six cylinders of a Pierce taken at 1,250 revolutions per minute.

Disjointed facts in the abstract rarely ever afford insight into

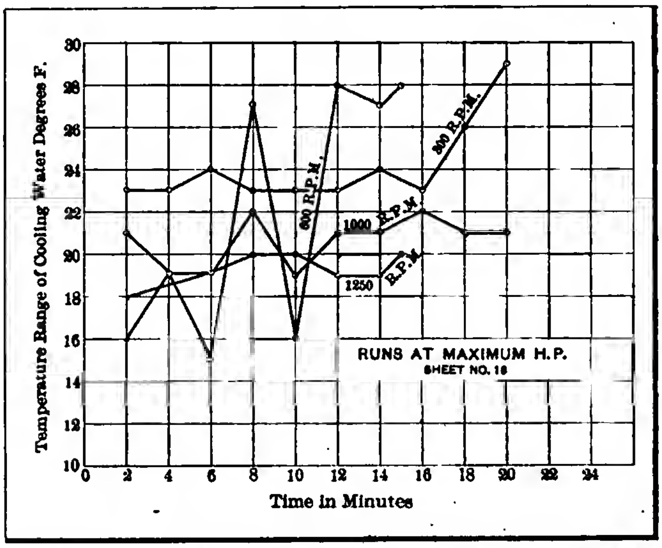


Fig. 24—Chart plotted to bring out performance of cooling water under different conditions of power and speed

the workings of an intricate situation sufficient to satisfy the ends to be met. When all the facts which are known are presented in graphic form they take on the characteristics of a bird's-eye view and the unknown quantities may then be estimated within reasonable limits of certainty.

In order to better understand the value of a graphic presentation Fig. 21 is offered. This represents a dynamo electric machine, directly connected to a gasoline motor as manufactured by the General Electric Company at the Schenectady plant. It is of the same type used for lighting, the charging of storage batteries and kindred work.

The dynamo has an output of 25 kilowatts, as normally rated. It may be overloaded to the point known as 1 1-4 load for a specific period of time. When the dynamo is delivering its full load the gasoline motor must deliver nearly 42 actual horsepower, and, as the illustration indicates, the motor has all the ear marks of automobile motors, with the exception, of course, that the base is shaped to stand on a foundation rather than to be cradled in a chassis frame as in automobile work.

Illustrating the utility of the graphic method of arriving at and recording engineering data, Fig. 22 is afforded, it being a presentation of the characteristics of the 25-kilowatt generator set as shown in Fig. 21. In making the test the engineer in charge used gasoline, the specific gravity of which was 68 degrees Baumé, at 60 degrees Fahrenheit, and it was found by test that one pint of the gasoline contained 16,120 British thermal units of heat (B. T. U.).

The columns of figures to the left on the chart fix the valves of abscissa, first in pints per horsepower hour of the gasoline used; second, in terms of thermal efficiency (per cent). The values of ordinates, reading from the bottom up, are first, in terms of brake horsepower required to drive the generator under the several conditions of load; second, the output of the generator in kilowatts, measured at the terminals of the same, and third, the energy actually delivered at the switchboard as measured in kilowatts.

With this chart available, it is possible to see at a glance the relative performance of the generator under varying conditions. For illustration, referring to curve IV and at 3-4 load, the thermal efficiency is 13 per cent (slightly under) which is found by following up the ordinate representing 3-4 load to the point of intersection of the curve IV with the abscissa which has the value of 12.9 (very nearly 13 per cent). This curve shows that the thermal efficiency increases as the load becoming a maximum at a point just beyond full load, and holding stationary thereafter. The thermal efficiency is of course very low for everything under 1-4 load, it being about 7.8 per cent at that point. This value 7.8 for the thermal efficiency at 1-4 load is relatively very good, it being about the maximum thermal efficiency for the average high-speed slide-valve steam engine. Granting this, it follows that the thermal efficiency in internal combustion motors at anything above 1-4 load increase very rapidly above the average thermal efficiency under conditions of average steam practice.

There is one other point of importance which is clearly shown in this graphic presentation. It relates to the gasoline consumption under the varying conditions of load. Considering the power of the gasoline motor in brake horsepower, and utilizing curve III, it will be observed that 1.1 pints of gasoline will serve for one horsepower hour when the motor is running at full load of the generator. This gasoline consumption increases by gradual increments up to 1.9 pints of gasoline per horsepower hour, when the power delivered is that required at 1-4 load of the generator. The thermal efficiency falls away with decreasing load because the gasoline thus increases. This chart, while it is primarily related to this generator set, reflects conditions which will be found in gasoline motors in general, and, to a certain extent, as they are used in automobile practice, with the exception, however, that the better conditions, which obtain in automobile work, will reflect a little more favorably and the thermal efficiency will be on a little higher plane.

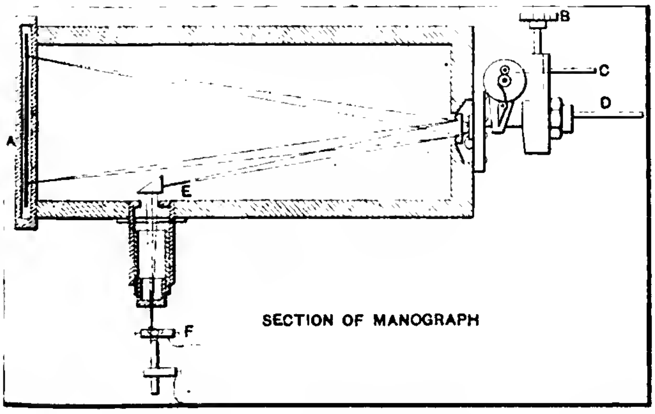


Fig. 27—Section of the manograph used in the testing of the Pierce motor under direction of Prof. Rola C. Carpenter

Unfortunately, the volumetric efficiency is not constant under all conditions of load and speed, when reference is had to internal combustion motors. In automobile work in particular, both the load and the speed vary over the broadest ranges. This volumetric efficiency is graphically represented in Fig. 23, which was taken from the Pierce series of tests, and it presents the situation very aptly. The volumetric efficiency decreases with increasing speed, due to the decreased time which is afforded for the incoming mixture, and by volumetric efficiency measurements it is possible to ascertain when the suction pressure crosses the atmospheric line. Under different conditions of power when the motor is running at 1,000 and 1,250 revolutions per minute respectively, the efficiency reaches its maximum of about 88 per cent in this particular motor at 30 horsepower for the speed given.

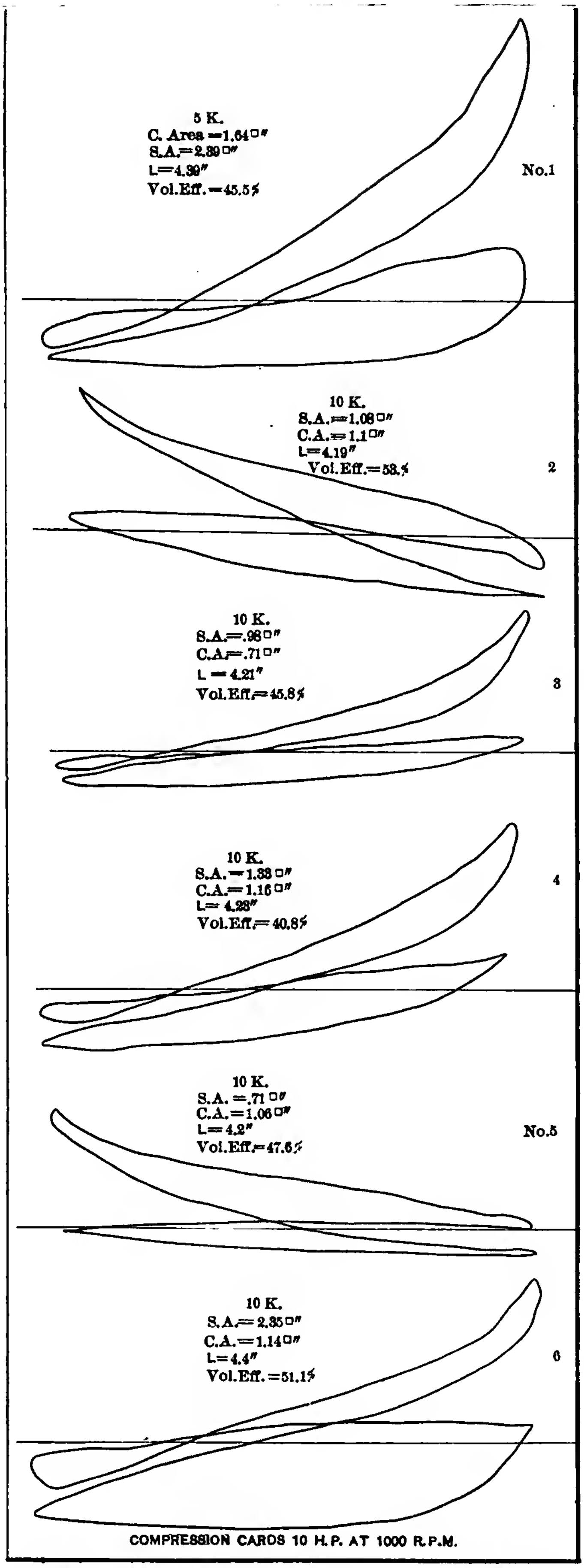


Fig. 26—Monograph cards from the six cylinders of a Pierce motor running at 1,000 revolutions per minute

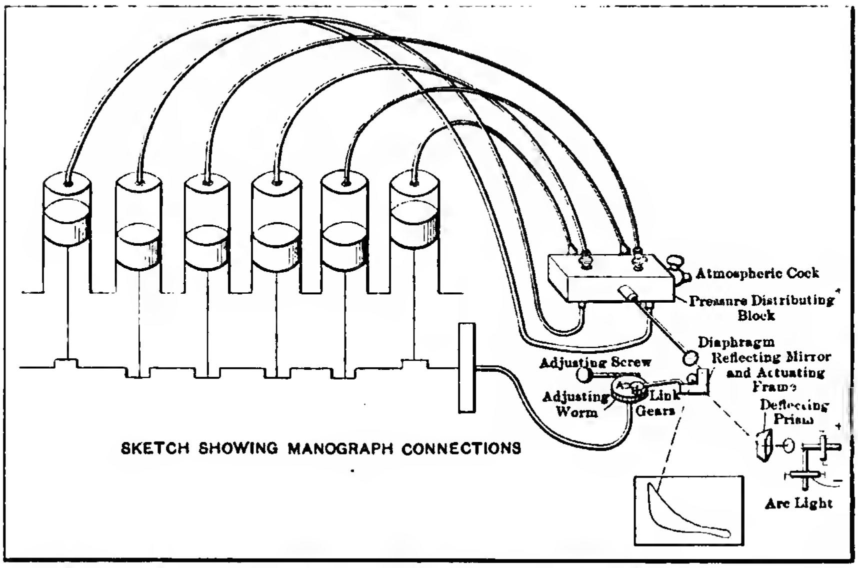


Fig. 28—Scheme of connecting up the manograph as it was used in the conduct of these tests

Influence of Temperature of Cooling Water—As a further illustration of the advantages to be derived from graphic methods reference is here made to Fig. 24, in which abscissa are in terms of temperature range of cooling water in degrees Fahrenheit; ordinates are in terms of time and minutes, and the motor, which was a "six," was run under conditions of maximum horsepower at several speeds from 600 to 1,250 revolutions per minute, inclusive. The temperature changed rapidly and violently when the motor was run at the low speed, which was 600 revolutions per minute. This goes to show that motors are prone to heat up, perhaps excessively, when the load is maximum for the minimum speed. The same characteristic is noted at a speed of 800 revolutions per minute, excepting that the changes are not so sudden. Nevertheless the temperature of cooling water increased persistently after a run of 16 minutes, whereas at 1,000 revolutions per minute the temperature ceased to increase after 18 minutes.

Autoists before acquiring a fair measure of experience frequently have what is termed "cooling trouble." It rather looks to the author as if it is in the nature of "heating trouble." This trouble comes primarily for reasons which are reflected in the chart Fig. 24, but they are accentuated if the motor is run on a retarded spark. Under the circumstances, in view of the information afforded, it would seem to be a good practice to avoid retarding the spark in the process of operating the motor at the low speed. Altering the richness of the mixture and the quantity thereof (putting it up to the carburetor)' would favorably influence this heating trouble.

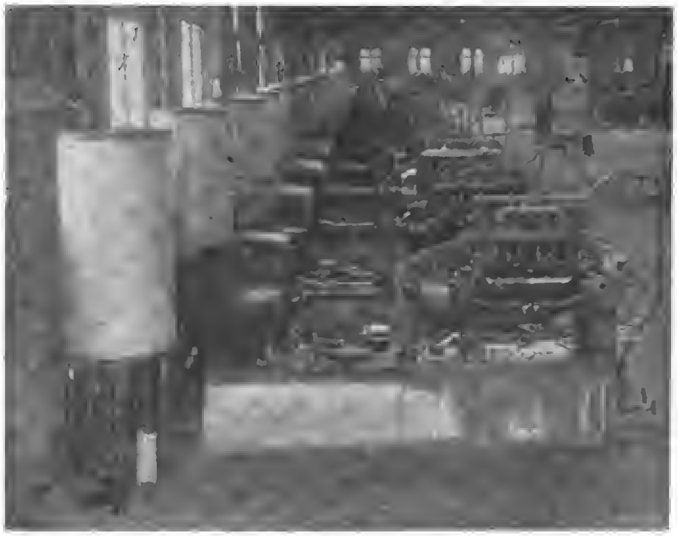


Fig. 30—Row of testing blocks as used at the Rambler plant for testing motors

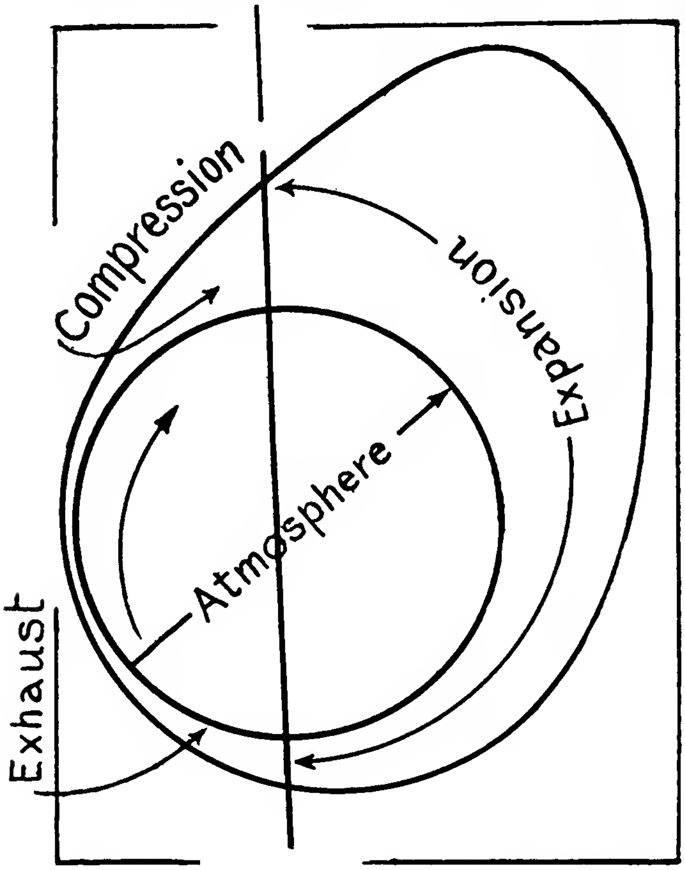


Fig. 29—Card from Purdy manograph, as taken at the Rambler plant by the inventor

UTILITY OF THE MANOGRAPH CONSIDERED

On account of the very high speed at which automobile motors operate, inertia, lost motion and other imperfections of indicators in general, renders them wholly unfit for use in determining the gas performance in the cylinders. The manograph, as an instrument, was contrived with the idea of overcoming these troubles, and it possesses certain virtues, among which is practically no inertia—this because of the utilization of photographic principles, on the theory that a beam of light is substantially free from inertia.

The cards taken by means of the manograph, as it is ordinarily used, look very much like the cards which are taken with a steam indicator. Fig. 25 shows the set of cards which were taken for the Pierce Company, one from each of the six cylinders of a Pierce motor, when the same was delivering 30 horsepower at 1,250 revolutions per minute. The information given on the cards is sufficient to make further discussion unnecessary at this time, save that it will be of advantage to have a set of compression cards from the same motor. This set is given in Fig. 26. They were taken when the motor was operating at 1,000 revolutions per minute delivering 30 horsepower.

The manograph used in this case was the Hospitalier-Carpentier, and the work was done under the direction of Prof. Rola C. Carpenter by graduates of Sibley College, Cornell. The section of the manograph shown in Fig. 27 and the method of connecting up is given in Fig. 28 with sufficient descriptive matter appended to satisfy the present situation.

Purdy Polar Manograph Has Advantages—In view of the importance of the subject, mention will be made of the Polar type of manograph now used in the Rambler plant of Thos. B. Jeffrey & Company, Kenosha, as invented by Frederick Purdy, Chief of the Rambler laboratory. This manograph produces a card as shown in Fig. 29, in which the beam of light rotates and presents a perfect circle at the atmospheric pressure, expanding as the pressure increases. In determining the pumping losses from this card all areas to the left of the center line represent losses, while the area of the expansion zone to the right represents useful work. It takes a little studying to make one familiar with this type of card, but it is entirely free from inertia and has other advantages which the author hopes to bring out at an early date.

A. L. A. M. LABORATORY WORK

In order to bring about a standardized set of conditions, the Association of Licensed Automobile Builders maintained what was designated as the Mechanical Branch, which was under the direction of a committee made up of chief engineers from some of the companies, and, having established a laboratory at a convenient point, investigated materials and conditions involved at length for the common good. It will be impossible to review the workings of the Mechanical Branch further than to briefly summarize a part of the result, sufficiently perhaps, to indicate the high character of the undertaking, and to enable purchasers of automobiles to appreciate at least a part of the reason why so much progress has been made in so short a time.

Specifications for Gas Engine Lubricants—In view of the importance of good lubrication, especially in cylinders of motors, investigations were made and the report rendered was as follows:

"Oil for this purpose must be a pure mineral oil, no addition or adulterant of any kind being permitted.

The following characteristics are desired:

Flash point (as determined in open cup) should not be less than 400 degrees Fahrenheit, and the fire test should not be less than 450 degrees Fahrenheit. Viscosity as measured at 100 degrees Fahrenheit, using a Saybolt Viscosimeter, should read not over 300 seconds. At other temperatures the viscosity should be as follows:

At 210 degrees Fahrenheit (Saybolt) 40 to 50 seconds.

At 210 degrees Fahrenheit (Tagliabau) 60 to 75 seconds.

Specific gravity should indicate between 30 and 32 degrees Baumé.

Residue on evaporation not over 1 per cent.

According to the recommendation the flash point should be the lowest degree at which the vapor ignites and goes out.

The fire test should be the lowest degree of which the vapor ignites and continues to burn.

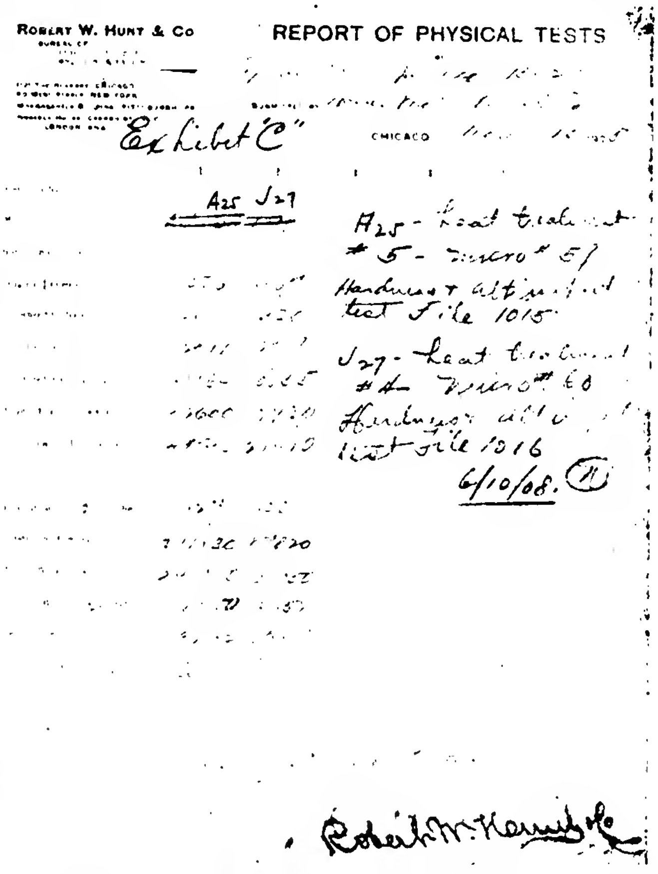
The specific gravity may be determined by special hydrometers, or better, by means of a Westphal balance.

Residuum on Evaporation—This test is of a special nature; in a retort (No. 16,384 Bausch & Lomb, or No. 3,873 Eimer & Amend) is placed between 40 and 50 grammes of oil carefully weighed. This retort is then put over the naked flame of a Bunsen burner and heated slowly to the boiling point, continuing the heat until all the liquid portion of the oil has passed over and out of the retort. The heating is then further continued by passing the flame over the entire surface of the retort in such a manner as to drive off everything possible from the body and neck of the retort which can be driven off at an incipient red heat. This is a temperature at which the glass in the retort begins to soften.

A coke-like residuum will be found in the retort. When the retort is cooled, this residuum should be weighed and the percentage of residuum, as compared with the original weight of the oil, may then be determined.

Only the best makes of retort will answer for this test, and for reliable work it should be made of Jena glass. Even with this quality of retort breakages are frequent, and, as a matter of fact, the test must be conducted with the greatest care.

Fig. 31—Testing dynamometer at the Rambler plant contrived to test completed automobiles



ROBERT W. HUNT & CO

REPORT OF PHYSICAL TESTS

Exhibit "C"

CHICAGO

A25 J27

6/10/08.

Fig. 32—Method of reporting investigations of steel as made by the Hunt laboratory

The Mechanical Branch of the A. L. A. M. fully settled a great many of the lubricating controversies for the manufacturers of automobiles, and eliminated speculation in so far as they are concerned. In the same way, the Mechanical Branch took up with the questions of steel, brass, bronze, and babbitt metals, fixing the limits within which it is safe to operate, considering the materials available or to be had by special heat.

A.L.A.M. SPECIFICATIONS NO. 3 FOR NICKEL STEEL

Nickel, 3.00.
Carbon, 0.20-0.28.
Silicon.
Sulphur, 0.04.
Phosphorus, 0.04.
Manganese, 0.60-0.90.

PHYSICAL PROPERTIES REQUIRED

Tensile strength, 85,000 pounds per square inch.
Elastic limit, 55,000 pounds per square inch.
Elongation, 25 per cent. in 2 inches.
Reduction of area, 50 per cent.
Condition, annealed.

PHYSICAL PROPERTIES AFTER HEAT TREATING

Tensile strength, 100,000 pounds per square inch.
Elastic limit, 70,000 pounds per square inch.
Elongation, 20 per cent. in 2 inches.
Reduction of area, 50 per cent.

TABLE II—CYLINDER ANNEALING TEST AT 400° F.

Measurements Made on Cold Cylinders. Cylinders Hot 15 Min. and Cold 15 Min.

Cylinder	Time	Top Parallel to pin	(Head) Perpend. to pin	Bottom Parallel to pin	(Open end) Perpend. to pin
1	9:45	3.6240	3.6241	3.6244	3.6248
	10:45	3.6241	3.6240	3.6245	3.6248
	11:00				
	1:00	3.6241	3.6241	3.6246	3.6248
	1:15				
	4:15	3.6241	3.6240	3.6246	3.6248
Hot	5:00	3.6350	3.6340	3.6350	3.6350
2	9:45	3.6243	3.6241	3.6249	3.6244
	10:45	3.6243	3.6240	3.6249	3.6244
	11:00				
	1:00	3.6247	3.6240	3.6249	3.6245
	1:15				
	4:15	3.6247	3.6240	3.6249	3.6244
Hot	5:00	3.6360	3.6350	3.6350	3.6350
3	9:45	3.6242	3.6246	3.6249	3.6250
	10:45	3.6243	3.6245	3.6249	3.6248
	11:00				
	1:00	3.6241	3.6244	3.6249	3.6249
	1:15				
	4:15	3.6243	3.6244	3.6248	3.6249
Hot	5:00	3.6350	3.6350	3.6360	3.6360

Oct. 16, 1908. L. R. Evans.

TABLE I—COMPARATIVE RADIATOR DIMENSIONS

Name	H.P. A.L.A.M. Rating	Area of front surface of Radiator in sq. ft.
Thomas (K)	72⅝	4.14
" (F)	53	3.33
" (L)	31⅝	3.28
" (G)	18¼	2.15
" (M)	43⅝	3.66
" (E)	53	3.74
Packard	40	3.0
"	26	2.56
Matheson	40	3.10
Pierce-Arrow	36	2.85
Rainier	(4 cyl.)	3.45
National	35	3.48
"	50	4.94
Haynes	36	2.65
Royal	42	3.0
Peerless	38	3.11

Sept. 1, 1909.

Note: The front areas, as given, do not tell the whole story. In order to be able to ascertain why the respective motors perform satisfactorily even though the front areas are not the same, it is necessary to investigate the motors, and determine the flame-swept surfaces, efficiencies, and depth of radiators, as well as other matters. This table tells of one phase of the effort to evolve quality, the other phases having been taken up in regular order.

TABLE III—TEST DATA OF REED EJECTOR MUFFLER

Speed of car Miles per hour	Manometer reading Mercury inches—Muffler In	Out	Back pressure. No. sq. in. above atmosphere—Muffler In	Out	Position of throttle	Remarks
55		1.8		.88	Full	Level
60	10.4		5.1		"	"
70	8.6		4.21		"	Down hill
40		.7		.343	⅞	Up hill
50	6.8		3.33		⅞	"
60	7.6		3.72		⅞	Level
60		2.0		.98	⅞	"
70	8.4		4.11		⅞	Down hill
45	7.6		3.73		¾	Up hill
50	8.5		4.16		¾	"
60	10.0		4.9		¾	Level
60	9.8		4.8		¾	"
63	10.0		4.9		¾	"
73	8.4				¾	Down hill
74		2.6		1.27	¾	"
40	4.6		2.26		⅝	Level
45	5.0		2.45		⅝	"
45		1.0		.49	⅝	"
50	6.0		2.94		⅝	"
55		1.7		.835	⅝	"
60	7.0		3.43		⅝	"
65	7.4		3.62		⅝	"
65		2.0		.98	⅝	"

TABLE IV—PISTON DISTORTION TEST

1st bridge Paral	1st bridge Perpen to pin	2d bridge Paral	2d bridge Perpen to pin	3d bridge Paral	3d bridge Perpen to pin	4th bridge Paral	4th bridge Perpen to pin	Between wrist pin and 4th Paral	Between wrist pin and 4th Perpen to pin	Bottom Top Paral	Bottom Top Perpen to pin	Bottom Web Paral	Bottom Web Perpen to pin
Readings with no load ever applied to piston. Piston straight ground.													
3.6170	3.6170	3.6224	3.6220	3.6223	3.6220	3.6225	3.6220	3.6225	3.6220	3.6220	3.6220	3.6220	3.6220
Readings of diameter with 2-ton load. Practically maximum pressure occurring during operation of engine.													
		3.6234	3.6216	3.6263	3.6204	3.6262	3.6192	3.6269	3.6202	3.6210	3.6190	3.6224	3.6175
		3.6232	3.6212	3.6260	3.6200	3.6265	3.6200	3.6265	3.6200	3.6217	3.6185	3.6223	3.6170
Readings of diameter with 5 ton load.													
		3.6245	3.6205	3.6275	3.6185	3.6315	3.6160	3.6310	3.6185	3.6175	3.6155	3.6210	3.6140
		3.6245	3.6210	3.6280	3.6190	3.6320	3.6165	3.6315	6.3190	3.6180	3.6160	3.6205	3.6140
Pressure of 7 tons applied and rod failed. Readings of diameter after 7-ton load pressure removed. Permanent set of pistons.													
3.6170	3.6170	3.6224	3.6220	3.6227	3.6215	3.6238	3.6216	3.6245	3.6224	3.6203	3.6230	3.6203	3.6243
3.6170	3.6170	3.6222	3.6220	3.6225	3.6213	3.6236	3.6214	3.6244	3.6223	3.6203	3.6230	3.6299	3.6243

Electrics Extending Scope of Usefulness

By Thos J Fay

HISTORY as it relates to electric vehicles presents a long series of efforts undertaken in the process of bringing the storage battery up to its present state of efficiency. The electrical equipment in general was substantially protected, even before the electric vehicle became a serious undertaking, but the battery situation retarded progress for a number of years, not so much due to inherent lack of ability of the storage battery as

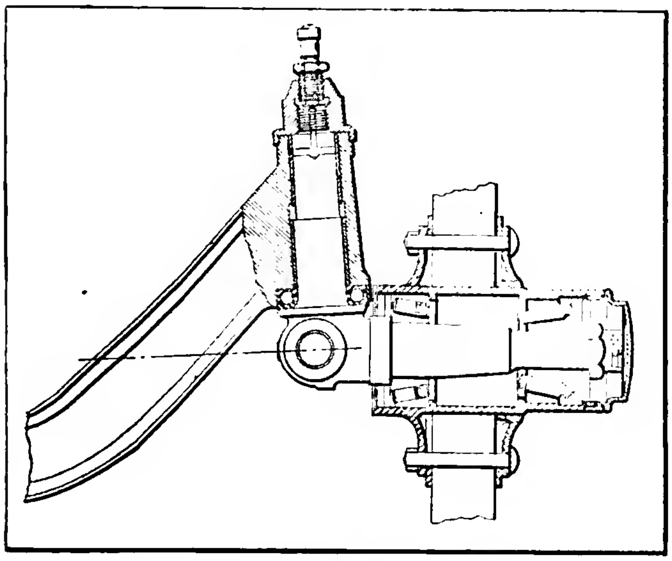


Fig. 1—Lemoine type of steering knuckle with Timken roller bearings and a ball thrust

a type, but to lack of training of the men who were required to handle an electrochemical equipment, they not being possessors of sufficient knowledge of this highly technical character.

ELECTRIC VEHICLES MECHANICALLY CONSIDERED

In a general way, the running gear of an electric vehicle differs but slightly from the same class of gear, as it obtains in gasoline automobile tactics. The wheelbase is generally shorter in the electric vehicle, the center of gravity is probably a little lower, and the chassis frame is frequently dispensed with, the body serving adequately for the intended purpose. This being of wood has the virtue of resisting the fumes of acid. The acid fumes come, of course, from the battery during the charging period, owing to the presence of sulphuric acid in the electrolyte, the specific gravity of which is about 25 degrees Baumé.

Barring the structural features in electric vehicles, which are brought about to considerations as above, the whole mechanical situation is one which can be treated in a rational way, and in the cars which will be on exhibition they present normal features, differing in a schematic way, so that they may be subdivided in classes as follows:

(A) Side chain drive types as exemplified in the Woods electric vehicle.

(B) Worm drive, of which the Babcock is a fine example.

(C) Shaft drive as presented in the Baker.

(D) Silent chain drive as exemplified in the Studebaker, Detroit Electric, Waverley, Rausch & Lang, Columbia, Bailey and others.

Next to the electrical features which influence the mechanical structure in these vehicles, it is very likely that for the rest, modern drop forgings, steel pressings and anti-friction bearings, are representative of the very best practice. The front axles are pretty generally of the eye section, made in one piece, and while Lemoine, Elliott and the other standard types of knuckles are used, they more often than not have a ball thrust bearing to carry the load. The wheels roll on annular types of bearings in some cases, Timken roller bearings in others, and cup and cone bearings to some extent.

Rear axles are fairly well divided between side chain drives and live types. Taking the side chain drives, and using the Woods type as an illustration, the point will be made that the sprocket chains are rendered noiseless by using the best class of chains over accurately cut sprockets, and with means for maintaining precision of alignment and distance. Referring to the live types of axles, numerous of the examples are equipped with full floating types of jack shafts, and the driving jaws are especially large and particularly well fitted. In this class of work, in view of the desire of mileage without heavy drafts on the battery, it is this precision of mechanical fit and well executed detail at every point which indicates the way to prime success.

SPRING SUSPENSION AND RIDING QUALITIES

In view of the weight of battery which has to be carried, frequently reaching at least 2000 pounds, referring of course to the most pretentious types of electric vehicles, the spring suspension must be most carefully thought out, and the character to be determined of material and workmanship incorporated in the springs taxes the ingenuity of the most expert spring makers. In this type of car platform types of springs are much in vogue, they have the requisite characteristics, and the further effort is by way of utilizing a sufficient mass of suitable material. It is now a well-established principle in spring making that quality of material is not the sole criterion. There must be a certain quantity of material used, the mass of which must relate to the foot pounds of energy represented in the body oscillations. The spring makers who deal with this problem are fully informed as to the facts, and, from results attained, it seems to be a fair conclusion that they have taken advantage of every opportunity.

WIRING CONTROL AND OTHER FEATURES

With a view of insuring a minimum of losses when the draft on the battery is maximum, the sizes of wire used are generally such that the drop in volts will be well within 2 per cent. when the current in amperes is equal to three times the normal draft. The wire used is of the class known as "flexible cable" made from pure lake copper, insulated to a good thickness by acid re-

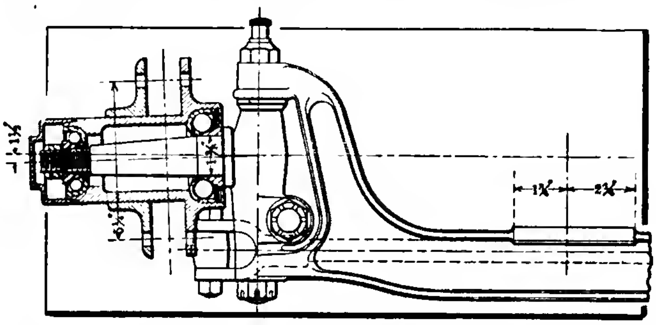


Fig. 2—Elliott type of steering knuckle with eye section axle and cup and cone ball bearings

sisting rubber compound. Cotton braided insulation is not used in view of the effect of acid upon it. The wires are run in wooden casings, or on porcelain insulators, and the preference is for a perfectly accessible position, in order that trouble, if it should creep in, may be quickly found and eliminated.

Controllers are frequently of the drum type, designed for continuous torque work, and five speeds ahead with one reverse seems to be the general practice. Electric vehicles in pleasure service are provided with interlocking devices so contrived that

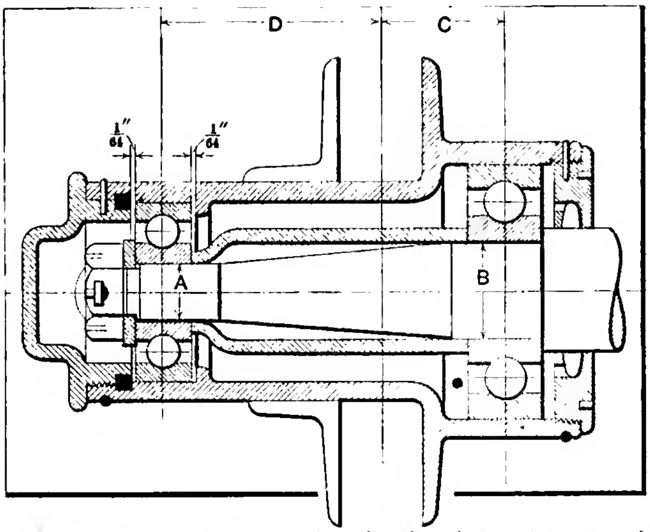


Fig. 3—Annular type of ball bearings for side chain drive rear axle

the operator (if absent minded) is protected as against wrong moves, the idea being to make it impossible to start an electric vehicle excepting gradually, and under precise conditions, which is a matter involving progression, starting the car slowly and gradually working up to the highest attainable speed.

Brakes are mostly mechanical, of great competence and duplicated, thus affording the ordinary service brakes for regularly operating and emergency brakes against an occasion. To some extent electric brakes are utilized also.

STORAGE BATTERIES SIMMERED DOWN

In 1881 M. Camille Faure in France and Charles F. Brush in America, working independently, but along similar lines, patented (Faure in France and Brush in America) methods of hastening formation of active materials on the grids of plates used in lead storage batteries. Since then progress has been slow but sure, knowledge has amplified and makers of storage batteries, against great resistance, due to prejudice born of lack of electrochemical knowledge, have persistently fought. To-day, however, storage batteries are as stable as banks and electric vehicles depend absolutely upon them for success.

The history of the storage battery dates back of the efforts of Brush and Faure, in fact, back to many early investigators, among which the following were the more prominent:

HISTORY OF STORAGE BATTERY EFFORTS

Year. Discovery.

1800—Volta discovered the galvanic battery.

1901—Gautherot discovered that if platinum or silver electrodes were connected together after they were subjected to an electrical charge, a discharge would follow.

1803—Ritter made the same discovery, substituting gold wire for platinum or silver. He superimposed plates of gold, separating them by means of discs of cloth, moistened the couple with ammonia water and observed that a secondary current of good strength and efficiency followed each charge (electric) of the couple.

1837—Schoenbein discovered that peroxide of lead was a medium of great efficiency in storage battery work.

1837—Volta, Davy, Marianini, were successful in adding much to the store of knowledge.

1842—Grove constructed his famous gas battery and he demonstrated that the voltage obtained was due to electrolytic action, liberating oxygen and hydrogen, the electrolyte being acidulated water, using sulphuric acid for the purpose. Grove, by the way, prior to 1842, came forward with the statement that metallic grids, coated with oxide, were better than metallic grids for the purpose, and Wheatstone, as well as Siemens (prior to 1842), found that peroxide of lead was the most efficient for the purpose.

Michael Faraday, about this time, added to the store of knowledge, he having discovered that after electrolyzing a solution of lead acetate, peroxide was produced in the positive plates. Niblett stated that Wheatstone, Niaudet and de la Rue were cognizant of the powerful depolarizing action of peroxide at that time, but it was not taken advantage of then.

1860—M. Gaston Planté constructed his well-known secondary battery, in which sheets of pure rolled lead were separated from each other, by means of felt, and they were then rolled up into a coil, submerged in sulphuric acid electrolyte, and charged; the first practical storage battery was the result. The title to Planté's distinction was somewhat clouded, due to the claim made by M. Duerlir, that Sinsteden took advantage of the secondary action of lead in a bath of sulphuric acid in 1854.

1879—Metzger did away with the long snd costly forming process by applying active materials to the metallic grid, thus aborting the necessity of growing active material out of the metallic lead of the grids.

1881—M. Camille Faure, in France, precured letters patent on a process of mechanically applying the active materials to the grids.

Charles F. Brush, in America, took out letters patent on the mechanical process of mechanically applying the active material to the metallic grids.

In an action at law, in the United States, the Court ruled that to Charles F. Brush belonged the honor of the invention.

History, as it is written in France, dissents with the Court which ruled in favor of Brush.

THE THIRTY YEARS' WAR

From 1880 down to the present time represents the period of development, as it were, of the storage battery, and during this time so many patents were taken out by such a large army of inventors that to record them would demand more space than would be available in a Show Number of The Automobile. This period of 30 years represented a war of mind over matter, involving millions of dollars, a myriad of failures and final success.

Strange to relate, the storage battery of to-day, clothed in the ermine of success, is but the storage battery of 1881, carefully made and conforming to the tangle of laws; laws that when offended, as they formerly were, made known their displeasure, and failure was the reward of the offenders.

Distinctions To be Drawn—The Planté type of battery, which was the product of 1860, is one in which the active material is formed out of the grids which compose the elements of the cells of battery; whereas, the Faure type is the one which takes advantage of the mechanical application of the active material.

Earlier methods, involving both generic types of battery, were long ago discarded in favor of more efficient ways of accomplishing the desired results. For illustration: In the Planté type

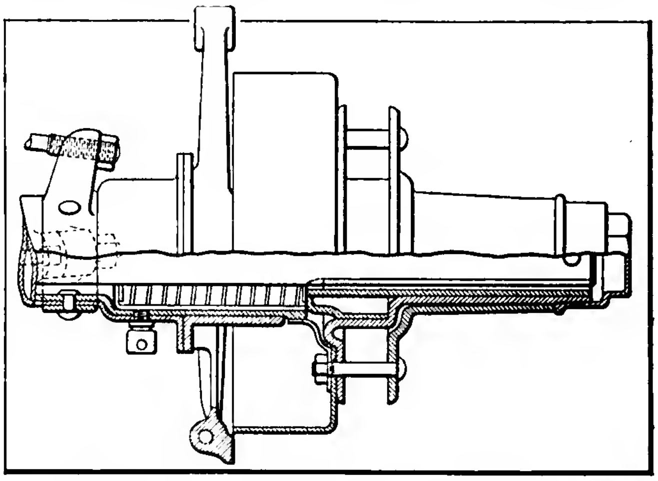


Fig. 4—Hyatt type of roller bearings as used in live rear axles

of battery, as it is made to-day, the grids are first "spun," an idea introduced by Madden and Chamberlain in 1896 (Letters Patent U. S., No. 572,363) and one now in vogue, especially for negative plates in Gould storage batteries. The spinning process is conducted in an especially devised machine, in which the sheets of pure rolled lead are placed and deep grooves are made by means of rotary knives, placed in gangs on a mandrel, so arranged that the original surface of the plate in each instance is increased enormously. The spun plates are placed (between dummies) in a forming electrolyte, and when a charging current is passed through the plates they quickly grow a deep coat of active material which completely fills the furrows.

In the Faure types of plates instead of subjecting them to a spinning process they are cast under pressure, using an alloy of lead and antimony to give strength. Then a lattice work formation of the moulds brings out the grids in shape to enable them to be filled with salts of lead formed into a paste. The active material is then readily formed and the ampere hour capacity of the batteries so made is found to be great in comparison.

In the earlier attempts to make batteries in this way, owing to lack of knowledge of the phenomena which transpired in the charging and discharging cycles, the materials failed to stay in place sufficiently long to satisfy the commercial needs. Then improvements made were mostly in this direction, it being the case that they gradually mounted to a high plane, and to-day as it can be safely said, in view of the rapid growth of electric vehicle enterprises, that the storage battery is stable, efficient and so commercially capable to meet all reasonable requirements.

WATT OUTPUT AND LIFE RELATED

Since a lead cell of battery has a potential difference of about two volts (between 1.8 and 2.2 volts, which is the discharging range), it is necessary to employ enough cells in series to make up the voltage for which the motor is wound, limiting the number of cells in series, however, to that number which, when charged in series, will permit of charging on the circuit available for the purpose.

When batteries are being charged there are times when the voltage should be on a basis of 2.6 volts per cell and with 44 cells in series (not counting "drop" in the wiring system) the charging voltage must equal 114.4, which, including probable "drop," brings the circuit voltage up to 120 as a low figure, it being true, as a rule, that the "drop," which may be quite noticeable in wiring, switches and connections, will equal more than five volts.

With 44 cells of battery in series, considering the average voltage on discharge as, say, 2 volts, the motor would be wound for, say, 90 volts, and the fields, which would be series wound, would take care of all voltage variations, since the exciting current would be the same as that entering the armature. In some cases, when the voltage of the charging circuit is down to 115, 40 cells of battery are used, and the motor is then wound for 80 volts.

When the battery, as respects the number of cells used, is not matched up with the circuit with which it will be connected for purposes of charging, one of two things must happen: (A) If the charging voltage is not high enough the battery will be starved, sulphation will take place and the life of the battery, also its output, will fall below the obtainable level. (B) If the charging voltage is excessive the battery will be destroyed, unless a resistance is inserted in series with the battery sufficient to cause a drop equal to the excess of voltage.

The right number of cells to use then is that number which can be correctly charged, considering the circuit available, and the motor for an electric vehicle must be wound for the mean voltage of the battery. These are matters of the gravest importance and probably the details which, being well cared for, have brought battery life, hence vehicle satisfaction, up to a very high level in the estimation of users.

With these matters properly attended to, it is possible to intelligently discuss the questions of watt output of batteries and so learn how it is that life and watt output are entwined.

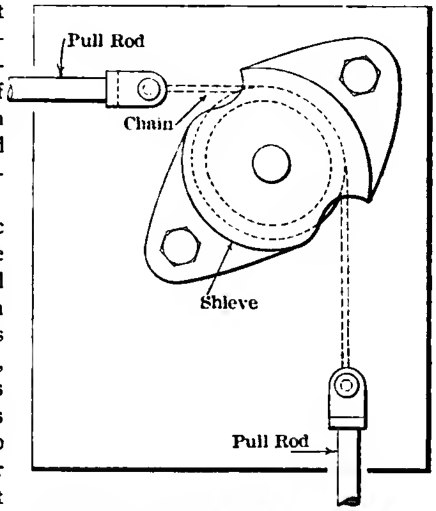


Fig. 5—Flexible cable and shleve as used with brake cables to make turns

The average electric vehicle of the pleasure type will run on a hard level road at maximum speed at, say 80 volts and 20 amperes, and, since volts by amperes equal watts, it follows that 80 × 20 = 1,600 watts, which, per hour, represents watt hours.

If the battery used under these conditions will furnish the necessary current in amperes, say, four hours, the watt output will then be (taking an average) 6,400, and if the battery weighs 400 pounds the watt output of the same will be on a basis of 16 watt-hours per pound of battery.

The watt output of a battery depends upon the conditions as follows:

(A) Surface of positive plates, assuming the negative plates are equal to the requirement, which is generally true, and in the better class of batteries, negative plate capacity is in considerable excess, thus affording long life.

(B) Weight of active material in positive plates, assuming the same to be capable of conversion; or, better yet, counting that portion of the positive active material which is converted during charge and subsequent discharge.

RATE OF DISCHARGE AND OUTPUT OF A BATTERY

Discharge Rate	Ampere Hours Output
In 10 hours	100
In 8 hours	98
In 6 hours	93
In 4 hours	82.5
In 3 hours	75
In 2 hours	65
In 1 hour	50

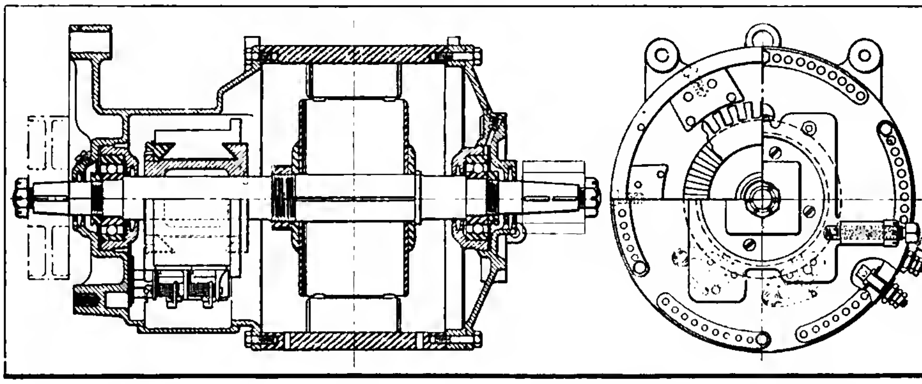


Fig. 6—Section of a ball bearing type of electric motor as applied to vehicles

THE AUTOMOBILE

Vol. XXII Thursday, January 6, 1910 No. 1

THE CLASS JOURNAL COMPANY
H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

EDITORIAL DEPARTMENT
R. F. KELSEY THOS. J. FAY
MORRIS A. HALL GEORGE H. GODLEY
W. F. BRADLEY, Foreign Representative

ADVERTISING DEPARTMENT
W. I. RALPH, 1035 Old South Bldg., Boston LOUIS R. SMITH, New York
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Cable Address - - - - - - - - - - - - - - - - Autoland, New York
Long Distance Telephone - - - - - - - - - - - 2046 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico - - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Union, Including Canada - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS
ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

AN EDITORIAL ANNOUNCEMENT

After four years of service as managing editor of "The Automobile" there comes a severance of pleasant relations with The Class Journal Company, in order that I may assume new duties in a field that once before strongly appealed to me. From the national secretaryship of the American Automobile Association in 1906, I moved to the editorship which I am now relinquishing to become again identified with the A.A.A. as chairman of its Executive Committee and publisher of its official monthly magazine. If the readers of "The Automobile" share the expressed belief of The Class Journal Company that my efforts have contributed some additional interest to its pages, even in part, then I shall consider that the years spent were well employed. A. G. BATCHELDER.

OPTIMISM MARKS PALACE SHOW

Apparent from blocks away, all through the three or more floors of the Grand Central Palace, and particularly noticeable among the salesmen and agents, is the cheerful optimism of this year's A. M. C. M. A. Show, holding forth during the present week in New York City. Not alone are the public pleased with the fine, brave showing which the cars themselves have made, but their sponsors are jubilant, the factory representatives elated with the business transacted, and there are none worried, except possibly some isolated sales agent whose allowance of cars may be cut down.

As is usual, the decorations and arrangement of the building and exhibits are nearly as good as the ubiquitous press agents have been telling us they would be for some months past. The car exhibits, with perhaps one single exception, were in place for the opening, and the whole show was ready when it was supposed to be.

As indicative of the more remote future tendencies, the commercial section is very well filled with a fine class of cars, varying throughout the whole range of capacities and running the whole gamut of prices. Not this alone, but many of the pleasure vehicle manufacturers not previously numbered with this crowd either actually or in spirit, make the fact known that they are working on something in this line which will make every one concerned observe the result. Were these cases few and far between, nothing would be thought of them, but in the present instance they are numerous and widespread.

Many more makers take the stand that they are so busy trying to make as many pleasure cars as their agents sell that they have no time to even think of the commercial end.

Most noticeable among the details are the increased tendencies toward thermo cooling, long strokes, block cylinder castings, magneto predominance, and increased percentage of water-cooling systems. All of these—barring long stroke—may be taken as simplifications, which, in a word, is the predominant tendency. Radius rods and torsion tubes are missing, wheels and tires are larger, and all of the little details hardly worth mentioning here are improved, refined and brought up to, or, more correctly, ahead of, date. The present show is a fitting introduction to what is destined to be the biggest and best automobile year for all concerned, 1910.

AND NOW, THE LICENSED SHOW

In that city of rapid transit, New York, those inclined toward the automobile and its parts will this week be given the chance to show their skill in the rapid change line, for following closely upon the A. M. C. M. A. show, the show of the licensed body known as the Association of Licensed Automobile Manufacturers will be opened to the public.

Among the ranks of the latter, the percentage of makers catering to the class of buyers who inquire the price last instead of making it the controlling factor is much greater than at the show which will just be closing at the time this one opens. This higher percentage of higher-class cars without a doubt will give the latter exhibition a somewhat higher tone; the cars themselves will doubtless be more elaborate and more highly finished.

Then, too, the setting in the historic Garden—now, if rumor can be believed, about to be razed to make place for a more prosaic structure—has always been such as to attract many who would not visit the other house. All this combines to throw about the A. L. A. M. annual exhibit a glamour which there is no gainsaying. This is very desirable to the exhibitors, for the bigger the attendance, the bigger the sales, if not at present, at least in the near or more remote future. The whole spells more business, which in the last analysis is the actual reason for all shows of this character.

ANNUAL MEETING SOCIETY OF AUTOMOBILE ENGINEERS

THE fourth annual meeting of the Society of Automobile Engineers—first session—was opened on Tuesday at 10 a. m. in the Assembly Room of the Automobile Club of America. The meeting was attended by about thirty members, President Henry Hess in the chair. The morning session was given up to the discussion of various matters for the good of the society, including the appointment of automobile publications to receive and publish the papers of the society, arrangements having been made by the council whereby the publishers of the leading automobile papers contribute largely to the funds of the society for the use of its technical papers and other material.

On adjournment of the morning session the members of the society were tendered a luncheon by the Automobile Club of America in the grill room adjoining the meeting room, which occupied the attention of the members until the meeting in the afternoon at 2 o'clock, at which time, in the regular order of business, the following papers were read and discussed:

The effect of frequent and heavy charging upon pasted lead peroxide plates, by Hugh Rodman.

A graphic determination of chain-speed gear-bearing loads, by L. C. Freeman.

Characteristic curves of internal combustion motors, by B. D. Gray.

These papers proved to be of unusual interest because they were of a character which might well be designated as "all meat." The storage battery paper was apropos in view of the wide activity which now dominates the electric vehicle situation, and the paper, when published, should prove of exceeding value, particularly to those who have the maintenance of electric vehicles within their charge. It will, of course, have a secondary interest to the owners of electrics. The paper in relation to chain-speed gear-bearing loads, while it is of a technical character in accentuated form, is most comprehensive, nevertheless, and covers divers important points, clearing up things in relation to which engineers have been in controversy.

Mr. Gray's exposé of the characterictic curve situation has the especial merit of tersely pointing out conditions which should lead to a final and better understanding of the abilities of internal combustion motors, and the paper should lead to intelligent and profitable discussion, which is what Mr. Gray hopes to bring out.

At the close of the technical session the chairman announced that a paper discussing some causes of failure of automobile gears would be read by Dr. Sargent at the January 13 meeting.

WHAT IS TO BECOME OF THE A. C. A. DYNAMOMETER

It will be remembered that the A. C. A. installed a special automobile testing dynamometer, which was designed by Dr. Schuyler Scatts Wheeler and installed at the club with the expectation that it would serve as a means by which club members, when they purchased automobiles, would be able to ascertain if the makers lived up to the expectations of the purchasers. This dynamometer is a most ingenious device, capable of many things, and what to do with it is the matter which was broached at the meeting to-day, with the hope, perchance, that this body of engineers, collectively, might be able to suggest a method by which the excellent virtues of this testing machine could be spread out over a more diversified zone of usefulness.

Alden L. McMurtry, chairman of the technical committee of the Automobile Club of America, invited the members to witness tests of an automobile type motor and also a radiator in the laboratory of the club, and an adjournment was made to the top floor of the building where the testing appartus is installed. Mr. McMurtry said that the question of making certain changes in the club's dynamometer was being considered by the technical committee of the club. It had been proposed to adapt the instrument to take power readings from the hubs of the rear wheels of a car under test instead of transmitting the power by the contact of the rear tires with wooden drums. In this way the error introduced by the condition of the tires would be eliminated.

In a general discussion of the dynamometer in which the members of the Society were asked to express their views, Mr. Cave suggested that automobile builders be requested to submit cars from their factories which would be typical of their average practice, and tests made with these cars could be adopted as standards for comparison. It would thus become possible for a user of any car to have it tested and its performances compared with those of the standard factory car, so that any deficiency could be noted.

It is understood that the board of governors of the club contemplates the sale of the dynamometer in case the proposed modifications are not put into effect.

Pursuant to notices sent out by Secretary Churchward, the first of the two annual dinners to be held during the Shows was held in the Grill Room of the Automobile Club of America at 8 o'clock. About sixty members and guests were present, after which the meeting adjourned until the second session to be held at the Engineering Societies Building, on January 13, which will be followed by a dinner at the Engineers' Club in the evening of the same day, after which the Society will be turned over to the new officers for the ensuing year.

It was a graceful act on the part of the A. C. A. to place its beautiful club house at the disposal of the engineers, but the board of directors of the club reached the hearts of the S. A. E. membership through the most diplomatic channel known to man, which took expression by way of a mid-day luncheon, which very aptly bridged over the recess which was taken at that time. In recognition of the splendid hospitality of the club, the Society, before the termination of the evening at the banquet, tendered a vote of thanks to the A. C. A.

FUTURE OF THE SOCIETY LOOKS BRILLIANT

When the Society of Automobile Engineers first started, and A. L. Riker took the presidency over five years ago, it was a baker's dozen of enthusiasts who assembled there and bravely assumed responsibilities of charter members. To a casual observer the situation looked discouraging in view of the then activities of the mechanical branch of the A. L. A. M. These staunch advocates of an absolutely independent and untrammeled society used excellent material for a foundation, and after events proved that an association of engineers to accomplish the most good must enter the assembly hall dressed in their own minds, and free to express such sentiments as they may care to voice, with a feeling of perfect independence, enjoying the distinction of doing as they see fit.

Commercialism has never been welcome in this Society; it stands for abstract engineering, and it has in its body upwards of 300 members at the present time, they coming from the engineering offices of the most representative companies who are devoted to the building of automobiles in America, and to some extent from abroad.

The Society has what is designated as an International Membership, which permits engineers from foreign societies to take out a membership in the S. A. E and to participate in the advantages which are derived therefrom.

SALIENT FEATURES OF THE A. L. A. M. SHOW

OPENS Saturday evening, January 8, and closes Saturday, January 15. The show is open to the public daily, except Sunday, from 10 a. m. to 11 p. m. Society days are Tuesday and Thursday, when double admission will be charged.

Three hundred and twenty-three exhibits, including gasoline, electric and steam pleasure and commercial vehicles, chassis, bodies, motorcycles and all sorts of parts and accessories, machine tools, automobile apparel, etc.

Forty-two exhibits of standard American pleasure cars; 12 exhibits of commercial cars, delivery wagons, trucks, buses, taxicabs, ambulances, fire wagons, etc.; 23 exhibits of motorcycles; 243 exhibits of accessories and parts.

Total value of exhibits, $2,250,000, $250,000 more than in 1909.

More than $35,000 has been expended for decorations.

Lowest priced car, $750.

Highest priced car, $7,500.

Expected attendance, 150,000 persons.

Expected attendance of carriage dealers, 2,000.

Expected attendance of automobile dealers, 5,000.

One of the most pretentious displays of automobile trophies ever seen in America. Among them are the Vanderbilt Cup, the Glidden tour prizes, the Indiana trophy, the Massapequa Cup, the Merrimac Valley Cup, Brighton Beach 24-Hour Race trophies, the Dewar Cup, Sewall-Alden, Tanforan, Thermoid, Lowell, Fairmount Park, Detroit and Dead Horse Hill Climb Cups.

Decorative scheme—main floor: A Roman amphitheatre. White and gold are the dominant colors throughout the whole decorative scheme, although green and crimson are also strongly in evidence. More than 7,000 yards of blue bunting are used for a canopy, concealing the girders of the roof. A score of arc lamps with colored shades hang from the roof, and thousands of incandescent lamps twinkle in the canopy. Over 6,000 square yards of carpeting are used for flooring of the car exhibits.

Thirty Doric columns, each 25 feet high and topped by the show emblem—an eagle on a wheel—add to the beauty of the decorations. Fifty ornamental lamp-posts mark out the spaces on main floor and thirty on the elevated platform. A decorative Roman seat faces the Garden arena entrance. It is backed by an electrically illuminated fountain filled with goldfish and pond lilies.

The Exhibition Hall contains a novel latticed arbor, and an immense rosette and twenty-four white sunbursts hang from center of hall.

The Concert Hall exhibits appear beneath a canvas tent ceiling similar to that of a circus tent.

In the basement a Dutch-Colonial rathskeller, painted in cream white, adorned with autumnal foliage, is a feature.

The exhibition is under the management of the Association of Licensed Automobile Manufacturers. Show committee: Col. George Pope, chairman; Charles Clifton and Merle L. Downs, secretary.

MEETINGS DURING GARDEN SHOW WEEK

The week of the Tenth National Automobile Show, in Madison Square Garden, January 8-15, will be a busy period for the automobile enthusiast and those actively connected with the industry. Many firms and organizations have planned dinners, meetings, etc. Apart from entertainment features there will be a lot of doings of serious sort on the part of various organizations. Events that are scheduled definitely are:

Tuesday, January 11

Meeting of Executive Committee of the American Automobile Association, 10 A. M., at National Headquarters, 437 Fifth avenue. President Lewis R. Speare will preside.

Wednesday, January 12

Meeting of Executive Committee of the National Association of Automobile Manufacturers, at Hotel Victoria, 10 A. M. The annual meeting of the Association will be held at the same place at 11 A. M.

Meeting of Legislative Board of the American Automobile Association, 437 Fifth avenue, 11 A. M. Charles Thaddeus Terry will preside.

Thursday, January 13

Meeting of the Society of Automobile Engineers at the Society's building, 25 West Thirty-ninth street, 10 A. M. At 8 P. M. a dinner will be held.

Meeting of the directors of the New York State Automobile Association, 10 A. M., at Hotel Belmont. President H. A. Meldrum will preside.

Meeting of the Touring Information Board, at headquarters, 2 P. M. Chairman Powell Evans will preside.

Meeting of the Show Committee and Committee of Management of the American Motor Car Manufacturers' Association at headquarters, 505 Fifth avenue, 10 A. M.

Friday, January 14

Second annual reunion of the A.A.A. State and Club Secretaries at headquarters of the Association, 10 A. M. Secretary Frederick H. Elliott will preside. Luncheon at 1 P. M.

The Association of Licensed Automobile Manufacturers will hold meetings during the week, as will also the Importers Automobile Salon.

ENGINEERS WILL MEET IN JANUARY

Meetings of the American Society of Mechanical Engineers will be held in New York on Jan. 11, in St. Louis on Jan. 15, and in Boston on Jan. 21. The New York meeting, which will be held in the Engineering Societies' building Tuesday evening, Jan. 11, just in time to catch all of the engineers visiting the Metropolis then for the A. L. A. M. Show, will discuss mainly lubricating oils and lubrication. The paper upon "Efficiency Tests of Lubricating Oils," by Prof. F. H. Sibley, of the University of Alabama, will be presented and important contributions upon the properties of lubricants, their efficiency, durability, characteristics, etc., will be made by Dr. C. F. Mabery, of Case School, Cleveland, and General Charles Miller, of Franklin, Pa.

This subject of lubrication is so important in its bearing upon the conservation of power and upon machinery of all kinds, especially since the introduction of recent new types, such as the steam turbine and automobile, that it is desirable to have authentic information easily available for the use of engineers.

The president of the Boston Society of Civil Engineers will also outline what his organization has accomplished toward a project that has been under discussion for a united engineering building, to be occupied by the societies in that vicinity.

SHOW SMALL, BUT A BUSINESS-GETTER

COLUMBUS, O., Jan. 3—While the attendance was not all that was expected, the first motor show held in Columbus under the auspices of the Columbus Automobile Club, which closed New Year's night, was a success. The dealers were enthusiastic over the number of cars sold and prospects secured. While it has not been stated officially, the rumor is about that the show will be made an annual affair.

Impressive in the extreme were the closing scenes. All the exhibitors and assistants, headed by the electric cars and the band, paraded the hall before the show was declared closed.

THE STORY OF THE A·M·C·M·A SHOW

WHEN Acting-Mayor McGowan pulled the cord which opened the silken curtain concealing the electrical marble fountain at the end of the main hall of the Grand Central Palace on New Year's Eve, after a short, felicitous speech, he disclosed the central figure in the most elaborate and easily the most spectacular, decorative show scheme ever attempted in the now-famous Palace.

Not only did the show committee of the American Motor Car Manufacturers' Association, which fostered and, in fact, engineered this, the Tenth International Show, set out to outdo previous shows and previous decorative schemes, but what is of vastly more interest, they accomplished it. The main idea of the decorations was that of a garden. With this idea as a starting point, the roof trusses were hidden with a canopy representing a garden trellis nearly covered with growing vines of green.

On the exhibition floors the same trellis idea was carried out, the large spaces of the walls being painted with panels which purported to represent floral scenes both at home and abroad. The lattice or trellis work was made effective and seemingly real by the well-selected colors—Nile green, with a background of Caen stone. Through the canopy overhead, what was apparently the blue sky was to be seen, the colors being well simulated.

Signs of raised Egyptian letters, gilded, on a green background, together with a green floor covering, and very dark mission furniture, carried the scheme through, even to the uttermost corners of the very highest of the many high balconies, for the space demand was such that every available nook and cranny were used.

Although the hour at which Acting-Mayor McGowan opened the show was but eight o'clock—unusually early for the Metropolis—a large gathering was on hand. With such a good start, the attendance has been heavy right through to date, and at the time of going to press it is, if anything, greater than on the opening night.

The first showing of the 1910 cars was well worthy. Despite the talk about lower prices and more low-priced cars, the market as a whole showed firmer in tone, and, if anything, there were as many makers raising prices as there were of those who lowered them. By a natural law of compensation the situation thus adjusts itself, the increases balancing off with the price cutting, so that the man who was looking for a price landslide was left as far from a choice as ever.

Society was out in force at all times, not alone for the formal opening and the equally formal day which followed, New Year's being "dress-suit" day, but at all times the society leaders were there, delighting alternately at the more recent foreign importations and the latest products of American skill and ingenuity. Following the visits of the "400," with which society set its stamp of official approval upon the show, the "4,000,000" making up the proletariat, began to flock in, and they have been flocking ever since.

One of the tendencies shown abroad, at the great Olympia show, to be specific, was the general adoption of the dashboard, radiator and sloping bonnet, made famous and always featured by the French houses of Renault and Charron, popularly called C. G. V. This same tendency was to be noticed, in a much smaller way, however, at the Palace exhibition, one of the most prominent newcomers in the small-car class, listing at close to $1,000, using this useful and highly ornamental form. This, following closely upon the success of a middle Western firm with the same construction, will, without a doubt, pave the way for the general adoption of more of the same.

While the small single sales have not been large, or, to be more exact, have been very small, this is a method of selling cars which nearly every manufacturer now frowns upon. This is barring, of course, the honor of making the first actual sale after the show is officially opened, for which there was this year, as always, much sharp competition. The small individual sales have been small, but, to offset this, the sales to dealers and agents have been unusually large, and many factories have entirely disposed of the 1910 output in this way.

In this category the number of makers were many, and the sales managers of those concerns were, according to their dispositions, either tickled to death or just the opposite. One manager was complaining that his whole year's work had been cut off short by this show, for the factory capacity was all booked, and so he had nothing to do until plans could be made for the 1911 models and factory production. Being so very busy getting out this year's business getters, there was little prospect of this being settled for a long time, which meant

Central Portion of Main Exhibition Floor Showing Fountain at Western End and Lattice Work Decorative Details

enforced idleness for that space of time. For a hustler, as most sales agents are, this is the hardest kind of hard work.

Saturday was set aside as Army and Navy night. In previous years show managers had to be content with the Army only, but the presence in New York harbor of the big gray Atlantic squadron made the double-purpose evening possible. The blue-jackets manifested an unusual amount of interest, while the officers of the fleet were out in force, not alone on the night set aside for them, but at all other times as well.

When the management set aside Tuesday as Society day, and boosted the price of admission to an even dollar, it was thought that only the care-free rich would "give up" to that extent. Many entertained the thought that on this day a visit would be worth the extra money, for then the crowds would be less and more of the show would be visible to the naked eye. Perish the thought! For whether there to see the cars or to view the Paris (and other) gowns, the fact remains that the crush on that day even exceeded the previous day, to say nothing of those following.

Torpedo, gunboat, bathtub and similar bodies were shown in several of the exhibits and were well and closely examined. It can not be said that the public has taken to them with the avidity which was expected, but still the interest which has been awakened in this form—not a freak, but a useful one—has more than paid the few bringing out this type for their missionary and educational efforts in the body-building line. It is freely predicted that as soon as this form takes hold of the popular fancy all other previous styles of fast runabout bodies will become obsolete.

Sharing the automobile world topics of conversation with the big show at the Palace were the private shows. These were more numerous than ever before, and were not confined to the largest and most exclusive salesrooms by any means. The unusual demand for space had led Manager Reeves to lessen some of the spaces, this at a time when the exhibitors would have been pleased to get addititonal space. The result was that many makers changed their exhibits several times during the course of the week, one commercial car manufacturer changing his entire seven vehicles for seven additional and different ones during the eight days of the show. Most of the larger members of the foreign contingent followed this example, showing in this manner twice as many cars as would otherwise have been possible. The private shows along Broadway's Automobile Row were thus bigger and much more numerous than any previous two or three years taken together.

Summing up, it may be said without any poetic license that this year's A. M. C. M. A. Show will go down into history as the biggest and best ever. Manager Reeves and his corps of capable assistants may well be proud of their work, for the exhibit which opened at the Palace on the last day of the old year easily excelled all of its predecessors in every way.

GIST OF THE PERTINENT MECHANICAL FEATURES

INTERESTED spectators, being the possessors of much mechanical skill, particularly of the character which relates to automobiles, see through the proverbial twenty-one applications of "rough stuff" and "finish," and they see right. Before taking up the strictly mechanical features of the running gear proper, spectators were afforded a wide opportunity to examine the body creations of the year, and many of them were, no doubt, interested greatly in the little cars and their natty types of roadster bodies, observing that the steering wheel had a rakish tilt, and that the seat was set back close to the vertical line of the front of the rear wheel for the back of the seat, and the gasoline tank, round or elliptical, occupied the balance of the space.

These types of bodies were very cleverly exemplified in the Model Q Maxwell, Paige-Detroit, and the friction drive Cartercar. In the Mora 20, however, instead of a gasoline tank back of the driver's seat, a trunk, of nice design, occupies this space. The Hupmobile has a perfectly oval tank to the rear of the driver's seat, and, it being finished with the body, makes for the whole show much of style and contrast. The Brush runabout, of the racy type, has a gasoline tank above the chassis line back of the rear seat, but purchasers are offered the option of the same type of car with a platform to the rear of the seat.

Among the toy tonneaus which attracted the notice of a discriminating audience, the Model K 10 Pullman offered evidences of refinement by way of a wide side entrance, luxurious upholstery, and fine finish. The Atlas 60-horsepower two-cycle was fitted with a long and low toy tonneau, the effect being brought about by the short height of the underbody, overhung dash, and long bonnet. The Cole "30" was commented upon favorably by the many visitors who observed that the foot room for the driver was very ample, and that the control system in this car is very nicely situated. Moreover, while the car ranks as a toy tonneau, nevertheless the commodious rear seat, with its rich upholstery, puts it in a class which, a year or two ago, would have been looked upon as a monster touring car. One of the Marmons in the toy tonneau class attracted a great deal of notice for all the reasons of fine body construction, and particularly on account of the commodious side entrance, excellence of mudguards, and fine finish. The Gaeth Type XXI was one of the excellent representatives of Cleveland, Ohio, in which the body work partakes of the qualities of a hunting gold case for a chronometer.

TORPEDO TYPES OF BODIES IN EXCELLENT PRESENCE

The automobile public has been expecting something by way of torpedo types of bodies, and they were not disappointed. The

Main Exhibition Hall of Grand Central Palace, Looking Toward the Main Entrance at the Eastern End

Section of Main Floor Devoted to the Pleasure Car Exhibits

Stoddard-Dayton was there, it being with almost a perfectly smooth exterior with two wide side entrances, an overhang dash, and a rather abrupt rear termination. The curve of the overhang of the dash presented a neat appearance, being shaped to act as a "dodger," thus deflecting the wind upwards and above the head of the driver.

The Speedwell torpedo type of body, as exhibited, proved to be in some contrast, due to the flattened overhang of the dash, and the effect on the general appearance of liberal-sized mudguards, flaring down to the chassis frame, and serving a very useful purposes, besides a pleasing effect.

The many types of touring cars, looking a little smarter than heretofore, had a liberal sprinkling of steel bodies made by properly shaping sheet steel over stout, suitably ironed wooden framing, resulting in very serviceable work, over which the finish presents all the evidences of carriage refinement, and permanence becomes one of the most conspicuous features. Aluminum body work is on the highest possible plane.

SYSTEMS OF IGNITION UTILIZED

Without attempting to definitely place the respective systems of ignition employed, it will be the purpose here to emphasize what seems to be the positive trend in ignition service, in which magnetos take the brunt of the work in every case, the following makes being in widely distributed use:

U. & H., both in the dual and self-starting types; Remy, Eisemann, Kingston, Herz, Splitdorf, Pittsfield, Witherbee, Hess-Bright, and Bosch. In some cases the Atwater-Kent unispark system takes precedence, and low-tension magnetos obtain in widespark work, as in the Premier. Coils, in supplementary ignition work of the various well-known makes, are used in all excepting a few of the smaller cars in which but a single system, that a magneto, is depended upon.

Demountable rims seem to have taken a hold of the autoing public to a greater extent, perhaps, than any other one feature, and among the demountable rims exhibited there is the Diamond, which is a strictly demountable type, with a considerable space under the clincher so that the silt of the road when it forms into a cement-like paste will not cause the clincher to adhere sufficiently to be a source of annoyance. The Firestone demountable rim has also the detachable idea, and, since the rim fetches up against bevel seats, it seems to offer attractions, judging by the crowd. Then there is the Howard idea, in which a worm and wheel, when given motion, causes a right and a left-hand thread, turnbuckle fashion, to tighten or loosen the rim, merely depending upon the direction of turning. The Michelin demountable rim, using a clincher without a brake, is held in place by means of lugs, with through bolts, and the Universal demountable rim has a brake in clincher, thus bringing it in the class of demountable and detachable, and a very novel system of locking, which is actuated by means of a socket wrench, tightens or loosens the rim on its supplementary band with almost no effort, but the security offered is adequate for every need. The Nadall demountable rim is also detachable, in which the clincher is parted, and the two halves are mounted on a supplementary rim, which in turn is locked after being sprung into place, and the whole, with the tire inflated, after it is put into place, is slipped over the felloe and fetched up into place against 45-degree bevel faces by means of alloy steel clamping bolts in such a way that bending moments are absent.

NON-SKIDS MUCH IN EVIDENCE

From the Firestone, which prints its trade-mark as it goes along, to the Morgan & Wright, which has the embossing in rounded quadrangle formation, is a considerable distance to a casual observer, but the principle is the same in either case, and from the latter to the Republic staggard tread represents but a difference in the manner of placing the embossed figures. Then there is the Ajax non-skid, with a diamond formation, but with this difference: instead of the figures being embossed, the grooves between the figures are sunk. The Calmon is of the conventional form, studded, and the Kempshall, which is called an anti-

Another View on Main Floor That Showed Careful Arrangement skid, takes on the appearance of efficiency. From these and other types of non-skids to the Goodrich-Palmer tread idea, which is very popular in connection with electrics, represents the two extremes in tires as they are used in automobiles, in which the non-skid types are considered essential to comfort and safety in connection with touring cars, and the Palmer web, with its ten light plies, offers attraction in that the tire losses are reduced to the absolute minimum, and life is sufficiently long to answer every practical requirement.

Here the Aisle Was Wide, Affording Opportunity for Inspection

Much of the tire success which has been observed of late is due to the use of larger diameters and greater sections. In other words, it is better to pay twice as much for tires, if they will last four times as long, and there seems to be no doubt about the lasting qualities, when the sizes are sufficient to carry the weight without flexure to more than a nominal extent.

In wheels, despite the claims of some, the second-growth hickory employed, which comes from Missouri, is of an unexceptional grade. In view of the circulation of canards in relation to the scarcity of this grade of wood, it comes as a surprise, in a way, to discover that automobile wheels, almost without exception, are selected with the utmost care as respects this material.

Twelve spokes are the rule; they are nicely shaped, and dished wheels take precedence in the majority of cars. Hubs are from drop forgings, or steel castings, and roll on annular types of ball bearings in some cases, conical roller bearings in other examples, and the Hyatt flexible type of bearing finds a wide use in live rear axles.

EYE SECTION DROP FORGED FRONT AXLES

Eye-section front axles are now in such common use that they may almost be regarded as standard. Fortunately, they are drop forged in one piece, thus eliminating welds, utilizing highly kinetic material, usually basic in its characteristics, with well-regulated carbon, and low in metalloids. Steering knuckles are of the several well known types with hardened metal pins, bushed, and grease cups are present in nearly every case.

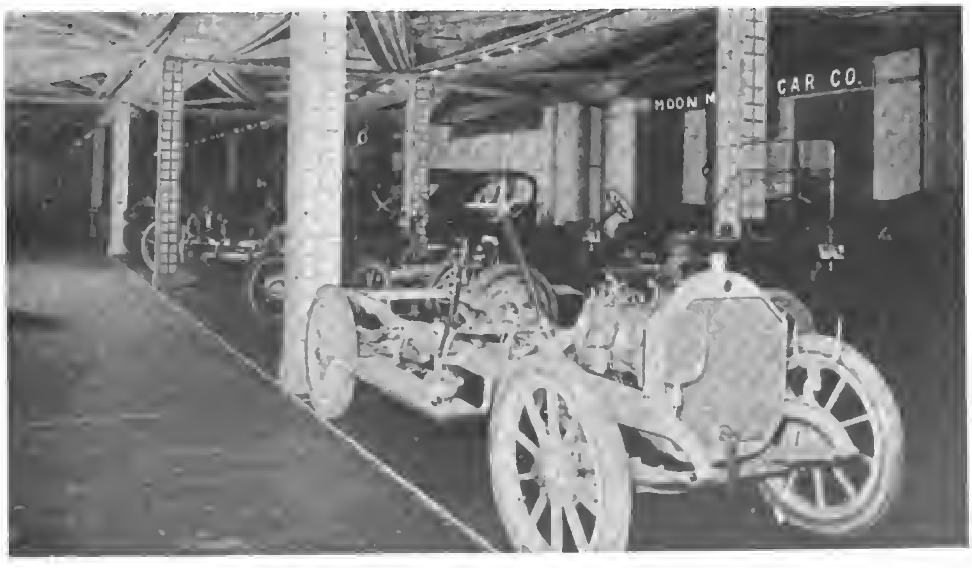
of traveling of the mixture in route to the combustion chamber is greater than the rate of flame propagation in the body of the mixture itself within the intake manifold. In all events, the power plants, as they were exhibited, taking them as a whole, embodied such fine details as the proper proportioning of the intake manifold, thus assuring that the speed of the gas en route to the combustion chamber will exceed the speed of the flame, and overlapping in the valve timing becomes practicable.

Well-regulated compression aborts carbon formation in so far as coking out will transpire in the gasoline component of the mixture, and this particular improvement eliminates to a very considerable extent the contention that lubricating oil is at the bottom of carbon trouble. On the exhaust side of the motors, taking them in general, there are finger prints of the fine Italian hand of the designer which indicate that the ejector idea is stalking forth, and, instead of a considerable back pressure, which kills power, there is something of a vacuum which coaxes the spent products of combustion away from the combustion chamber, thus adding materially to power and flexibility.

Just now there is a tendency to utilize the nozzle idea in connection with the exhaust, and it has been found by experimenting, and through experience, that the idea is good.

DETAILS OF POWER PLANTS

It is extremely interesting to pass along from booth to booth and listen to the arguments of the clever salesmen who, in explaining the top features of their products to a receptive audience, delve into technics, with never a thought as to whether or not the audience is familiar with this strange and weird language. Perhaps they have learned, some of them to their sorrow, that the audience is fully alive to the difference between a needle valve in a carbureter and a gudgeon pin for a piston. Maybe they learned, perhaps too late to save their dignity, that this same audience grasps the idea of the overlapping valve, and knows perfectly well that popping in a carbureter is not at all due to weak mixture; that popping in a carbureter will not take place at all if the speed



Looking North Along the Lexington Avenue Side of Main Floor

ADDITIONAL REASONS WHY ONE SHOULD BUY

IT has been truly said that show time is not slow time, for at that season of the year makers, selling agents, advertising men, and even the editorial staffs are very busy, too much so to attend to everything. In this hustle and bustle something must be overlooked. It never fails. So it happened that many of the "Reasons" intended for last week's issue reached us too late for publication. Many of those used, too, were not written especially for this column, as had been intended, which accounts for repetition in the late comers given below.

CAMERON: G. N. Jordan, Sales Manager—Of the total number who will purchase automobiles in the United States in 1910, about 90 per cent. will buy for business purposes, and to such purchasers economy is one of the most important considerations; economy in the use of gasoline and lubricating oil, in tire consumption, and in time.

We have designed the Cameron car with these points in mind, sliding gear system), especially in the hands of inexperienced operators.

The high efficiency of the transmission on all speeds is an important factor in keeping down the fuel consumption, and, by leaving off water-cooling apparatus, we are able to reduce the weight of the car 200 pounds, reducing the wear on tires. The car being high powered in proportion to weight, will start quicker from a standstill, will pick up quicker after turning corners and be more economical in time in getting from place to place, even though driven at no higher extreme speed than the heavier underpowered type of car, which requires a long distance to get under way.

The Cameron car is not an assembled proposition, each part is designed and built to fit the other part with the main object in view of giving our customers the most economical car on the market; and, by economy, we do not mean fuel economy alone,

Section of the Main Floor on Forty-fourth Street Side Where Many Middle West Makers Were Located

and believe we are offering the most economical and practical car for the following reasons:

No water is carried.

On the Cameron system of cooling the excess heat is carried off by a natural circulation induced by hot air rising from the cylinders as fast as it is radiated, and cold air rushing in beneath to take its place around the cylinder wall.

When the engine is running light very little heat is radiated off and the circulation of air is naturally slow, keeping the cylinder walls at the proper temperature. When the car is driven hard and more heat radiated off, the circulation becomes faster just in proportion to the amount of cool air required and, on being operated under all conditions at an even temperature, develops its power on smaller consumption of gasoline and lubricating oil and gives longer life to the wearing parts of the engine.

The Cameron transmission system is direct drive on every speed; all our cars are equipped with three forward speeds. This gives the operator the proper range of gearing for any condition of road, allowing the engine to be operated at its most efficient speed.

In changing gears, the gears throw opposite each other and roll naturally into mesh without the danger of wrecking (as in the but economy of upkeep and economy in ease and rapidity of handling. And it is the ideal car for the busy business man who must have highest efficiency, and a car that is always reliable and ready to start regardless of weather condition; a car that can be stored in an ordinary small home garage without heat, and can be left standing indefinitely in zero weather; a car that, when extreme occasions demand, can be driven at terrific speed all day long without overheating, radiators boiling out, causing delay to refill, or other defects peculiar to the water-cooled type of car.

GRABOWSKY: Sales Department—In buying a commercial vehicle, the purchaser must necessarily take an entirely different viewpoint than that taken in buying a pleasure car. He has primarily these facts to consider, ability to give continuous and efficient service, economy and advertising value.

Economy has many factors, the least of which is first cost, if reasonable. Economy of maintenance and up-keep are lowest in the Grabowsky car for these definite and easily proven reasons: Maintenance. The very first requisite of cheap maintenance is absolute accessibility. This the Grabowsky alone has by reason of its removable power plant, in which the motor, transmission and levers are a unit, which slides out or, when out, is shoved

Showing the Distribution of Many Leading Exhibits on the West Side of the Palace, Facing Main Hall

back into the car just as is the drawer of a desk, thus every adjustment is at the chauffeur's finger tips.

Second, the Grabowsky has hardened steel bushings in every working connection. No necessity to renew whole parts at a considerable cost; just replace steel bushings at a very low price.

Third, highest grade of materials used throughout the car. Mr. Grabowsky's long study of and familiarity with steel and iron relative values assures best results here.

The second factor, economy of up-keep, is worth discussing. First, the Grabowsky lubricating system, by means of a vacuum crankcase and a fine application of the laws of attraction, uses its lubricating oil over and over again, thus saving fully one-half the cost of oil.

Second, a two-cylinder opposed motor uses far less gasoline than a four-cylinder motor. Moreover, there is less weight of parts to carry in a two-cylinder motor than a four cylinder and every pound of weight adds to gasoline consumption and maintenance.

The third factor, ability to give continuous and efficient service. This is perhaps the most important feature to the buyer of a power wagon.

The Grabowsky offers continuous service because it is the only car whose entire power plant can be removed and another power plant inserted in the car, a one-man operation requiring hardly 15 minutes. By actual (not theoretical) standardization of parts, every power plant made by the Grabowsky Power Wagon Company fits every Grabowsky truck.

For the use of commercial vehicles, it is only necessary to have an extra power plant (at a small cost) and continuous service of this truck is practically guaranteed. As to power, it is only necessary to show that the Grabowsky is making good in Pittsburg, Cincinnati, the Rocky Mountains, the Allegheny Mountains, the Sierra Mountains (the hardest conditions under which cars can be used) to prove the power efficiency of the Grabowsky.

An Aisle in the Foreign Car Department Where the Importers Displayed Their Products Advantageously

Renault Inside Steering Coupe—A New Type

For these reasons and many others we recommend the Grabowsky as giving unequal satisfaction to prospective purchasers.

MARTIN: Publicity Department, Martin Carriage Company—Economy is the word that makes the Martin Commercial car the most desired.

The strength of a Martin car is economy in every sense of the word. A car that will stand up under its full loading capacity, and not show a sign of weakness, even when under its normal road speed, and equipped with an engine having power enough to run the car loaded to capacity at its normal road speed. A car that inexperienced men can handle with ease, constructed as near fool proof as possible, with gears that can be shifted in a second's time and with no danger to the mechanism.

Martin motor cars can be run through congested streets on high gear, at a speed not to exceed 4 miles per hour.

The riding qualities of a Martin car excel all others, hence every part of the car has a protection not found in other cars.

A motor that has no bevel gears or third chain, not even a belt in its construction, is water cooled and equipped with a mechanical oiler, a simple direct drive.

The Martin car is designed and built by men who know the requirements of a delivery car—men of years of experience in this construction. We back up all this with twenty-five years of experience in vehicles and wagons for transportation purposes.

MIDLAND: E. W. Nicholson—The strong argument in favor of the Midland Model L is the up-to-date design and the careful attention to details in the construction of the Midland unit power plant and system of three-point suspension.

Elsie Janis' Handsome New American Simplex

On the Model L it is absolutely impossible that any of the strains caused by rough and unven roads shall be transmitted to the power plant. By this it is meant that the style of suspension is so flexible that there will be no strains applied to any part of the power plant construction.

This feature is a most decided advance in automobile construction and is being so thoroughly recognized by all who have examined the car it cannot help but prove interesting to the man looking for a car that will give satisfactory service for a long period of time.

A GERMAN ON THE AMERICAN INDUSTRY

Herr Wilhelm Opel, who has recently returned to Germany from a lengthy visit to the United States, has been interviewed by a leading Berlin daily paper as to his impressions. The following is culled from his verdict, which primarily led to a comparison of the state of affairs sixteen years ago, when the industrial development towered high over that of Germany and now, when, during his second stay, Commercial Councillor Opel finds that the Fatherland has caught up to the Republic and that there is no great difference in business organization here nor there. "Nothing," said Herr Opel, "could make me realize more fully the immense strides the German industry has taken than the absolute lack of any surprise during the eight weeks, in which I have inspected American factories, large and small. Over here the industry is on the same level as over there.

"Regarding the American workman as such, I may say he is a specialist as compared to ours, who, in a great many cases, is an all 'round man. But as specialization contains numerous advantages for the perfection of goods, we too are slowly nearing the American method of educating workingmen to this point. Over there this developed of itself, because the workingman himself pressed forward to this end, for, on the whole, he is more intelligent than ours, as a consequence of the racial mixture and the fresh infusion of blood attained thereby. On the other hand, this advantage is equaled by the better education given our working classes by compulsory schooling, as well as the evening classes which are partly obligatory, partly attended voluntarily.

"My chief automobilistic impressions concern the New York motor traffic. Horse-drawn cabs are hardly to be seen, and I venture to predict that in ten years' time horses will have completely vanished from the streets. One city corporation of New York is greatly interested in this problem and chiefly from an hygienic point of view, for the city is surrounded by water and suffers very much from swarms of flies, which naturally were encouraged by the horse, but now this plague is lessening. Motor traffic in the country is almost unknown, for what we would call roads are only met with for short distances; while we still use the highways that were built by the Romans in the middle ages or during the Napoleonic period, the railway was the open-up culture for America and towns and villages were built on either side.

Asked as to the output of the American factories, Herr Opel replied: "During the first days of my stay I was told of factories with an annual production of 12,000 cars. The closer I came to these factories, the more these proud figures dwindled. Every town I stopped at knocked off a thousand or so, till when I arrived at the place in question I learned that, all told, 4,000 would be the figure. There are two or three factories which turn out 8,000 to 10,000 vehicles a year.

"I cannot imagine that we may respect a mass importation of cheap American cars, they have never been able to get a good grip on our market. However, surprises are never excluded in business life. Should an over-production take place, which is not impossible within the next two or three years, the American market may seek to fall itself by force and throw its goods on Europe. But we need not dread this competition. The American car is built too lightly and not rigid enough for our roads."

ON THE TREND OF THE AUTOMOBILE TRADE

By STEWART McDONALD, General Manager Moon Motor Car Company

FORECASTING has always been a very fascinating field for thought and those who are successful in wresting from the future her secrets are, other things being equal, generally the ones who achieve the greatest results in any line of business, for, as the old saying goes, "If our foresights were as good as our hindsights, we would all be successful."

The automobile is here to stay. There may be some differences of opinion as to the type of car, the particular price and size which will eventually fulfill the maximum requirements. There is also some difference of ideas as to the horsepower and motor sizes best adapted, but among any deep-thinking body of men it is bound to be unanimously admitted that the automobile as a necessity is permanent, and its sphere of action will be broadened and developed and the numbers in use multiplied exactly proportional to the quality of cars furnished, the general price, and the improvements in the roads and highways of this country.

The talk about the automobile industry being the natural heir to the calamities which befell the bicycle trade can carry but little weight when it is but once remembered that the bicycle, while it was a vehicle of transportation in a measure, was at its best but a species of gymnasium apparatus, eagerly sought for by the faddists, and as rapidly dropped when the craze lost its popularity.

From all this it is not to be argued that there may not be dark days, and many of them, in front of the automobile industry. However, these, if they come, will be the result of either the greed or the impetuosity of the manufacturers who are at present in the business, in their endeavor to expand their output in undue proportion to the natural market for cars.

What the exact effect even this will have upon the automobile industry, or more properly speaking, on the automobile as a whole, is still another problem and even more difficult to fathom. It would seem, though, that if such events came to pass, the natural result would be that the public, having a larger selection of wares to choose from, would buy with greater discrimination. Granting that the public does not long remain in the dark upon any one subject, it would appear that probably the identical manufacturers at whose doors could be laid the too large and too greedy growth would be the heavist sufferers themselves. Usually excessively rapid growth and thoroughness do not go hand in hand.

The trend of the automobile business is rapidly toward cheaper cars. This is as it should be, as the number of people who can afford a moderate-priced car is infinitely greater than the few who are ready purchasers of a high-priced automobile. It is only right that the greatest development which will probably take place in the next few years will be toward perfecting the car of medium price and bringing even this within more ready reach of the average buyer. A moment's reflection will readily convince the most skeptical of this.

Go away from the large cities, take the towns and villages and realize the enormous field in which the horse and buggy is still utilized. A good horse and buggy totals almost $500, to say nothing of what a fairly good team and surrey would come to. In any instance, one of the moderate-priced automobiles, even at the figures current to-day, would show a greater economy, greater mileage and greater service for a slight increase in the investment, with all the possibilities the future might bring in the way of reduced prices and more efficient service.

With the enormous increase in the use of automobiles is also coming a great development in the average user along mechanical lines. Business, office men and people who are never accustomed to handling anything more pretentious or complicated than a tack-hammer, display a truly intelligent knowledge of most mechanical principles. The intimate learning that even school boys have now, together with the original ideas, which in some instances they possess regarding the real intricacies, is marvelous and indicates that the day is fast approaching when even the boy will look upon the purchase, handling, and usage of an automobile with less forbearance than was shortly before felt by his friends who tackled the proposition with the services of an expert chauffeur.

Marvel has sometimes been expressed at the remarkable manner

In the Commercial Car Section the Display Was the Most Effective and Varied That Has Ever Been Presented

Looking North on an Aisle on the Second Floor

in which medium-priced cars have been absorbed in the good farming States—States where the average land-holder could well afford to be the purchaser of a medium-priced car. The possibilities here, large as they have been in the past, will greatly exceed this in future, as it is in these districts that the automobile comes in for its fullest measure of utility. The automobile is a pleasure vehicle always, and one that does not weary with miles—a device that places the farm within almost neighborly distance of the city—the means of quick communication with stores, shops, doctor, or emergency repairs, and, above all, something, which added to country life, gives it all the conveniences of the city with the charms retained.

Another Section of Second Floor Looking Eastward

Coupled with this has been the natural way in which they "catch on" to cars in the country districts. It has often been wondered why it was that a shipment of 50 cars to a small town where they are distributed to the people living in the vicinity is heard from in the way of repairs so much less frequently than the same number shipped to a large city agent.

The reason is simply that the people living in the country have been accustomed to machinery for a long time—hardly one of fifty owners has not an anvil on his own place. These can make a weld as well as the average journeyman blacksmith. Furthermore, they are more patient and used to thoroughly looking into their various machines and learning the principles thereof and so they naturally take the same pains with their automobiles. Hence, in a very short time, they become as proficient in their adjustments and handling as is the dealer who sold them the car.

The trend, then, of automobiles, as the writer sees it, is toward more and better cars. Probably lighter cars with simplifications in the mechanism taking place as rapidly as developed is a factor which lessens buyer resistance. These all would have a tendency toward a reduction in price, especially as standardization sets in and changes become less frequent.

The development of good roads will greatly increase the use of cars, especially in States where the trade is somewhat backward. However, the greatest development will be the acquisition of a complete knowledge, acquaintanceship and understanding of the underlying mechanical principles. It is not enough then, therefore, for a manufacturer to see that his employees—his agents, salesmen, etc.—are thoroughly familiar with the constructive theory and features, but the real and prospective purchaser, the public at large, should also acquire a thorough familiarity and understanding of the mechanical principles underlying automobile construction.

This, coupled with a healthy growth in the manufacturing end of the business and a steady development of good roads, will take care of the future of the automobile industry.

CHAIRMAN FOR BALTIMORE SHOW

BALTIMORE, Jan. 3—President C. Howard Millikin, of the Automobile Club of Maryland, will be chairman of the committee which will have charge of the next annual show to be held under the club's auspices, February 22 to 26, inclusive, at the Fifth Regiment Armory. Dr. Millikin has appointed as other members of the committee, Thomas B. Hutchinson, assistant chairman and also assistant secretary of the club; Dr. H. M. Rowe, H. M. Luziers, Thomas G. Young and Joel Nassauer. Dealers who desire information regarding the show will be accommodated by President Millikin, 914-916 Equitable Building or Assistant Chairman Hutchinson at the clubrooms, The Garage Building, Mt. Royal avenue and Charles street. Aeroplanes and balloons will be among the new features of the approaching exhibition.

Floor space has already been partitioned off and drawings for the desirable places will be made by the dealers within a week or so. All spaces, with the exception of a few in the middle, will be sold at the same price. Representatives of the show committee have been attending the shows already held and will be present at others to be held with the view of suggesting the latest features for the Baltimore exhibit. The club members held a stag progressive euchre party at the club rooms last Tuesday evening.

CINCINNATI SHOW FOLLOWS CHICAGO'S

CINCINNATI, Jan. 3—The Automobile Club of Cincinnati will hold its show in the Music Hall, February 21 to 26 inclusive. This is the first time that the club has promoted a show. Although applications for space do not close till December 31, more than half of the space had been taken and deposits paid by the middle of the month. Rutherford H. Cox is general manager.

Things that Attract in the Accessory Field

"WATCHMAN, what of the night?" Automobiles by dominance of size and space occupied claim first attention of visitors to the Show. Primarily, they overshadow other exhibits, unduly draw attention, and rob half the accessory subject of its potency as an attraction. In the meantime, when truth is dragged from its lair, and photophobia is thrust behind, spectators may be awakened from their lethargy, and the news may be gently broken: There is not, in all the land, an automobile made in which accessories do not enter.

Some automobile makers claim the distinction of producing 93 per cent. of all that goes into their wares; more hold that they produce all but lamps, tires, radiators, tools, wheels, rims, drop forgings, bodies, windshields, tops, cylinder castings, crankcases, gearcases, crankshafts, etc. These say they build the car complete.

Consistency is the jewel which shines for all but the man who wants to take unto himself credit for having thought out the scheme of the Universe before God wrought parts, put them together, and thrust them out, into the swirl of gravitational influence, branding the whole flock as "accessories."

When the A. M. C. M. A. show opened at the Palace on New Year's eve, the accessory division may have been a little less spectacular, thrust in corners to some extent, and less of interest to the casual observer, but the cars, as they were to be seen, taking them as a whole, were as good as the foundation on which they rested, and it is to the credit of accessory makers, to a very considerable extent, that they bask in the sunlight of favor, and reflect credit upon their sponsors.

The accessory division is a big limb of the tree, even though some would have us believe that it is no more than a twig. Accessory makers are bent upon compounding a permanent reputation for themselves, and they fully realize that, to be successful, it is necessary for them to engrave their crest high up on the face of a granite cliff, rather than in the sands of the shore. Having forged from the solid bar, so to speak, taking pains to apply the "sand blast" of experience and honest endeavor in the process, the accessory makers lighted their lamps of wisdom, wave to magnetos, coils and batteries, their allotted work, lubricated the ways for business, sounded horns, while tires were there in profusion, vying with shock absorbers.

From the Palace to the Garden, will be the move, and when the A. L. A. M. opens on January 8, for a week, it will be with all the Palace accessory exhibitors attending, and many more besides. Never before, in the history of the automobile, has there been such a display of accessories, or such a widely diversified panorama of the 895 different kinds of parts which constitute a full-fledged automobile. Again, it is not a far stretch of the imagination to proclaim that quality presides, good taste sits at the right hand, and catchpenny knick knacks, of which a flock once perched among us, have taken wings as timid birds, lacking in down and feathers.

GENERAL REVIEW OF ACCESSORY EXHIBITIONS

In reviewing accessory exhibitions, it has ever been difficult to arrive at a basis which would afford satisfaction from all angles. One way is to briefly mention each stand, state what it holds by way of a leader, and leaving a good taste in the mouth of the advertiser, at the same time, avoid offense to the sensibilities of the readers. In order to realize the difficulties involved, it is only necessary to state:

Taking the accessory exhibitions at the Palace alone, assuming that there are 238 separate subjects to cover, and allowing that each subject be dismissed with 200 words, it would require just under 50,000 words to cover the exhibits, and as will be readily appreciated, not a single one of the exhibitions would be intelligently discussed, for the reason that, in 200 words, it is not possible to say anything on a basis of introduction, construction and conclusions. It follows, then, that without telling what a thing is for, how it is made, and how well it performs, it is useless to broach the subject at all, much less to dribble out 50,000 words in nauseating puffs, thus destroying the value of the paper, killing the usefulness of the writer, and rendering the audience immune from future attacks, either with truth, truckle, or trend.

RESUME OF THE ACCESSORY INDUSTRY

A comprehensive résumé of the accessory industry, better than a sea of meaningless mentions, will leave the subject in a healthy state, and in the time to come, it will be possible to systematically sort out the accessory features, and by properly spacing them, and using comprehensive illustrations to make good reading for maker and user alike, reflecting credit upon the paper which undertakes the task.

For the time, then, we present the resumé, taking the subjects in rundown order. There is no order of importance on the count that "every link is necessary in a perfect chain."

BODIES, TOPS AND WINDSHIELDS

Comfort in winter automobiling depends in no small measure on the equipment of top and windshield, providing of course that the open touring car is used all the year round. The supply of windshields shown at the Palace is particularly extensive, and indicates a very strong demand for this accessory. It is worthy of note that the old style single-piece shield has practically disappeared; even the cheapest models are hinged in the center. No one who has had experience with the old type will regret its passing.

One concern shows a new shield of this variety at a very reasonable price, in which the glass frames are of wood. This finish is preferred by many people, and is in keeping with the tendency to eliminate brass work as much as possible. The majority of shields, however, are made with brass frames; in many cases these are made very narrow.

These is really no reason why a glass shield should be surrounded with a heavy metal border. Glass is one of the most elastic substances known, and is much harder to break than people generally suppose. Indeed, it is less liable to breakage when unsupported than when held rigidly by heavy metal-work. One shield at least seemed to be built with reliance on this idea, although two other companies also offered exceptionally light and neat constructions.

Means employed for holding the folding glasses in place are almost innumerable, and seem to work on nearly every principle of mechanics. Automatic devices naturally predominate, with many varieties of spring-tension and thumb-screw arrangements. An increasing number are what is called automatic—that is, they can be moved into any desired position merely by pushing or pulling with a single hand, and when set will retain their position. This feature is accomplished usually by a constant-tension spring device.

Another feature which is becoming more prominent is the adoption of eccentrically folding upper glasses, instead of plain hinged ones. This allows the shield to be set with the parts separated, leaving an open strip through which the driver can see the road perfectly even when the rest of the shield is spattered with rain. At the same time the protection is but slightly impaired.

One company has a model especially adapted for runabouts in which the lower glass is slanted back at a considerable angle. Many modern cars have so much room between the front seat and the dash that a straight vertical shield over the latter gives but little protection. This idea of course brings the vertical upper section back into a more useful position.

Tops are shown by two companies, and another has on exhibition a line of its fabrics for tops, which have found general use. Monograms and door-plates are also shown. For body finishing there are varnishes made by two reliable firms. Most of the body builders proper have migrated into the complete car section, by taking the agency for some car which they can fit with their bodies. This tendency is particularly noticeable in the importers' section, as many of those exhibiting there have graduated from the accessory class. The complete list of those exhibiting at the Palace follows:

L. C. Chase & Company, Boston.
Hill Mfg. Co., Buffalo, N. Y.
Ideal Wind Shield Company, New York City.
Metal Stamping Company, New York City.
Moller & Schumann Company, Brooklyn, N. Y.
Pantasote Company, New York City.
W. F. Polson, Buffalo, N. Y.
John A. Salman, Boston, Mass.
Sprague Umbrella Company, Norwalk, O.
Troy Carriage Sun Shade Company, Troy, O.
Valentine & Company, New York City.
Vehicle Apron & Hood Company, Columbus, O.

The following will exhibit at the Garden show only:

Cowles & Co., New Haven, Conn.
Cox Brass Mfg. Co., New York City.
Hayes Mfg. Co., Detroit, Mich.
C. A. Mezger, New York City.
L. J. Mutty Co., Boston, Mass.
National Auto Top Co., New York City.
Novelty Mfg. Co., Waterbury, Conn.
Rands Mfg. Co., Detroit, Mich.
Springfield Metal Body Co., Springfield, Mass.
Vanguard Mfg. Co., Joliet, Ill.

PROFUSION OF HORNS AND SPEEDOMETERS

Automobile horns may be divided into three classes; those of the familiar type operated by air pressure from a bulb, those connected with the exhaust of the engine, and those operated electrically. The "old reliable" type is shown in a multiplicity of forms by one company, including the design with a knob punched full of holes in place of the bell.

Exhaust operated types are shown by two concerns. One outfit is extremely reasonable in price, and has what is described by the maker as a "chromatic scale of bird-like notes." The other company's devices are more pretentious, being made to sound a chord of three notes. The most recent production is the "trumpet," which can be made to sound the army bugle calls. It has four separate tubes, each giving a different note, and controlled from a keyboard. As a warning, all four can be sounded together.

Most modern of all are the electric horns. The latter is one of the most original and efficient devices for converting energy into sound ever invented. It contains a small electric motor with a toothed wheel on an extension of its shaft. The teeth strike against a hardened steel button on a steel diaphragm, causing the latter to vibrate sharply. The process is compared, with reason, to snapping the bottom of a tin can. The diabolical racket that results when the current is full on can be heard a mile, and is guaranteed to produce results.

The other, although likewise electric, does not depart so widely from the ordinary. In this case the motor drives a turbine fan, and the sound is produced by an air blast. A feature is the ingenious magnetic brake, which brings the revolving part immediately to rest when the current is turned off.

Speedometers offer one of the widest fields for the exercise of mechanical ingenuity. Among those exhibited there are three actuated by centrifugal force, one by air pressure, one by liquid pressure, and one by magnetism. One other exhibit seems to elude all classification. This latter, a new device, resembles a clock mechanism, and indicates only the average speed for each thirtieth of a mile, making no record of momentary variations. One great advantage of this construction is that the fastest moving part revolves only 30 times to each mile. Naturally there is no perceptible amount of wear in the parts.

The centrifugal instruments although working on the same principle, differ in many details. Each has some distinguishing feature of merit. One company, as usual, features the "steady hand," and the exhibit includes a device for shaking and jolting one of the instruments to exhibit this feature.

Another retains the familiar magnetic action, and a third the tube full of red liquid and the centrifugal pump to drive it up along the indicating scale. One company has a new idea, in which the instrument is worked by air pressure. No details of the construction are available, but it is interesting simply as another example of the ingenuity which is expended in this branch of the automobile industry. Those who exhibit horns are:

Automobile Supply Mfg. Co., Brooklyn, N. Y.
Gabriel Horn Mfg. Co., Cleveland.
Lovell-McConnell Company, Newark, N. J. m
Nightingale Whistle Mfg. Co., New York City.
Nonpariel Horn Mfg. Co., Brooklyn, N. Y.
Sireno Company, New York City.

The speedometer makers are:

Auto Improvement Company, New York City.
Cleveland Speed Indicator Company, Cleveland.
Hoffecker Company, Boston.
Shipman Instrument Company, Sunbury, Pa.
Star Speedometer Company, Danville, Pa.
Stewart & Clark Mfg. Co., Chicago.
Troy Carriage Sun Shade Company, Troy, O.
Veeder Mfg. Co., Hartford, Conn.
Warner Instrument Company, Beloit, Wis.

The following will exhibit at the Garden show only:

Jones Speedometer Co., New Rochelle, N. Y.
Recometre Co., New York City. m
Riley-Klotz Mfg. Co., Newark, N. J.

GREAT VARIETY OF LAMPS EXTANT

Two noteworthy tendencies may be observed among the exhibitors of automobile lamps, namely, the growing popularity of electrics and the great number of devices to reduce the "glare" or partially eclipse the lamp for city driving. There can be no doubt that the electric lamp is the lamp of the future. Its simplicity of operation and reliability would alone suffice to give it the preference; add to this an economy of operation far surpassing the gas and oil forms, and its triumph is sure. Practically every maker of gas and oil lamps showed electric models, sometimes adapted for electricity alone, sometimes arranged for combinations.

One well-established company showed an electric headlight of very simple and pleasing design, the body of the lamp being a single bowl-shaped piece of drawn metal, without projections except the bracket lugs. One of the latest styles of gas lights is called the "close-coupled," a rather short lamp of large diameter, which should give a pleasing effect in connection with modern body work. Another new idea is a fixture for a gas headlight to hold an electric bulb. The bulb may be swung into focus whenever desired, as for city driving, or may be swung out of the way, without disturbing connections, so as to allow the use of the gas jet. Two other companies also showed electric headlights.

Practically all the new oil side and tail lamps are arranged for the use of electricity if desired. Two makers have an electric fixture which replaces the oil front, and a third has the bulb permanently in place beside the oil flame. This exhibit also includes a good-looking side lamp for closed cars, in the shape of a cylinder set vertically, and a combination electric tail light and number-plate holder, so arranged that the latter is always illuminated to comply with State laws. One shows a combination oil and electric side lamp, but does not feature it so extensively.

Many devices have been brought out to reduce the objectionable glare of the ordinary acetylene headlight. These take the form either of obstructing partly the light, or of diffusing it in better ways. The latter construction is exemplified by a lamp with a front door which consists of a number of lens strips, the front sides of which are ground to a convex curvature. These have the effect of spreading the light out horizontally rather than vertically; when the beam from the lamp is cast on a wall the illuminated area takes the shape of a flat ellipse with the longer axis horizontal. With the lamps in their ordinary position on the car the light from them is kept below the level of a pedestrian's eyes. The only change from the ordinary acetylene lamp is in the door, and the new doors with the lens strips can be obtained separately and put on old lamps.

A very neat eclipsing device has been brought out, which consists merely of a metal disc on the end of a pivoted arm. These are controlled from the driver's seat by Bowden wires, so that when desired the discs may be swung down into the center of the lamp, thus cutting off the strongest portion of the beam. It is noteworthy that the disc swings down behind the jet, not in front of it, as might be supposed. When the disc is down, one looking into the lamp sees only the acetylene flame against a black background, with no more dazzling effect than an ordinary gas jet.

The reaction against excess brass work has been the occasion of the bringing out of a very pleasing new finish. This is known as the "patent leather" finish, giving a metallic lacquer-like lustre, impervious to heat and moisture. It does not need to be polished and requires no especial care in washing to prevent scratching. Several combinations are made; one all black, one a black body with the front door rim left in brass, and another black with nickel trimming. The innovation seems deserving of great popularity. The exhibitors of lamps are:

Atwood-Castle Company, Amesbury, Mass.
Badger Brass Mfg. Co., Kenosha, Wis.
R. E. Dietz & Company, New York City.
Edmunds & Jones, Detroit.
Gray & Davis, Amesbury, Mass.
C. M. Hall Lamp Company, Detroit.
Manhattan Screw & Stamping Works, New York City.
Rushmore Dynamo Works, Plainfield, N. J.

The following will exhibit at the Garden show only:

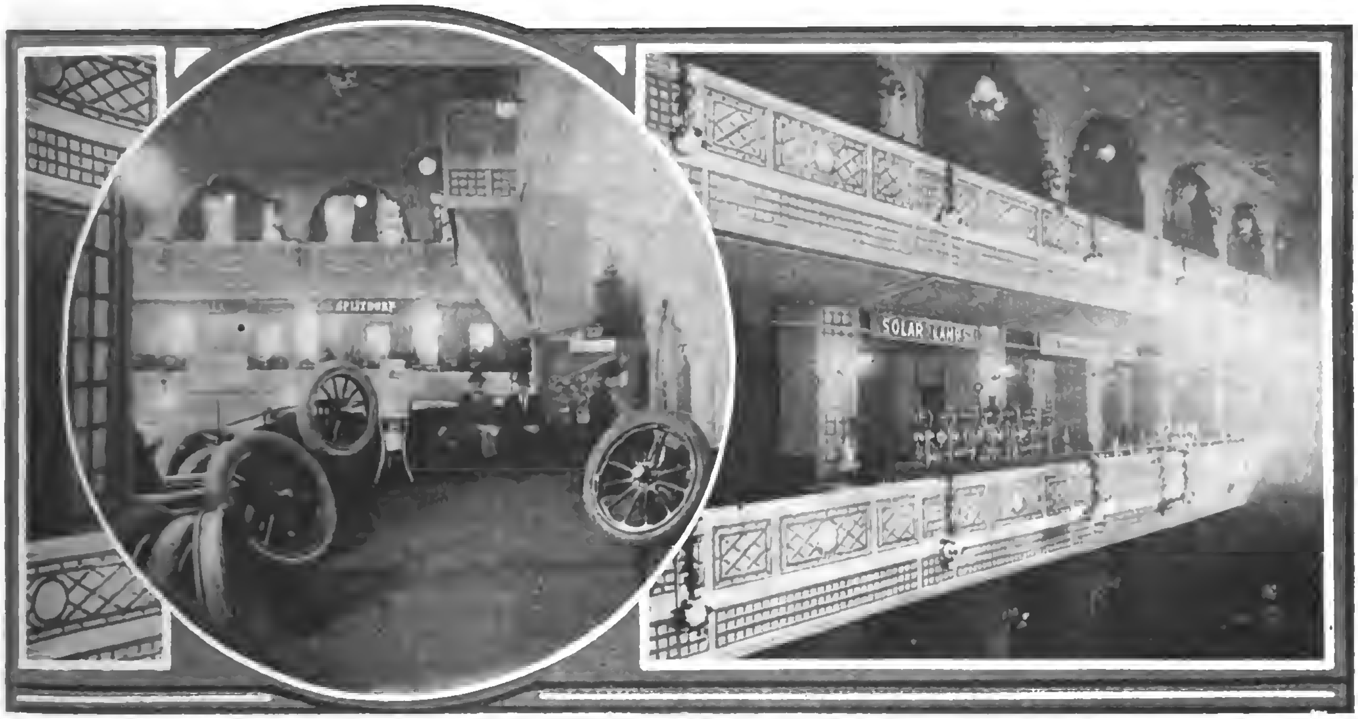
Apple Electric Co., Dayton, O.
English & Mersick Co., New Haven, Conn.
C. T. Ham Mfg. Co., Rochester, N. Y.

TIRES, RIMS, AND ACCESSORIES FOR THEIR CARE

Winter is the open season for non-skid treads, and most of the exhibitors at the show featured this side of their line. The most popular idea seems to be raised projections molded in the rubber tread. These take many forms. Most of the standard makes are furnished with a well-known tread of regularly spaced studs, which has been in satisfactory use for several years. Others have adopted different ideas. One manufacturer has his name molded into the tread in sharp-cornered letters, which are said to be of peculiar efficacy in holding the wheel to the road.

Still another idea is to thicken the whole tread a quarter of an inch, and then mold diagonal grooves in two directions, crossing each other, through the body of this additional rubber. This had the effect of greatly increasing the thickness of the tread, and by consequence its wearing and puncture-resisting qualities. The deep corrugations still leave, however, a large range of flexibility, and so the resilience is not seriously impaired.

Steel-studded treads are also seen in many stands, and the general impression seems to be that they can cope with situations too serious even for the raised rubber tread. The unsatisfactory features developed by these tires in early days have been overcome by modern machinery and methods. They have usually leather protecting bands to hold in place the steel rivets. This leather is specially treated so that it will not lose its flexibility in service; it will neither become soft and spongy nor hard and brittle. The steel studs are turned from soft metal and then chilled by a special process, making them practically glass-hard; in this condition even road grit and sand have but little wearing effect on them. The inside of the rivets still remain soft, so that they will not break off.

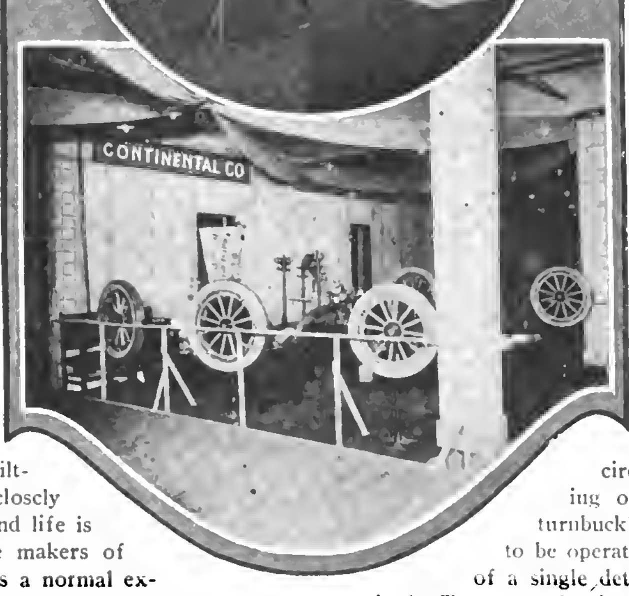


Two Views of Accessory Exhibits in the Balcony, Set Among Original and Artistic Decorations

Makers of detachable anti-skid devices are also present in full force. There are tire chains of every imaginable shape and arrangement. One make has a band of rubber under each cross chain, thus not only protecting the tire shoe from the abrasion of the chain, but also covering a space on each side of the chain and protecting the tire from wear and puncture. In this type the cross chains are about five inches apart. The side chains to which they are attached are flexible and so lie flat against the side of the tire. The side chains have rings on each end, which are connected by a one-inch chrome leather strap. These have buckles, by means of which the chains can be drawn up tight. The ends of the straps are then passed around one of the spokes and made fast, thus preventing the chains from creeping.

It is also possible to secure steel-studded leather covers for the entire tire, which may be applied or removed at pleasure and

AMONG THE TIRE EXHIBITS



give practically the same result as the steel-studded tread integral with the tire. One of these which has good features is held in place by a crimped steel wire on each side. This wire is connected to the edges of the protector by short straps which pass around it and are adjusted by buckles. In this way the cover can be made tight enough to absolutely prevent any possibility of its creeping and chafing the tire.

The very latest thing, perhaps, referring to tires is represented in the new "quilted" casing. This quilting binds the plies of the fabric so closely that it does not detach in service, and life is much prolonged. According to the makers of this new tire, 10,000 miles represents a normal expectation, the increase in distance being brought about by the influence which the stitching has in that it limits fabric trouble and isolates the ills of road inequalities, permitting surface repairs at leisure and aborting blowouts.

Many improvements have been made in the construction of inner tubes, and as a result of this one maker has found it practicable to guarantee his tubes for one year's service. The claims made for the tube proved justified, and no demand was made for replacements under the guarantee. All the tubes returned had been injured by punctures, pinching and other mishaps in no way the fault of the manufacturer or of the tube. The policy has been so successful that it will be continued for another year. The features of construction to which this success is said to be due are enumerated as the use of the best Para rubber, specially compounded; careful cutting of the material, and the making of the valve patch integral and careful curing at the right pressure and temperature.

Demountable rims are proving a fruitful source of inventive activity. There are several at the show that have never been exhibited before, and whatever may be their merits as rims, one and all are the product of remarkable ingenuity. In one of these all the mechanism is confined to a single bolt, which is turned on or off to loosen or tighten up the rim. This makes it impossible to put the tire on in the wrong position. This is accomplished by a worm device actuating a double turnbuckle.

One concern boasts of a combination quick-detachable and demountable rim. The idea is that the rim is ordinarily a demountable one, but if the automobilist should happen to have two punctures in succession, and but one spare rim, the quick-detachable feature will be found very convenient. This device, too, is very simple. The rim is like that of an ordinary clincher tire, but is sawn apart, giving it two ends which may be sprung apart or drawn together so as to make larger or smaller the circumference of the rim. This pulling or pushing is accomplished by two turnbuckles spanning the gap, and arranged to be operated simultaneously by the movement of a single detachable key, which is the only tool required. To put on the tire and rim the latter is expanded until it is large enough to slip easily over the felloe, and then contracted until it is clamped tightly in place. The reverse process accomplishes the removal. To remove the tire from the rim the latter may be contracted still further; this loosens the steel tire retaining ring and allows the tire to be slipped off as on any quick-detachable.

Another rim which is new at the shows looks like a further development of a well-known make of tire. The rim is held to the felloe by six through bolts. The advantages of this type are the absence of narrow wedge-shaped parts, which are always liable to rust and stick.

Cushion tires are seen in at least two forms, both of which seem to have given good satisfaction in the hands of users. One of these resembles a pneumatic tire in every respect except that instead of an inner tube it is provided with blocks of soft rubber inside. A heavy annular rib of fabric runs around the tread of the tire and equalizes the support received from the rubber blocks, so that the tire is of equal stiffness at all points, whether directly over a block or between them. The blocks are of course proportioned to suit the weight of the car they are expected to carry. The tire is built over a steel form or core and is cured or vulcanized in one operation, so that there is no danger of the blocks separating from the solid wall. This tire is claimed to ride as easily as a pneumatic.

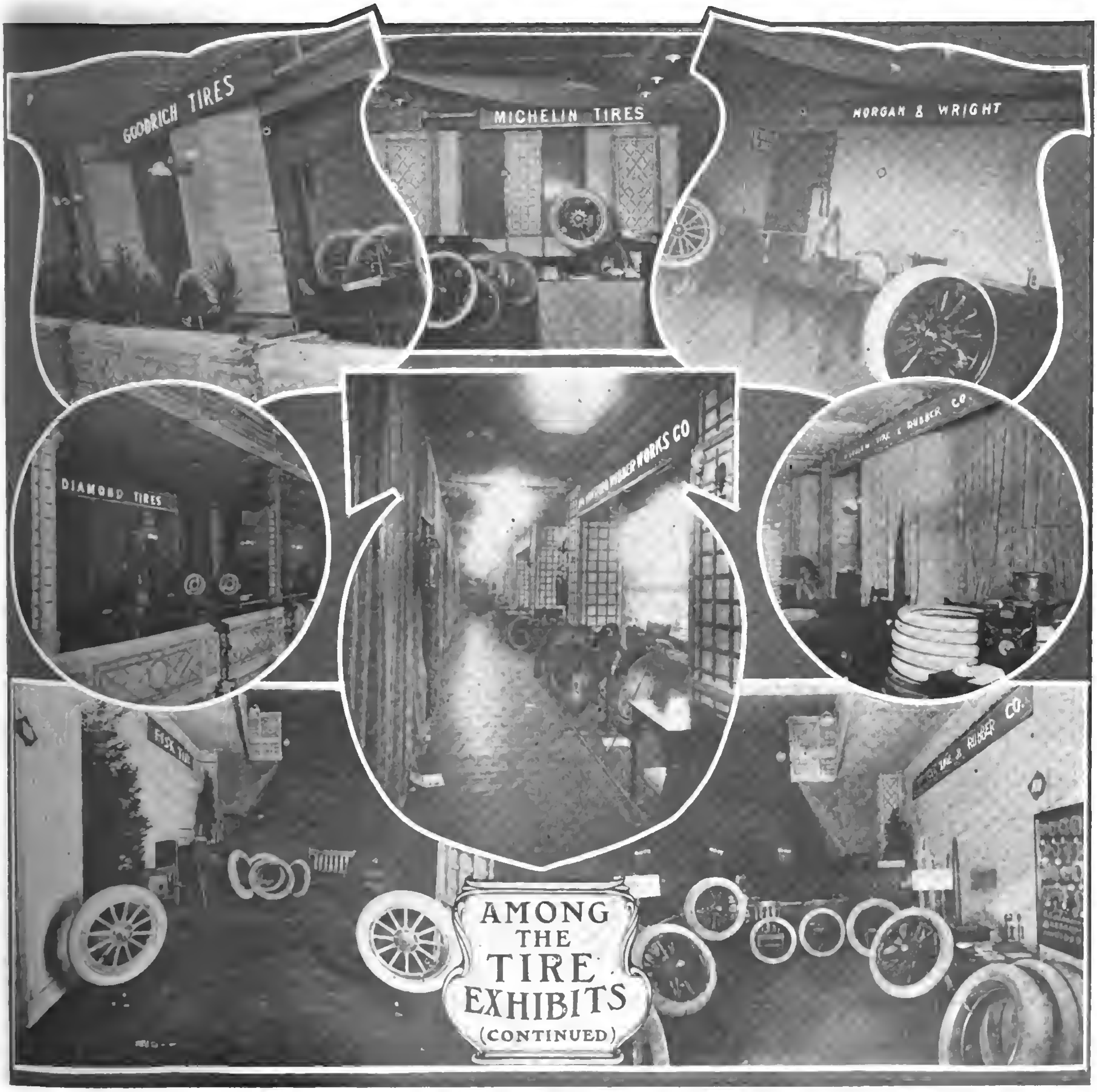
For commercial vehicles one of the most interesting forms is a sectional block tire brought out by a well-known manufacturer of carriage tires who has recently invaded the automobile field. These tires are made up of as many as thirty or forty blocks, square in shape but with beads around the base. These are held in place by a metal frame with square holes through which the blocks project. The frame clamps down on the beads at the bottoms of the blocks. The shape of the tire precludes skidding and gives the maximum resilience possible with a solid tire. These tires are made up to eight-inch dual treads, 48 inches in diameter, suitable for trucks carrying ten tons load.

A very recent development of note in the tire industry is the effort of a German maker who has never before attempted to export to this country. This is distinctively a high-priced tire, and makes no pretension of competing in price with other brands. This is said not to be due to the duty alone, but to the fact that the tire sells for more in Europe than other tires made abroad and competing with it. Like some American tires, it is guaranteed for 5,000 miles' service.

Aeronauts, present and prospective, will be interested to learn that at least one American tire maker is prepared to meet their requirements. Three styles have been brought out, made in a variety of sizes, and in their construction care has been taken to secure the maximum resiliency and at the same time great strength.

For electric vehicles a special tire has been brought out which is claimed to give a much greater mileage on the same battery charge than was obtainable with solid tires. It is a double-tube, with all the flexibility and buoyancy of a single-tube and the strength of a solid. This tire was used on one electric that set a high-water mark of 150 miles on a charge.

Tire accessories are usually of as great interest as the tires themselves, and their efficiency or lack of it often makes or mars the pleasure of a trip. No feature of tire operation is as



AMONG THE TIRE EXHIBITS (CONTINUED)

important as the maintenance of the proper air pressure. One tire maker has brought out a gauge which will instantly register the pressure by merely pressing it over the valve. It is a small and handy device, easily carried in the pocket. A pin in the socket of the instrument forces the valve plunger down when it is applied, admitting the air pressure to the body of the gauge and the pressure is instantly registered on a scale.

To obviate the labor of pumping up the tires, once it is known that they are deficient in pressure, there are innumerable forms of engine-driven pumps and cylinder taps, but one of the neatest devices is that air tank brought out by one manufacturer during the last Glidden tour. This is simply a substantial tank filled with compressed air and provided with a suitable reducing valve, a pressure gauge and a length of hose to make the connection. It can be refilled any number of times, and each filling is sufficient to inflate fully from seven to thirty-five tires, according to their size. Empty bottles are exchanged on the same plan universally used for gas tanks.

The following makers of tires and the accessories involved in their operation are exhibited at the A. M. C. M. A. show:

Ajax-Grieb Rubber Co., New York City.
American Stepney Spare Wheel Co., New York City.
Atlas Rubber Co., Batavia, N. Y.
Batavia Rubber Co., Batavia, N. Y.
Burroughs Remountable Rim Co., New York City.
Caimon Pneumatic Tire Co., New York City.
Consolidated Rubber Tire Co., New York City.
Continental Caoutchouc Co., New York City.
Dayton Rubber Mfg. Co., Dayton, O.
Diamond Rubber Co., Akron, O.
Empire Tire Co., Trenton, N. J.
Firestone Tire & Rubber Co., Akron, O.
Fisk Rubber Co., Chicopee Falls, Mass.
J. L. Gibney & Bro., Philadelphia, Pa.
B. F. Goodrich Co., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
G. & J. Tire Co., Indianapolis, Ind.
Hartford Rubber Works Co., Hartford, Conn.
Howard Demountable Rim Co., Trenton, N. J.
Leather Tire Goods Co., Niagara Falls, N. Y.
Michelin Tire Co., Milltown, N. J.
Morgan & Wright, Detroit, Mich.
Newmastic Tire Co., New York City.
Pennsylvania Rubber Co., Jeannette, Pa.
Republic Rubber Co., Youngstown, O.
Rutherford Rubber Co., Rutherford, N. J.
C. A. Shaler & Co., Waupun, Wis.
Standard Leather Washer Co., Newark, N. J.
Stevens Co., New York City.
Swinehart Clincher Tire & Rubber Co., Akron, O.
P. C. Traver Mfg. Co., Far Rockaway, N. Y.
Victor Tire Traction Co., Boston, Mass.
Zeglen Tire Co., Chicago, Ill.

The following will exhibit at the Garden show only:

Continental Rubber Co., New York City.
Favary Tire & Cushion Co., New York City.
Federal Rubber Co., Milwaukee, Wis.
Fox Metallic Tire Belt Co., New York City.
Hopewell Bros., Cambridge, Mass.
McGraw Tire & Rubber Co., New York City.
Motz Tire & Rubber Co., New York City.
N. J. Car Spring & Rubber Co., Newark, N. J.
J. H. Sager & Co., Rochester, N. Y.
Seamless Rubber Co., New York City.
Stein Double Cushion Co., New York City.
Voorhees Rubber Mfg. Co., New York City.

SYSTEMS OF TRANSMISSIONS WELL DEFINED

The production of transmissions seems to be to a very considerable extent in the hands of parts makers, and in a general way they may be classified as follows:

(A) Side chain drives.
(B) Selective, three speed.
(C) Selective, four speed.
(C) Selective, two speed.
(D) Progressive, three speed.
(E) Progressive, four speed.
(F) Semi-selective systems.
(G) Planetary systems.

Direct on high gear is the rule, this being true in the examples of planetary as well as when sliding gear systems are employed. If side chain drives are used with direct on high gear systems the reduction from the motor speed to that of the driving (road) wheels, initially, is made by establishing a lesser number of teeth on the different sprockets than on the rear wheel sprockets, and the improvement of the year lies in the use of driving sprocket wheels (pinions) with more teeth than formerly. It is now considered poor practice to have less than 14 teeth in the driving sprocket pinion, and in every possible case 18 teeth are used as a minimum. Contrary to the belief of some, side chain drives are more numerous than ever before, a great array of light runabouts using this class of drive, while trucks as employed in commercial pursuits are almost invariably of the side chain drive genera. Where once there were a few hundred high-priced touring cars built with chain drives, there are now thousands of runabouts that use them. When the writer went through the plant of the Diamond Chain Company, at Indianapolis, a few weeks ago, he expected to see far less than he found; instead of business falling off, due to encroachment of shaft drives, the reverse was indicated in many ways. The plant was full of work, additions in machinery were being made, rearrangement was going on, and an examination of the class of work being done, proved that it was for almost exclusively automobile makers. Reports from the other chain makers are on a level with the conditions as they obtain at Indianapolis, and a conservative statement of fact is that the chain situation is on a better basis than it was when shaft drives were the exception. The following chain makers have exhibits at the Palace and the Garden:

Baldwin Chain Manufacturing Company, Worcester, Mass.
Diamond Chain Company, Indianapolis, Ind.
Whitney Manufacturing Company, Hartford, Conn.

Will be at the Garden only:

Link-Belt Company.

BALL, ROLLER AND PLAIN BEARINGS

"Money talks" in the world of trade, so it is said. In the automobiles of the year, likewise, facts are stuborn things. Ball, roller, and plain bearings are used; none are excluded on the ground of lack of competence, and preference is given, in each instance, with reference to adaptability. It is this adaptability, then, that is uppermost, everywhere, and the specifications, as they would read for some cars, may be given as follows:

(A) Annular types of ball bearings for crankshafts and transmission gears.

(B) Tapered roller bearings for front and rear axles.

In a number of other instances the specifications would read:

(A) Plain bearings for motors, including crankshafts, camshafts, connecting rods, gear-spindles, etc.

(B) Annular types of ball bearings in the transmission gear, tapered roller bearings in road wheels, and Hyatt flexible roller bearings in the tubes, as in the live rear axles.

As a further example of present-day practice, there is the class of cars in which some one type of bearing is used exclusively, as:

(A) Annular types of ball bearings in the crankshaft, camshaft, clutch, transmission, propeller shaft, live rear axle, front axle, steering gear, magneto and ball-thrust bearings where thrust must be resisted.

(B) Plain bearings for the crankshaft, camshaft, accessories, clutch, and starting crank; Timken roller bearings in the transmission gear, propeller shaft, live rear axle, all road wheels, steering gear and knuckle.

(C) Plain bearings in the motor; Hyatt roller bearings in the transmission gear, live rear axle, all road wheels, steering gear and other places.

The tabular story of the automobiles shows a wide range of selection, and, with these facts to be encountered, there remains but the principles of application to be exploited. In the early days of bearings, especially of the anti-friction types, they were regarded of such great competence that, for a given load, the sizes selected were relatively small. The original premests was on a good foundation, and the bearings were of great competence, but there are now two points to be taken into account in the selection of bearings:

(A) Static ability, referring to the ability of the bearings to sustain a quiescent load.

(B) Kinetic ability, which has to do with the life of the materials entering into the bearings, when subjected to shock, vibration, and alternating diagonal stresses.

In the earlier selections, in view of lack of experience from the point of view of kinetic ability, the bearings were large in relation to static conditions, but for kinetic service they frequently fell short of the requirement, and, while many of the applications were perfectly satisfactory, it remains that failure perched on effort with too frequent interval. Bearings, of the anti-friction types, under such conditions, fell into disrepute.

Most of the failures were in bicycle days, and when the automobile was in swaddling clothes. The introduction of annular types of ball bearings, under most careful conditions of selection, marked the turning point, and, by the proper use of appropriate materials, much headway was made in a few short years, and anti-friction bearings solved the problems of the day, among which, lubrication was not one of the least.

There seems to be no limit to the uses to which anti-friction bearings may be put, nor has any one type a monopoly of the good points. What the year's output seems to show is, that every application, no matter what the type the bearing may be, is a success when the bearings selected are large enough to do the work. The applications, being successful, as has been proved, rather go to show that the sizes adopted, for the respective kinds, are adequate.

STANDARDIZATION OF SIZES ALMOST COMPLETED

In the early days, when bearings were largely experimental, there were so many sizes, and such wide deviations in practices, that even the most experienced engineers were frequently in trouble, because of a mal-selection of a bearing. With no previous history, little information, and always the optimism of the makers and selling representatives, it was the easiest thing in the world to make a mal-selection.

This question of standarization is probably the most important step of all. It counts in more ways than were formerly recognized. Every maker, before agreeing to a standard, is bound to make sure that the standard fits the bearings in question. When ball and roller bearing makers, in America, adopted sizes such as were in common use abroad, they surely went to the pains to have the bearings so made, and of such good materials, that they would project favorable history for their sponsors.

One of the best practices of the present day is that of the makers of ball bearings who ascertain, by personal observation, if the bearings selected for cars are in keeping with the conservative ratings given, and, of the reputable makers of anti-friction bearings, none will fill orders if they discover that the uses to which the bearings are to be put, fall short of the practice established as safe. The makers of bearings which exhibited at the Palace were:

American Ball Bearing Company, Cleveland, Ohio.
Hess-Bright Manufacturing Company, Philadelphia, Pa.
International Engineering Company, New York City.
R. I. V. Company, New York City.
Standard Roller Bearing Company, Philadelphia, Pa.
Timken Roller Bearing Company, Canton, Ohio.

The makers of bearings which will exhibit at the Garden will be the same as at the Palace.

Tires and Other Accessories Exhibited in the Balcony Were Many and Well Placed.

LUBRICANTS—FLUID AND NON-FLUID OILS

Oils and greases for automobile use are shown in great variety, and many of the exhibitors have ingenious displays which never fail to excite the public curiosity and interest. In this respect they vie with the makers of ignition apparatus. One company has a gear-box filled with graphite grease, the shafts being rotated by an electric motor, and a crowd gathers whenever it is in operation to look into the slimy depths.

Oils have many attractive exhibits, and are shown in a great number of varieties. The special motor oil of one company is a distilled and highly filtered product, refined from the highest grade of Pennsylvania crude oil. It has a very high fire test. Other grades are known as light, medium, heavy and extra heavy. Motor oil is manufactured for use in cold weather, and makes a particularly appropriate and seasonable exhibit. It remains fluid at a temperature of 5 degrees above zero, and is of medium body. This company's gear oil is an extra heavy-bodied lubricating oil for use in gear cases, where the use of oil rather than grease is desirable. However, to give both possibilities attention, the same concern also makes a semi-fluid gear compound or "dope," which combines the advantages of both oil and grease. Several grades of heavy oil and graphite grease are also included in this line.

Oil is put up in one-gallon cans by the various distillers, is well preserved in them and the means for spouting the same from the cans when it is to be spilled into the oil basin of the motor are secure and handy. The cans are so marked that anyone of the respective grades may be readily had in compact form, and, in a car, it is frequently found desirable to store an extra can of the same.

Another line includes a non-fluid oil, for use in gear cases, composed entirely of mineral oils, and guaranteed not to contain soapstone, graphite or rosin; gear grease, for use in ball or roller bearings, steering gears and axles; transmission compound, for use in differentials and planetary or sliding change-gears, and automobile soap, a neutral linseed oil product.

Many makers are devoting all their attention to different grades of greases. One company is particularly proud of tests recently made in Germany and published by the gazette of the Ministry of Commerce and Industries. In experiments on engines in the coal washing plant at Louisenthal a saving of 43 per cent. over oil costs was obtained, and on shaft journals the saving amounted to 63 per cent. Three factors in lubrication, according to another company, are efficiency, quality and power, and arguments are offered to show that its brand excels in all of them. The exhibitors of lubricants are:

H. T. Alexander Company, New York City.
Connecticut Oil Company, Waterbury, Conn.
Adam Cook's Sons, New York City.
Jos. Dixon Crucible Company, Jersey City, N. J.
Duffy Grease Company, New York City.
Keystone Lubricating Company, Philadelphia.
Havoline Oil Company, New York City.
G. A. Haws, New York City.
W. P. Miller's Sons, Long Island City.

The following will exhibit at the Garden show only:

Columbia Lubricant Co., New York City.
N. Y. & N. J. Lubricant Co., New York City.
Valvoline Oil Co., New York City.
Vacuum Oil Co., New York City.
White & Bagley Co., Worcester, Mass.
Wm. R. Winn, New York City.

PRESSED STEEL AND FORGING ACTIVITIES

Never in the history of the industry has pressed steel been used so much as it is in the cars of this year. Besides side-bars, crossbars, running-boards and divers small parts for chassis frames, there are brake drums, front and rear axles, hubs, caps and a variety of housings, notable among which, the Ford bottom half of the crankcase will serve as a type to illustrate the point made here. In chassis frames, considering sidebars, they belong to classifications as follows:

(A) Straight, channel section.
(B) Straight, U-section.
(C) Narrowed, channel section, without a kickup.
(D) Narrowed, channel section, with kickup.
(E) Underslung, channel section narrowed.
(F) Laminated wood, no armor.
(G) Not laminated wood, no armor.
(H) Armored wood.

The methods of suspending the power plants are divers, and in a general way they may be classed as follows:

(a) On a subframe, motor and transmission in one unit.
(b) On a subframe, motor and transmission separate units.
(c) Eliminating the subframe, motor and transmission as a unit, with a three-point suspension.
(d) Eliminating the subframe, motor separate from transmission.
(e) Arms of motor cast integral, extending to side-bars proper, or to sub-frame.
(f) Separate drop-forged arms bolted to a flanged face, on either end of motor case, and extending across to side-bars.
(g) Separate drop-forged arm at one end of motor; other arm cast integral, both extending across to side-bars.

The exhibitors of pressed steel parts at the Palace were as follows:

Columbia Bolt & Nut Company, Bridgeport, Conn.
Driggs-Seabury Ordnance Company, Sharon, Pa.
A. O. Smith Company, Milwaukee, Wis.
Standard Metal Works Company, Thomsonville, Conn.
Standard Welding Company, Cleveland, Ohio.

The above exhibitors will show at the Garden also.

SHOCK ABSORBERS OPERATE ON MANY PRINCIPLES

Fluid compression is the principle used in two well-known devices; in one air is the medium, and in the other a glycerine mixture. The latter has cylinders with pistons, double-acting, connected between the frame and the axles at four points. On heavy touring cars these cylinders are of a size to hold about one quart of the mixture. The under side of the piston is deeply grooved, and in it are bored two small and four large holes. Their arrangement is such that the downward travel of the springs is not checked unless it is very violent. At the rebound or recoil, the four large holes are automatically closed by a valve. This checks about 85 per cent. of the recoil, and the car body rises slowly. The passengers are not bounced from their seats, and the single upper leaves of the springs, which have the duty of resisting the upward motion, are not unduly strained. Their longevity is thereby materially increased.

The pneumatic device is constructed in much the same way, and resembles the hydraulic check in outward appearance and in its method of application. The air moves from one side of the piston to the other through a by-pass of adjustable area. Owing to the compressibility of air, it is possible to make this by-pass much smaller than the valves in the hydraulic check, and so cushion the shocks by the direct compression of the air.

Another form of shock absorber is that which employs coil springs. There are two methods of employing these, both shown by reputable concerns. In one the coils are interposed between the ends of the semi-elliptics and their hangers, and in the other the coil spring is connected directly between the axles and the frame. The operation of the latter is so obvious as to require no comment. The other uses two coil springs at one end of each of the main springs, the attachment being at the shackled end. The coil springs are arranged so that they work both on the upward and the downward movement of the main springs.

Following is the list of exhibitors at the New York shows:

Ernst Flentje, Cambridge, Mass.
Gabriel Horn Mfg. Co., Cleveland, O.
Hartford Suspension Co., Jersey City, N. J.
Kilgore Mfg. Co., Boston, Mass.
J. H. Sager & Co., Rochester, N. Y.
Supplementary Spiral Spring Co., New York City.

AMONG THE MAKERS OF RADIATORS

This is one branch of the accessory business which is seldom invaded by makers of automobiles, exceptions noted include Rambler, Cadillac, Packard, and perhaps a few others. Radiators are distinctly accessory products, and, like magnetos, coils, batteries, windshields, tops, wheels and tires, are made in enormous qualities, as many as 100,000 radiators being made in a single plant devoted to this class of work.

Radiators, as they obtain, may be classified as follows:

(A) Honeycomb, square, or octagon.

(B) Vertical tube, with gills.

(C) Horizontal tube, with gills.

(D) Flat plate, imitating square tube effect.

Besides these general classifications, there are:

(a) Water circulated by means of a pump.

(b) Thermo-syphon systems.

In the water circulation class will be found:

(aa) centrifugal pump circulation.

(ab) gear pump circulation.

In thermo-syphon systems there are:

(ba) Renault (over the flywheel).

(bb) Regal, with a pocket and means for distributing the water.

(bc) Grabowsky, with a steam space above the water.

(bd) Radiator same as in water cooling but of larger capacity.

Exhibitors at the Palace were:

Briscoe Manufacturing Company, Detroit, Mich.
W. J. Kells Manufacturing Company, New York.
Livingston Radiator & Manufacturing Company, New York.
McCord Manufacturing Company, Detroit, Mich.

The above exhibitors will be at the Garden including:

A. Z. Company, New York.

CARBURETERS SHOW ENCOURAGING IMPROVEMENT

It is important, this carbureter question, and to meet its every angle in the quest for perfection, many manufacturers of many minds have, for inspection and purchase, different forms of this important device, all well fitted for the work, but often varying in construction more than in principle.

A water-jacketed type shows other and somewhat marked characteristics. The water jacket, be it known, is a circular chamber outside the mixing chamber. In this instance the makers claim instant volatilization of the gasoline, inasmuch as particles from the spray which are not volatilized as they issue from (in this instance) a canopy-shaped spray, will immediately turn to vapor upon striking the inner wall which is surrounded by the warm jacket. Priming is simplified for the reason that when the lever controlling this function is raised, it lifts the needle valve, causing a rise of gasoline in the chamber. The overflow by a simple process immediately and automatically primes the motor. The makers claim no flooding, no clogging. A fixed air inlet, controlled by a screw, adjusts the air supply for all speeds, and the manufacturers aver, produces a perfect mixture at all speeds.

TO SECURE MECHANICAL ATOMIZATION

Another device (properly speaking a carbureter accessory) is upon the market which lays claims to efficiency and perfect combustion through a new form of mechanical atomization accomplished through the agency of a rapidly rotating wheel with propeller blades, which is hung within a galvanized iron mesh which atomizes the fuel as it passes into the carbureter. This apparatus is a wheel which sets between the carbureter and the intake manifold. It is said that the gasoline spray and air fed by the carbureter must pass through the wheel, causing it to revolve rapidly. The mesh thrashes it into fine spray, disintegrating the mixture and turning it into an explosive mixture.

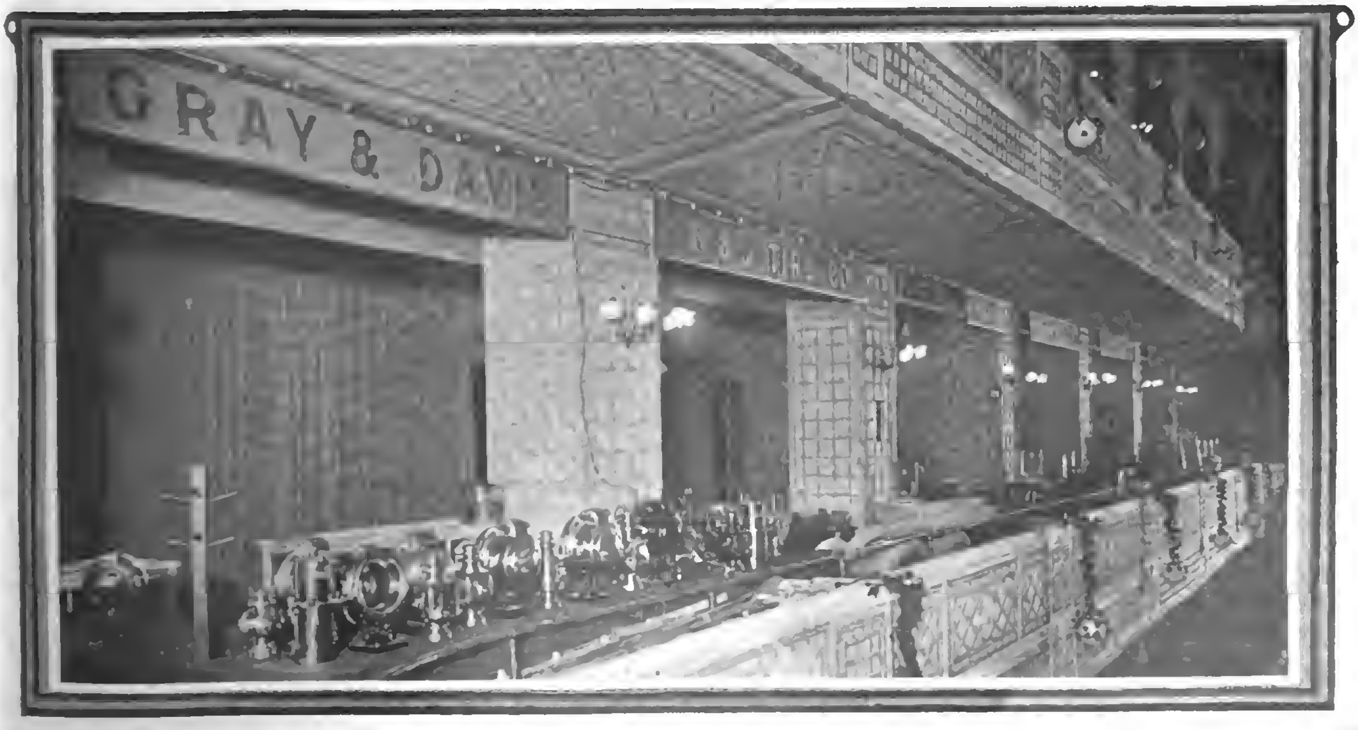
There may be seen on exhibition a carbureter for which many good points have been claimed, among which may be mentioned independent adjustments; a noiseless auxiliary air valve; central draught for main air and gasoline spray, which prevents changing fuel levels on grades, and a needle valve construction which causes complete atomization. It is made in vertical or horizontal form, with a choice of engine connections.

The following manufacturers exhibited at the Grand Central Palace Show:

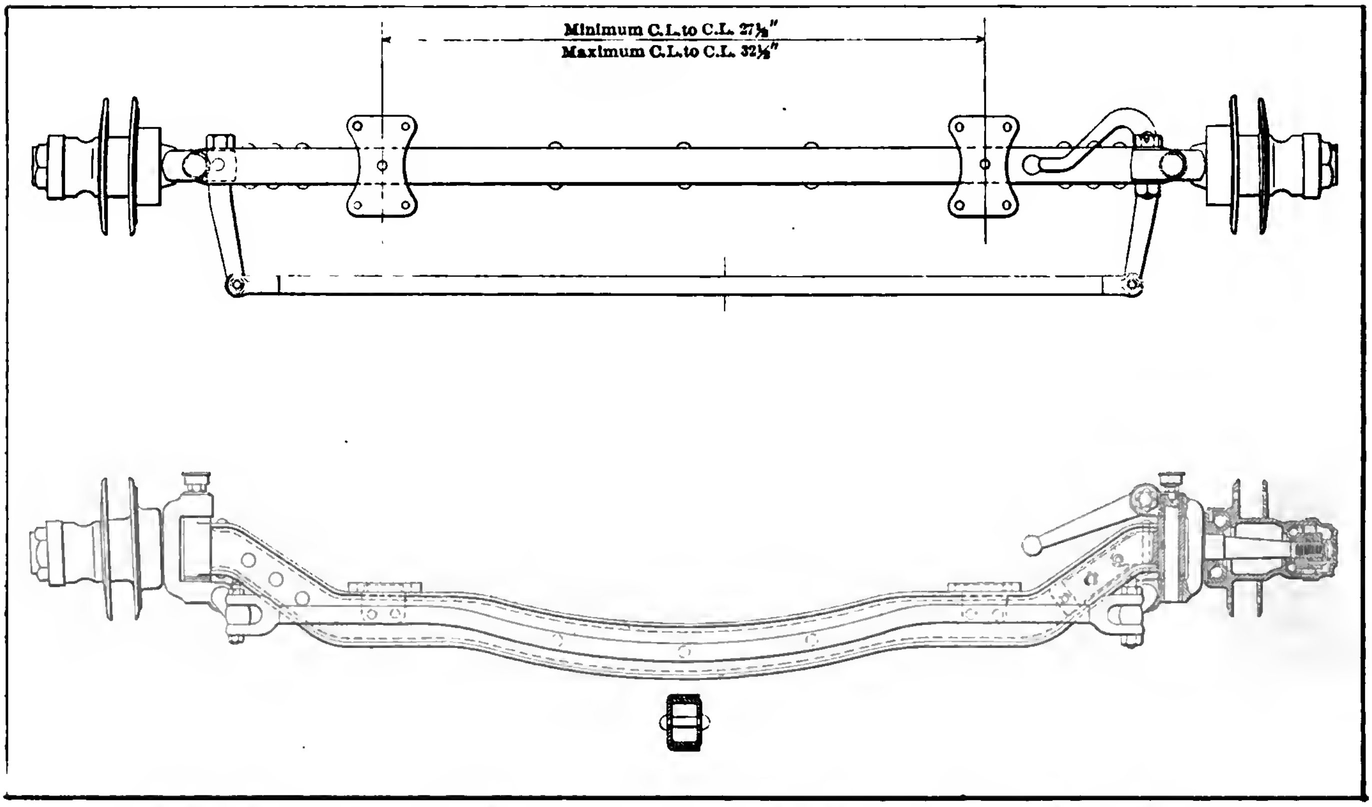
Auto Improvement Co., New York City.
Breeze Carbureter Co., Newark, N. J.
Byrne, Kingston & Co., Kokomo, Ind.
Gasoline Motor Efficiency Co., Jersey City, N. J.
Siro Carbureter Co., Springfield, Mass.
Stromberg Motor Devices Co., Chicago, Ill.
Wheeler & Schebler, Indianapolis, Ind.

The following are exhibited at the Madison Square Garden Show:

Allen Auto Specialty Co., New York City.
Byrne, Kingston & Co., Kokomo, Ind.
Stromberg Motor Device Co., Chicago, Ill.
Waterhouse Co., Boston, Mass.
Wheeler & Schebler, Indianapolis, Ind.



On the Balcony Overlooking the Main Hall Many Leading Accessories had a Vantage Point.



Pressed Steel, Front Axle With Special Steel Knuckles in Riveted Relation as Made at the A. O. Smith Plant

MAGNETOS STRIVE FOR SIMPLICITY AND DURABILITY

Many magnetos represent many ideas and there is presented here a few suggestions covering, in bare detail, the qualifications of this very important device, as it applies itself to modern automobiles.

In connection with the magneto comes a set of spark plugs which together form a complete ignition system. There is no extra coil nor "make and break" apparatus, but cable connections, and an advance lever which locate directly the steering part. The manufacturers state that this magneto forms a standing flame capable of igniting the poorest mixture.

Many points of superiority are claimed for a medium-priced magneto, offering, among other improvements, helicoidally-shaped pole pieces, which it is said permit smooth running of the magneto, prevent demagnetization and allow throttling down and easy starting.

Ready accessibility and great strength are quoted as primal characteristics of an offering in this line. In this instance the magneto has a heavy brass base, supporting two bronze ends, with a triple magnet for the field. The armature is of the Siemens type, with two windings. The makers claim easy and quick regulation, interchangeable parts and a quick hot spark at low speed.

In conclusion it will be well to say that a number of coil makers, realizing the importance of the magneto as a factor in gasoline engine development, have entered the field and are now turning out this latter product with the same attention to detail and excellence which has marked their work in their original field of endeavor.

The following manufacturers exhibited at the Grand Central Palace Show:

Bosch Magneto Co., New York City.
J. S. Bretz Co., New York City.
Heinze Electric Co., Lowell, Mass.
Herz & Co., New York City.
Hess-Bright Mfg. Co., Philadelphia, Pa.
Lavalette & Co., New York City.
Motsinger Device Mfg. Co., Pendleton, Ind.
Nilmelior Electrical Co., New York City.
Pittsfield Spark Coil Co., Dalton, Mass.
C. F. Splitdorf, New York City.
Witherbee Igniter Co., Springfield, Mass.

The following manufacturers will exhibit at the Madison Square Garden Show:

Bosch Magneto Co., New York City.
J. S. Bretz Co., New York City.
Champion Ignition Co., Flint, Mich.
Conn. Tel. & Elec. Co., Meriden, Conn.
Heinze Electric Co., Lowell, Mass.
Hess-Bright Mfg. Co., Philadelphia, Pa.
Herz & Co., New York City.
K-W Ignition Co., Cleveland, O.
Lavalette & Co., New York City.
Motsinger Device Mfg. Co., Pendleton, Ind.
Pittsfield Spark Coil Co., Dalton, Mass.
Simms Magneto Co., New York City.
C. F. Splitdorf, New York City.
Remy Electric Co., Anderson, Ind.

A FINE ARRAY OF MOTORS PRESENTED

Despite attempts on the part of experts to portray the trend in the design of motors in automobile practice, the exhibitions seem to show a diversified state of the art with all the types as follows, represented:

(A) Water and air-cooled motors.
(B) Cylinders with valves in the head.
(C) L-type cylinders.
(D) T-type cylinders.
(E) Individual cylinders.
(F) Twin cylinders.
(G) Cylinders *en bloc*.

It would be impossible here to discuss details sufficiently to serve any useful purpose at all, it being the case that refinements in detail in order to bring them to proper notice, will demand illustrations. The exhibits at the Palace showing complete motors were as follows:

F. A. Brownell, Rochester, N. Y.
L. A. W. Motor Company, Providence, R. I.
Carlson Motor & Truck Company, Philadelphia, Pa.
Excelsior Motor Company, Chicago, Ill.

At the Garden, the motors on show will probably slightly exceed the above list.

TRANSMISSION SHOWN IN DIVERS FORMS

Three speed (with reverse) selective transmission systems are very prevalent. This is shown in the tabulations of cars, both as they were given for the A. M. C. M. A., and as the A. L. A. M. automobiles are presented in the tabulation of the cars which will be at the Garden. It is difficult to put one's finger on the top idea presented. Perhaps the wide adaption of cast iron, as a substitute for aluminum, in the casings, not only for transmissions, but for motors, as well, is the most radical departure of the year.

Certainly cast iron is lighter than aluminum if the measurement is made in terms of strength—true, aluminum is from 10 to 15 times more costly than cast iron, and, as to market conditions, it is cast iron which can be had, more readily, from many sources, and with less risk as to strength.

Gears are now made of alloy steel, in nearly every case, and the equipment used in plants, as gear cutters, planers, shapers, hobbers, etc, are designed to sustain under the work. This is one of the advances of the times, because, in former years, machine tools, as used for shaping gears, were designed to be fashioned on a basis of cast iron, machine steel, etc., and, when alloy steel first came into vogue, it was found that the machine tools were not sufficiently rigid to perform the required operations.

Gear spindles, as prime and lay-shafts in transmission systems, are made as short as possible, and large in diameter in order to defeat deformation which, especially in connection with sliding gears, even though slight, interferes with the working of the system. In matters of this sort, much improvement will be noted all along the line.

As to the materials of which gears are made, chrome nickel steel is present in conspicuous examples. Nickel steel is a prime favorite. Silico-manganese steel is making a name for stability. Vanadium steel is being taken up, and cementing grades of carbon steel are in common use.

Of the exhibitors, at the Palace, the following makers presented transmissions:

Brown-Lipe Gear Company, Syracuse, N. Y.
F. A. Brownell, Rochester, N. Y.
Cotta Transmission Company, Rockford, Ill.
Driggs-Seabury Ordinance Corporation, Sharon, Pa.
Gemmer Manufacturing Company, Detroit, Mich.
Light Manufacturing Company, Pottstown, Pa.
Muncie Gear Works, Muncie, Ind.
A. O. Smith Company, Milwaukee, Wis.
Standard Roller Bearing Company, Philadelphia, Pa.
Timken-Detroit Axle Company, Detroit, Mich.
Warner Gear Company, Muncie, Ind.
Warner Manufacturing Company, Toledo, Ohio.

In addition to the above companies which will exhibit at the Garden also, the following concerns may be included:

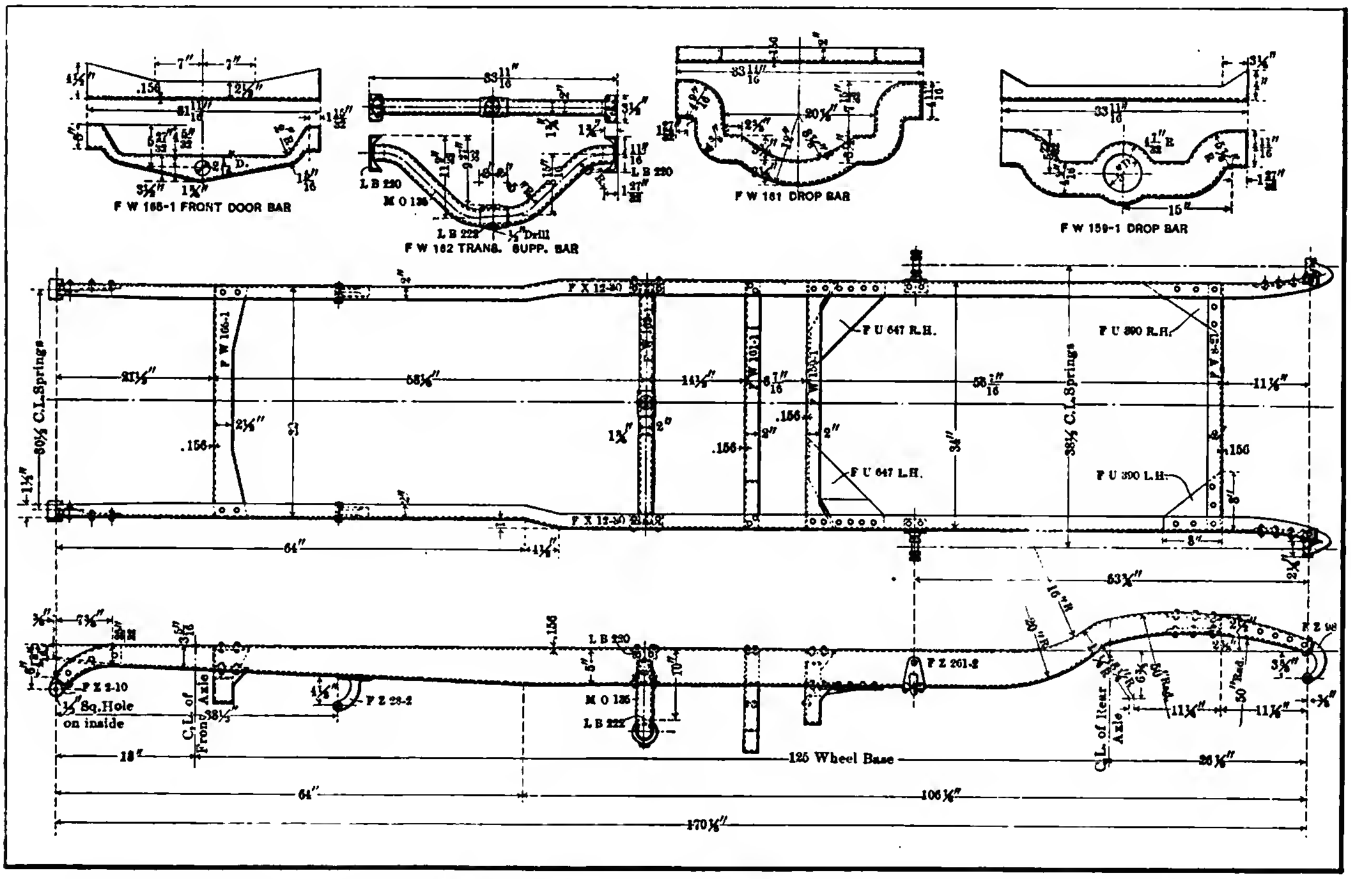
High Wheel Auto Parts Company.

Transmissions are also carried to a considerable extent by the supply dealers, a list of which is given elsewhere.

GRAY IRON FOUNDRIES EXHIBIT THEIR WARES

The extreme importance of cylinder castings and the difficulties involved in their production, considering the quantity requirement in America, has trained up a series of foundries which now produce gray iron castings for automobile work of the first quality. In addition to cylinders, there are pistons and piston rings, crank boxes, gear cases, and to some extent, small parts, all of which, in view of the shock nature of the service they must render, are from carefully selected grades of pig, in the cupola or by the natural draft process, from patterns of competence involving well-made cores, an intelligent "gaffer" and facilities.

In some cases, it is now the practice to mix a certain percentage of steel in the charge, the idea being to increase the average strength of the castings, and refinements made in



Chassis Frame With a Kick-up at the Rear and Special Shapes in the Cross Members Made at the A. O. Smith Plant.

foundry methods render this scheme feasible. The time was when to add steel to the charge was to put up with stout casting but prone to blemishes, the character of which would debar them from cylinder work, in view of the fact that cylinders must be tight as well as strong.

In the shops, with excellent facilities for making hydrostatic tests, defective cylinders are discovered without any question, and foundries are now producing such close grained work that spraying in the hydrostatic test does not transpire, leastwise within the limits demanded for strength. Cylinders are made for both water and air-cooled work with about the same facility, due to refinements in air-cooled designing, and to long practice in water-cooled work. It would scarcely seem necessary here to enlarge upon the problems involved, for if in the past there were difficulties to be surmounted, they do not now seem to deter the makers of cylinders in the leastwise. Among the exhibitors of this character of material at the Garden the following is named:

Erie Foundry Company, Erie, Pa.

SPRING MAKERS IN STRONG PRESENCE

In view of the enormous output of the year, and the fact that springs are almost exclusively in accessory plants, it is normal to expect that this industry will be heavily represented at shows, and at the Palace the spring makers' contingent presented a most pleasing array of the several types of springs.

Distinctive among the exhibits were the designs which include scroll features, they being in three-quarter and full elliptic springs, in which excellence of design included very wide plates, relatively thin members, and retainers of competence. What is true of the display at the Palace will be true of that at the Garden, and it is fortunate that the quality of material utilized in springs is now on such a high plane that spring breakages, which were once prevalent, do not now annoy autoists, unless in emergencies, for reasons that can be traced to something definite. The exhibitors of this line at the Palace were:

New Jersey Car & Spring Company, Jersey City, N. J.
Perfection Spring Company, Cleveland, Ohio.
Thomas Prosser & Son, New York City.

The exhibitors at the Garden in addition to the above will be:

American Vanadium Company, Pittsburg, Pa.
Carpenter Steel Company, New York City.

IGNITION, OTHER THAN THAT BY MAGNETO

Ignition, aside from that furnished by the magneto, covers a wide radius of action and embraces auxiliary features of the magneto as well as independent devices of a like character, and it is the purpose to touch lightly here upon a few of the many devices of this character which are on exhibition at the Madison Square Garden Show. In this résumé, the matter of car lighting will also be referred to in brief, because to do full justice to all subjects mentioned above would require many more pages.

The following makers of ignition apparatus exhibit at the Palace:

American Elec. Novelty Co., New York City.
Atwater-Kent Mfg. Co., Philadelphia, Pa.
Auburn Mica Co., Auburn, N. Y.
Eastern Carbon Works, Jersey City, N. J.
Electric Storage Battery Co., Philadelphia, Pa.
Geiszler Storage Battery Co., New York City.
Heinze Electric Co., Lowell, Mass.
Herz & Co., New York City.
High Frequency Coil Co., Los Angeles, Cal.
Kokomo Electric Co., Kokomo, Ind.
Lovell-McConnell Mfg. Co., Newark, N. J.
Lutz-Lockwood Mfg. Co., New York City.
A. R. Mosler Co., New York City
National Carbon Co., Cleveland, O.
New York Coil Co., New York City.
Osburn Electric Co., Detroit, Mich.
Pittsfield Spark Coil Co., Dalton, Mass.
Remy Electric Co., Anderson, Ind.
F. W. Smith, Aberdeen, S. D.
C. F. Splitdorf, New York City.
Union Battery Co., Belleville, N. J.
Vesta Accumulator Co., Chicago, Ill.
Westchester Appliance Co., New York City.
Westinghouse Co., Pittsburg, Pa.
Witherbee Igniter Co., Springfield, Mass.

The following will exhibit at Madison Square Garden show:

American Ever Ready Co., New York City.
Apple Electric Co., Dayton, O.
Atwater-Kent Mfg. Co., Philadelphia, Pa.
Benford, E. M., Mt. Vernon, N. Y.
Briggs & Stratton, Milwaukee, Wis.
Champion Ignition Co., Flint, Mich.
Conn. Tel. & Elec. Co., Meriden, Conn.
Eastern Carbon Co., Jersey City, N. J.
Electric Storage Battery Co., Philadelphia, Pa.
Geiszler Bros. Storage Battery Co., New York City.
Grossman, Emil, New York City.
Hardy, R. E., Co., Brooklyn, N. Y.
Heinze Electric Co., Lowell, Mass.
Herz & Co., New York City.
High Frequency Ignition Co., Los Angeles, Cal.
Jeffrey-Dewitt Co., Newark, N. J.
Lovell-McConnell Mfg. Co., N. J.
Mezger, C. A., New York City.
Motsinger Device Mfg. Co., Pendleton, Ind.
Mosler, A. R., New York City.
National Carbon Co., Cleveland, O.
National Coil Co., Lansing, Mich.
New York Coil Co., New York City.
Philadelphia Storage Battery Co., Philadelphia, Pa.
Pittsfield Spark Coil Co., Dalton, Mass.
Remy Electric Co., Anderson, Ind.
Splitdorf, C. F., New York City.
Stackpole Battery Co., New York City.
Tray Plate Battery Co., Binghamton, N. Y.
Union Battery Co., Belleville, N. J.
U. S. Light & Heating Co., New York City.
Vesta Accumulator Co., Chicago, Ill.
Willard Storage Battery Co., Cleveland, O.
Witherbee Igniter Co., Springfield, Mass.

AN IMPORTANT MISCELLANY OF STRUCTURAL PARTS

Among the noteworthy exhibitors, especially under the head of structural parts, are many whose wares entitle them to specific mention, notably, the makes of steel castings, among which, at the Palace and Garden, are:

Hess-Bright Manufacturing Company, Philadelphia, Pa.
I. G. Johnson & Company, New York City.
Lebanon Steel Casting Company, Lebanon, Pa.

Among the companies which produce aluminum, brass, bronze and other important casting parts, are:

Brown-Lipe Gear Company, Syracuse, N. Y.
Wm. Cramp & Sons, Philadelphia, Pa.
Doehler Die-Casting Company, Brooklyn, N. Y.
Light Manufacturing Company, Pottstown, Pa.

In addition to the above, there will be numerous exhibitors of this class of materials at the Garden.

SUPPLIES HANDLED BY RETAILING HOUSES

These jobbing houses are of benefit to the automobilist in many ways. They not only discover and bring to the public notice various articles of merit which might never obtain prominence otherwise, but also do a large business in importing foreign specialties.

The catalogs of these companies are often volumes of considerable size, listing within their covers almost everything appertaining to the automobile except the automobile itself.

Among the novelties noted in the exhibits of the supply houses was a very neat little valve lifter, to relieve the spring tension in order to enable the cotter to be removed. This device had two long arms, notched at the ends, to be placed one over the valve lift guide and the other under the spring. These arms were connected at the outer end by a toggle-joint actuated by a thumb-screw. Tightening up the screw forced the arms apart and compressed the valve spring.

The latest thing in the decarbonizer line appears to be a dry powder brand. This is claimed to clean the cylinders and muffler of carbon in less than half an hour. The powder is put up in cylindrical cans, each containing enough to clean one cylinder, and eight cans are sold in a box.

Following is a list of exhibitors at the Palace show:

Automobile Supply Co., New York City.
Emil Grossman Co., New York City.
Chas. E. Miller, New York City.
Motor Car Equipment Co., New York City.

The following will exhibit at the Garden show only:

Detroit Motor Car Supply Co., Detroit, Mich.
English & Mersick Co., New Haven, Conn.
N. Y. Sporting Goods Co., New York City.
Pierson Motor Supply Co., New York City.
Post & Lester Co., Hartford, Conn.

SHOWS DRAW AUTOMOBILISTS FROM EVERY STATE

ATTENDANCE at the Palace included all the old timers, who had made a name in automobile activities, and a goodly sprinkling of the second generation; taking them from the administrative buildings in the many plants, the engineering offices, and the sales establishments all over the land. In some measure, this accentuated attendance is brought about through the small interval which intervenes between the two big shows. Nevertheless, there is a big attendance of autoists, many of whom have a serious bent, but it is a critical audience, and it is making its selection with a deliberation as never before.

One of the old-timers seen at the show was Charles Wridgway, who has just returned from England accompanied by W. M. Letts, of London. The latter is here for the shows and is looking for a good low-priced car to introduce in Great Britain.

F. E. Moskovics was at the show the early part of the week, enthusiastic over the prospects of the aviation meet which he is going to conduct at Los Angeles from anuary 12 to 20.

No show will be complete without the "big fellow from the West," as Pat Hussey is known by his intimates.

Among those in New York representing the Midland Motor Car Company, of Moline, Ill., at the show, are E. W. Nicholson, sales manager; J. E. Miller, engineer; G. P. Hall, who is promoting the car to agents. They are stopping at the Hotel Empire.

The New Grand Hotel is the home of the representatives of the Buckeye Manufacturing Company, of Anderson, Ind., during the show week. Among the representatives of the company here are: J. W. Lambert, president; G. A. Lambert, vice-president, and G. B. Louderback, sales manager.

The Firestone Tire & Rubber Company, of Akron, O., is represented by H. S. Firestone, president; Robert J. Firestone, sales manager, and Frank H. Martin, manager of the Chicago branch. They are stopping at the Hotel Astor.

Harry Brate, sales manager of the Osburn Electric Company, Detroit, is here for the shows and is stopping at the Park Avenue Hotel.

J. O. Heinze, general manager of the Heinze Electric Company. Lowell, Mass., will stay for both shows and is stopping at the Knickerbocker. The same company is also represented by Pierre J. Legare, who is staying at the Hotel Seville.

The Bartholomew Company, of Peoria, Ill., is well represented by J. B. Bartholomew, president; O. Y. Bartholomew, treasurer; G. G. Luthy, secretary; Roy Johnston and R. A. Whitney, sales manager. The Hotel Manhattan is their headquarters.

George E. Edmunds and W. T. Jones of the Edmunds & Jones Manufacturing Company, of Detroit, are staying at the Murray Hill Hotel.

Richard Everett, manager of the Detroit branch of the R. E. Dietz Company, who since his location in the West in the interest of this concern has proven himself a hustler, is stopping at the Hermitage. Allen Cosgrove, the London representative, arrived in New York recently for the purpose of attending both the shows.

The Warner Gear Company, of Muncie, Ind., is represented by A. L. Johnson, president; C. E. Davis, general manager, and R. P. Johnson, secretary and treasurer, who are staying at the Waldorf-Astoria.

The Park Avenue Hotel is the home of C. T. Byrne, president, and J. P. Grace, secretary, of the Kokomo Electric Company, of Kokomo, Ind., during the shows.

George Kingston, president, and Marion Black, are representing Byrne, Kingston & Company, of Kokomo, Ind., and are registered at the Park Avenue Hotel.

L. W. Collins, secretary of the Vesta Accumulator Company, Chicago, is registered at the Woodstock.

B. S. Shimer, of Milton, Pa., president Star Speedometer Company, is among the visitors at the show. He is stopping at the Hotel Astor.

The Timken-Detroit Axle Company, of Detroit, Mich., is represented at the show by W. R. Timken, president; H. H. Timken, vice-president; A. R. Demory, second vice-president; E. W. Lewis, secretary and treasurer; H. W. Alden, chief engineer; F. C. Gilbert, assistant secretary; W. H. H. Hutton, Jr., purchasing agent; E. B. Lausier, assistant sales manager.

The Timken Roller Bearing Company is represented at the shows by H. H. Timken, president; W. R. Timken, vice-president and treasurer; Herman Ely, secretary; H. W. Alden, consulting engineer; R. R. Abbott, metallurgist; F. A. Miller, purchasing agent; A. G. Gladden, cashier; Herbert Vanderbeek, engineer, and F. A. Cornell, sales representative.

W. S. Gorton, secretary and general manager; C. E. Miller and H. C. Clark are at the show in the interest of the Standard Welding Company, of Cleveland, Ohio.

The Pennsylvania Tire Company, of Jeanette, Pa., is represented by C. N. Du Puy, general sales manager, and A. M. Jerome, manager.

C. F. Pratt, president and general manager of the Ohio Motor Car Company, is visiting the show in the interest of that concern.

The Mora Motor Car Company, of Newark, N. Y., is represented at the show by J. S. Draper, general sales manager; S. H. Mora, president; W. M. Freeman, treasurer; W. H. Birdsall and T. C. Colins.

Among the representatives of the Driggs-Seabury Ordnance Company, of Sharon, Pa., at the show, are C. W. Blackman, general sales manager; John Stevenson, president; H. W. Bondy and R. M. Bean.

The Gabriel Horn Manufacturing Company, of Cleveland, is represented by C. H. Foster, J. F. Gibler and H. D. Preston.

Among the representatives of the American Motor Truck Company, of Lockport, N. Y., attending the show, are E. B. Olmstead, Charles R. Bishop, Robert Hall, H. J. Babcock and R. F. Wells.

The Diamond Rubber Company has a big force at the show. Among those noticed were W. P. Miller, O. J. Woodward, J. H. Braden and S. J. Bates.

Charles Motz, president of the Motz Clincher Tire Company, of Akron, Ohio, was seen at the Palace during the week.

President August Schacht and Joseph Berle, of the Schacht Manufacturing Company, of Cincinnati, are in town during the shows.

H. S. Raymond, general sales manager and second vice-president of the Goodrich Tire Company, was also a visitor at the show this week.

Among the representatives of the Goodyear Tire Company noticed were G. M. Stadelman, W. D. Shilts, L. C. Van Beaver, F. A. Seiberling and C. W. Seiberling.

The Regal Motor Car Company, of Detroit, Mich., is represented by F. W. Haines, George W. Franklin, George D. Wilcox and E. Peake. These gentlemen are stopping at the Belmont Hotel.

J. W. Gilson, sales manager of the Mitchell Motor Car Company, Racine, Wis., one of the best known men in the trade, accompanied by J. M. Cram and E. C. Beyer, is staying at the Hotel Manhattan.

Thomas Hart, president and general manager; Fred J. Pardee, assistant manager, and L. A. Hart, who are all stopping at the Hotel Astor, are representing the Inter-State Automobile Company, of Muncie, Ind.

Fred J. Pardee, one of the best-known men in the trade, is receiving congratulations on his joining the staff of the Inter-State Automobile Company, of Muncie, Ind., as assistant to President Hart.

The Remy Electric Company, of Anderson, Ind., is well represented by W. R. Poland, G. O. Driscoll, Fred Urban and C. Herbel Morris, who are stopping at the Hotel Wolcott.

J. A. Cain and Percy Barter, of the McCord Manufacturing Company, are among those registered at the Knickerbocker.

A. R. Miller, who represents Barthol & Daly, and also the Simm's magneto, is stopping at the Knickerbocker.

W. C. Marmon and H. C. Marmon, of the Nordyke & Marmon Company, Indianapolis, Ind., are at the Knickerbocker. H. H. Rice, sales manager, and A. R. Heiskell, purchasing agent, of the same company, are at the Manhattan.

H. O. Smith, president; George Weideley, vice-president, and R. W. Macey, Jr., of the Premier Motor Manufacturing Company, of Indianapolis, Ind., are stopping at the Engineer's Club. R. I. Eads, New England manager, is at the Breslin.

V. A. Longaker, president of the American Motor Car Company, of Indianapolis, Ind., is registered at the Broztell. Fred I. Tone and C. F. Baker are at the Cadillac.

The Simplex Motor Car Company, of Mishawaka, Ind., is represented by D. A. Shaw, treasurer, and George S. Waite, sales manager, who are stopping at the Astor.

E. J. Moon and W. R. Flint, of the Moon Motor Car Company, of St. Louis, are registered at the Woodstock.

The New Grand has among its guests this week C. Van Dervoort, sales manager, and F. G. Salisbury, of the Moline Automobile Company, of Moline, Ill.

Among those registered at the Hermitage are George M. Dickson, W. G. Wall and J. M. Clarke, of the National Motor Vehicle Company, of Indianapolis, Ind.

W. H. Schwartz has resigned his position as manager of the Boston branch of the Old-Oakland Motor Company and has been appointed sales manager of the Metz Manufacturing Company, of Waltham, Mass. Mr. Schwartz was associated with the Waltham Manufacturing Company in the Orient bicycle days. For several years past Mr. Schwartz has been prominently identified with the trade. Mr. Schwartz was seen at the show, representing the C. H. Metz Company, which has a very interesting exhibit.

H. D. Van Brunt has retired from the firm of Willis & Van Brunt, of Syracuse, N. Y., and his interest has been taken over by F. S. Willis, who will hereafter conduct the business under the name of the Willis Motor Car Company, at the same address, 231 North Clinton street.

A. C. Newby, of the National Motor Vehicle Company, of Indianapolis, Ind., who has been confined to his home with a severe cold, has fully recovered and is expected at the show.

President C. A. Shaler, R. B. Dunlap, sales manager, and M. E. Faber, electrical expert of the C. A. Shaler Company, Waupun, Wis., are at the Hoffman House.

George S. Atwater, sales manager of the Tray Plate Battery Company, Binghamton, N. Y., is at the New Grand. Stanley Bayless, secretary and general manager, is at the Collingwood.

C. D. Hudson, manager of the Seeley Sales Corporation, Detroit, is at the Grand View.

Irving W. Adams, Superintendent, High Frequency Ignition Coil Company, Los Angeles, is at the Woodstock.

Charles W. Harris, General Manager of the Wayne Oil Tank & Pump Company, Ft. Wayne, Ind., is at the Knickerbocker.

President William Young, of the St. Louis Supplementary Spiral Spring Company, St. Louis, is at the Empire. Mr. Young is in town for a double purpose—to attend the shows and to prosecute suits for infringements of the famous device patented and made by his company.

President G. F. Discher, Garage Equipment Company, Milwaukee, Wis., and Sales Manager Paul G. Niehoff are at the Park Avenue. L. J. Miley and F. H. Smith, sales department, are at the Breslin.

George Schebler, of Wheeler & Schebler, Indianapolis, is at the Cumberland.

Carl J. Holdrege, sales manager, Stromberg Motor Devices Company, Chicago, and Harvey Goodwin, manager, Boston branch, are at the Cadillac.

Fred W. Smith and A. E. Sweet, of the Point Spark Plug Company, Aberdeen, S. D., are at the Cadillac.

Fred L. Holmes, manager, and Harry Matthews, purchasing agent, Jackson Automobile Company, Jackson, Mich., are at the Astor.

Elmer Apperson, of the Apperson Bros. Automobile Company, Kokomo, Ind., who has been very ill with a severe cold for the past two weeks, has gone to Florida to recuperate.

President Frank Briscoe, Sales Manager F. A. Harris and Advertising Manager J. M. Evans, of the Brush Runabout Company, Detroit, are at the Belmont.

General Manager George Kissel, of the Kissel Motor Car Company, Hartford, Wis., is at the Belmont.

W. H. Wood, of the Empire Motor Car Company, Indianapolis, Ind., visited the Palace Show Tuesday.

Charles P. Henderson, vice-president, and H. C. Lathrop, secretary, of the Henderson Motor Sales Company, Indianapolis, are at the Empire.

President J. J. Cole and C. S. Crawford, engineer, of the Cole Motor Car Company, are at the Empire.

Sales Manager H. A. Githens, G. & J. Tire Company, Indianapolis, is at the Astor, and F. A. Drake and R. W. Weiss, of the sales department, are at the Breslin.

Charles S. Monson, Western sales manager for Gray & Davis, with headquarters in Detroit, is at the Astor.

George H. Strout, sales manager, and Wallace L'Hommedieu, sales department, Apperson Bros.' Automobile Company, Kokomo, Ind., are at the Astor.

No show would be complete without Courtland D. Cramp, of the William Cramp & Sons' Ship & Engine Building Company, of Philadelphia, who is very much in evidence this week.

MAY BE GARDEN'S LAST AUTO SHOW

Historic Madison Square Garden, the scene of so many successful automobile exhibitions, must in time, it is rumored, give way to a business structure, as the property is becoming too valuable as a business centre to continue as an auditorium for the purposes for which it is now used. According to William F. Wharton, one of the board of directors of the Madison Square Garden Company, six offers have been made during the past year for the property, and the bids are receiving serious consideration. What appears to be a matter of the utmost importance is whether another similar building—so far as the ampitheatre is concerned—will be erected in New York City. Mr. Wharton, who was a prime mover in the agitation for the present Garden, says that the need of such a building is most evident, and that he would do all in his power to have another constructed provided the present one is razed, and the suggestion that the site of the present armory of the Twenty-second Regiment, Engineers, N. G. N. Y., at Sixty-eighth street and Broadway, which is available, should be taken for this public meeting place met with his hearty approval. In discussing the situation, Mr. Wharton expressed himself as follows:

"It may be next week or not until next year that Madison Square Garden passes out of the hands of the present owners," he said, "but, be the day near or distant, it is bound to come some time. The offers last year were all brought to us by agents."

STUDEBAKER AND E-M-F COMPANIES STILL FIGHTING

DETROIT, Jan. 3—Apparently there is to be no immediate cessation of hostilities on the part of the Studebaker Automobile Company in its efforts to harass the E-M-F Company pending a final settlement of the question as to whether the selling agreement formerly existing between the two companies, and which was rescinded by President Walter E. Flanders of the E-M-F Company, could thus be annulled.

After a lengthly argument before Judge Swan, in the United State Circuit Court, last Thursday, the Studebaker Company was permitted, upon its own request, to withdraw its suit against the E-M-F Company, it being made a condition of the withdrawal that in the event it was desired to begin a similar action it would be started within ten days and in the same court.

Immediately after withdrawal of the suit, Studebaker attorneys began to skirmish to secure a temporary restraining order which would again tie up the local factory. Judge Severens was once more appealed to at Kalamazoo, but as he had already gone over the facts in the case and had refused an injunction, he declined to interfere. Judge John W. Warrington, of the United States Court of Appeals at Cincinnati, was next sought, and a new bill of complaint, drafted along practically the same lines as the original, was submitted to him. He also refused to grant a restraining order, but agreed to hear an application for a temporary injunction, the hearing being set for January 10.

The bill of complaint will have to be filed in the United States District Court here, as Judge Warrington will concern himself only with hearing the application for an injunction. This will, of course, compel the E-M-F Company to put in an appearance at Cincinnati, and probably go over the same ground that was covered before Judge Severens, at Kalamazoo, the only difference being that in the present instance Messrs. Fish, Studebaker and Eames, of the Studebaker Company, appear as officials of the latter, instead of minority stockholders in the E-M-F Company.

Meantime the fight has assumed a new angle, which may result in the ousting of Messrs. Fish, Studebaker and Eames from the board of directors of the E-M-F Company. The three men have been made defendants in a suppressed suit filed in the Wayne County Circuit Court by every other stockholder in the E-M-F Company, under an old Michigan statute which gives circuit courts jurisdiction over the actions of directors in domestic corporations where bad faith and gross misconduct are charged. The bill of complaint recites details of the transactions between the E-M-F and Studebaker Companies as showing the misconduct of the trio who have been made defendants in the action. It is alleged that their refusal to take the number of cars agreed upon was in pursuance of a plan to gain control of the E-M-F Company and make it a part of an $80,000,000 merger the Studebaker Company had been fostering, a project which it endeavored to get President Flanders to entertain.

There was a stormy session of the E-M-F directors last week, the seven members of the board being present. By formal vote President Flanders' action in rescinding the agreement with the Studebaker Automobile Company was ratified, although Messrs. Fish, Studebaker and Eames protested vigorously in an endeavor to have action postponed for one week, the evident intention being to, in the meantime, see what further legal steps could be taken toward preventing a complete severance of the relations whereby the Studebaker Company was to be sole distributor of E-M-F products.

An interesting phase of the matter has come to light through the assertion of agents who have contracts with the Studebaker Automobile Company for the sale of E-M-F cars that they are being advised by the Studebakers that they had better sign up with the Detroit company for their own protection, and that they can secure the return of deposits made by them with the Studebaker Company. This action is interpreted at this end of the line as indicating that the Studebaker Company is desirous of saving itself from the possibility of litigation.

Studebaker Company Files New Bill of Complaint

DETROIT, Jan. 4—A second bill of complaint was yesterday filed by the Studebaker Automobile Company against the E-M-F Company in the United States Court, the first bill having been withdrawn.

The present bill is drafted along much the same lines as the first, the only new feature of note being a series of affidavits signed by F. S. Fish, chairman of the executive committee of the Studebaker Company, with a view to controverting certain facts in the legal battle. Mr. Fish admits that he actively tried to promote the big merger that has been hinted at, but declares that the idea was suggested to him by President Walter E. Flanders, of the E-M-F Company. In another affidavit he declares that although the schedule of August, 1909, provided for 15,200 cars to be manufactured by the E-M-F Company, for which the Studebaker Company was to be sole distributor, Hayden Eames, general manager of the Studebaker Company, had no legal right to bind the Studebaker Company to take that many cars.

The suit instituted yesterday will come up in its regular order in this district, but the application for a temporary injuction made to Judge Warrington, in Cincinnati, will be heard there January 10.

AVIATOR DELAGRANGE KILLED BY FALL

BORDEAUX, FRANCE, Jan. 4—Another name was added to the growing list of aeronautic fatalities to-day. Léon Delagrange, a pupil of Blériot, was instantly killed by a fall from a height of 65 feet when one wing of his monoplane collapsed. The machine was one of the Blériot cross-Channel type. In place of the 25-horsepower Anzani motor, which is the regular equipment, Delagrange had substituted a 50-horsepower Gnome, and it is believed that the strain of this heavy and powerful motor was responsible for the accident.

Léon Delagrange was a pioneer in aviation. Two years ago, when he was using a Voisin biplane, he and Farman were rivals, and alternated in establishing world's records for duration of flight. Last Summer he became a convert to the monoplane type, and joined the Blériot forces.

RUBBER EMPLOYEES STILL ON STRIKE

HARTFORD, CONN., Jan. 3—The strike of the tire makers of the Hartford Rubber Works Company continues. The strikers report that about 30 men are now engaged in building tires, and, of these, 13 are inspectors. This information comes from one of the strikers who returned to work and later rejoined the belligerents. The strikers still maintain pickets about the factory.

Superintendent C. B. Whittlesey has sent out, it is said, a number of circular letters to prospective help. All the men received the one day's pay due them on Monday of this week and it is said that most of the men received official notification that their services were no longer needed.

There is a persistent rumor in circulation that the company was anxious to bring about the strike and that there is some likelihood of the works removing elsewhere.

Reo Challenger Center of Interest of Winter Scene

When the Reo, driven by Ray M. Owen, made a perfect score in the New York-Atlanta run, it challenged all other perfect-score cars to a further contest calling for a detailed technical examination. None of them saw fit to accept the challenge, so this name has been adopted for that model. It will henceforth be known as the Reo Challenger.

Patent Holders Build Own Product, Now—Owing to the expiration by limitation of the license heretofore held by the Livingston Radiator Company, New York City, the manufacture and sale of Livingston radiators will be conducted in the future by the Livingston Radiator & Mfg. Co., Inc., of 312 West Fifty-second street, New York. The El-Arco Radiator Company, formerly the Livingston Radiator Company, will continue the manufacture and sale of El-Arco radiators after the first of the year 1910.

Borax King Buys a Stearns—F. M. Smith, the California Borax King, who has made "20-Mule Team Borax" famous all over the world, has recently placed an order for a six-cylinder, 90-horsepower Stearns. Mr. Smith will use this car for fast work across the California and Nevada deserts in connection with his borax enterprises. In addition to the car, Mr. Smith has given an open order for complete equipment, embracing both necessities and luxuries, that can be added to a car.

Hartford Officials' Successful Trip—H. P. Fields, vice-president of the Hartford Rubber Works Company and M. C. Stokes, manager of the bicycle tire department, have returned from a month's trip to the west coast in the interest of the company. Business is reported to be unusually good at the various agencies of the company in that section of the country. Among the varions cities visited were, Chicago, Denver, Portland, San Francisco, Seattle, and Los Angeles.

Truck Capacity Doubled—So rapidly has the 1909 allotment of trucks of the Gramm-Logan Motor Car Company, Bowling Green, O., sold, that plans for another large factory with a capacity of 1,000 truck chassis to cost $96,000 have been completed. This will be equipped with the very latest machine tools. The 1910 trucks are nearly all contracted for.

Croxton-Keeton Doing Lots of Business—For the excess business of 1910, now beginning to come in, the Croxton-Keeton Motor Company of Masillon, O., is building, and has nearly completed, a new plant at Walnut and Canal streets, that city.

IN AND ABOUT THE AGENCIES

Recent Selden Agencies—The Selden Motor Car Sales Company has been established in Kansas City, Mo., at 913 East Fifteenth street, and will be in charge of M. B. Russ. J. V. Moore has secured the local agency for Oklahoma City, Okla., and together with the Regal agency will occupy a handsome new garage. In Chicago the Selden is to be represented by the [illegible] Motor Company, the principal owners of which are T. H. [illegible] and P. D. [illegible]. The recently incorporated F. A. Ballou Company, of Buffalo, N. Y., will represent the Selden in that city. Mr. Ballou is well known in the motor-boat business.

Rauch & Lang, Minneapolis, Minn.—Announcement has been made of the organization of the Hughes Motor Car Company, which is to represent the Rauch & Lang Company in this city. The new company is planning a new garage and charging station at Harmon place and Twelfth street, to cost $20,000. Raymond L. Lunt, who will be in charge, is now at the Cleveland factory, learning the fine points of the cars. After Jan. 15 the company will also take over the St. Paul territory.

Stewart Speedometers, San Francisco—A. C. Cowan has been appointed Western sales manager of the Stewart & Clark Mfg. Co., and will establish headquarters on Golden Gate avenue, San Francisco.

Demot, Minneapolis, Minn.—Arrangements have just been concluded by which the Pagel-Allen Company acts as agent for the Demot Car.

Exide Batteries, Houston, Tex.—The Imperial Motor Car Company has just taken on the agency for Exide batteries.

PERSONAL TRADE MENTION

D. C. Fenner, formerly with the Knox Automobile Company's New York branch, is now located at the factory in Springfield, Mass., where he is concerned primarily with the commercial vehicle sales end. Mr. Fenner has been with the Knox commercial vehicle department for a nnmber of years, bnt has never found as much activity in that line as just at the present time.

George A. Horner has been appointed factory manager of the Rapid Motor Vehicle Company's plant at Pontiac, Mich., which is said to be the largest in the world devoted exclusively to commercial vehicles.

W. H. Kirkpatrick has resigned his position as sales manager of the Peerless Motor Car Company, of Cleveland, and has severed his relation with the company, taking effect January 1.

MICHELIN TIRE CO'S NEW MANAGER

MILLTOWN, N. J., Jan. 3—Following the retirement of J. C. Matlack, J. Hanvette-Michelin, a nephew of Edouard Michelin, president of the four great Michelin tire factories, has been elected vice-president and general manager, with headquarters at Milltown.

Mr. Michelin, who now takes charge of the American interests, is a man of long experience abroad, both in the manufacture and sale of tires.

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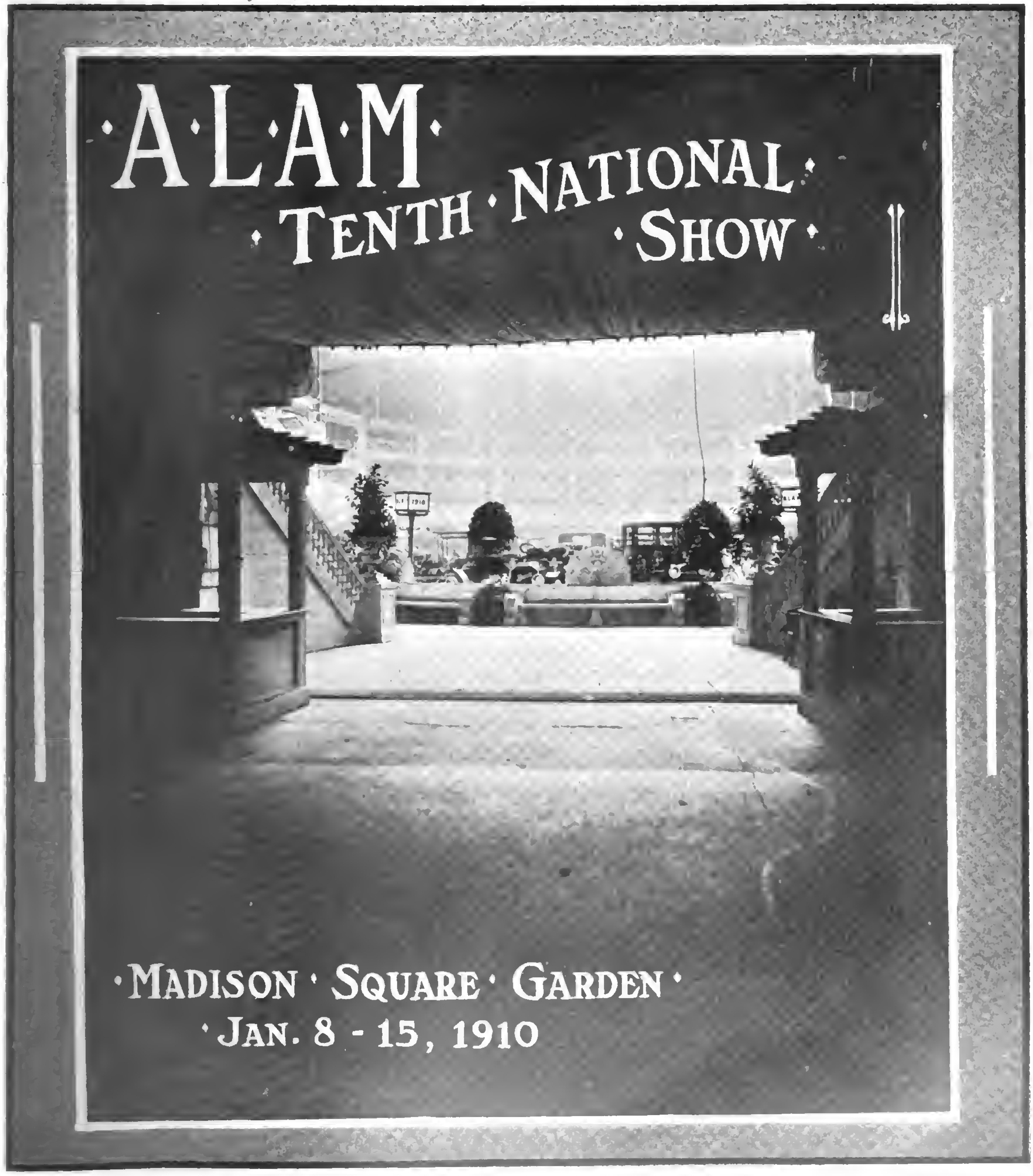
The Automobile



Madison Square Garden Never Looked as Beautiful as It Does the Present Week, Filled with Sp

SURPASSING even the predictions and expectations of those connected with it, the Madison Square Garden show has preserved the climactic effect which has its doings. As the industry is bigger and more prosperous than it was last year, so is the show bigger and more elegant. The exhibits have been prepared with a care and thoroughness which reveals the manufacturers' appreciation of its extent and importance. Their setting is of a nature to make the Garden worthy of a visit on that score alone.

For scenic effect the Garden show seems the last word. The proportions of the building, and the broad sweep of the exhibition hall, invite a decorative treatment at once simple and magnificent. Around the walls, outlining the galleries, stand massive Doric columns in snowy white; overhead a canopy of blue bunting conceals the roof beams and gives a background to a thousand electric bulbs that twinkle like stars. Perhaps the best view of the show as a whole is obtainable from the galleries. Looking down on the closely grouped cars and the swarming crowds, it is a dull man indeed who would fail to be impressed by the vigor and wealth of this still young industry. Those with an eye to the future will inevitably speculate on the development ten years more will bring.

In many of the smaller details the care taken in preparation becomes evident. Directly opposite the main entrance stands a fountain, fronted by a curved seat. The water falls into a long, narrow basin, strewn with pond lilies and other water plants, among which goldfish dart in and out. At any time during the day the seat may be seen occupied by visitors who, tiring of the exhibits, have paused to rest and watch the throngs that stream through the wide doors.

For the first time in the history of Garden shows the boxes so famous at the Horse Show have been thrown open to visitors. These are sufficiently elevated from the main floor to give their occupants a comprehensive view of the exhibits, and have proved popular with those who come because they regard the show as one of the great society events.

The attendance, which undoubtedly will be found at the end of the week to break all previous records, has been of every character. In the morning, when the crowds are not so great, come the tradesmen and those specifically interested in the mechanical details of the cars. It is then that the salesmen are forced to exhibit their best technical knowledge. Later in the day the attendance becomes at the same time more numerous and more fashionable. In the evenings no generalizations can be made; it seems as if half the city had turned out to attend.

ducts of the American Automobile Industry, and Embellished with the Highest Type of Decorative Art

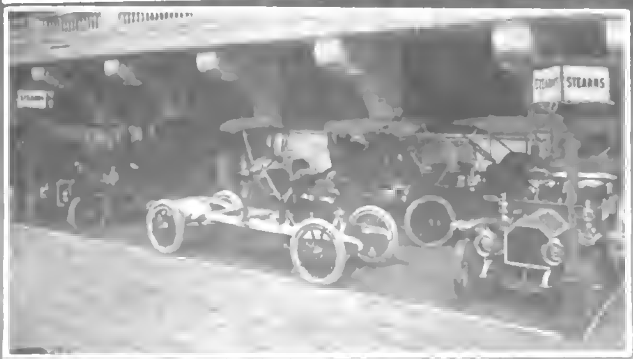
The exhibits on the whole are conservative. Half the models displayed show little, if any, change from those of last year. The most startling feature is the great number of torpedo or gunboat bodies shown. These are of every degree of radicalism. Some are only ordinary touring bodies with square doors front and rear; others run to the most extravagant curves and bulges. The manufacturers have found, however, that the torpedo body is a difficult proposition to handle, and it is doubtful if many of the models shown will be repeated very often for the benefit of prospective customers.

In its minor departments the show is up to the standard set on the main floor. Twelve manufacturers exhibit commercial vehicles, making a very complete and representative display of everything from the lightest delivery wagon to the heaviest five-ton trucks. The electric exhibit includes practically all the well-known makers of this type of automobile. Secluded from the main hall in the room known as the restaurant, it has a quiet and refinement very appropriate to the cars themselves. The accessory line includes 243 exhibitors, showing everything required to build or equip a car or to clothe its passengers.

The collection of trophies is most pretentious, and would put to blush many of the jewelry shops on Fifth avenue. A visitor can employ several hours, if he so desires, in looking them over, and if he can identify every one of them he should receive a medal for his knowledge of automobile history. Among them are the Vanderbilt, Glidden, Indiana, Massapequa, Merrimac Valley, Brighton Beach, Dewar, Sewall-Alden, Tanforan, Thermoid, Lowell, Fairmount Park, Detroit and Dead Horse Hill cups. The collection is reminiscent of many hard-fought contests on track and road. Each of them, no doubt, has contributed its mite for the information of designer, mechanic and driver, and has aroused enthusiasm in many once scornful of the new vehicle.

Once again the show committee of the Licensed Association has earned the heartiest congratulations. In the present unsettled condition of the show question, when rumors are afloat that the historic Garden is to be torn down, it is not improbable that this, the tenth annual show, will be remembered by automobilists as the last to be held in the building which witnessed the first feeble steps of the industry. Perhaps this show may mark the end of the old and the birth of a new epoch. In such case the association will have no reason to be ashamed of its most recent effort. The show is in every way worthy of the industry which it represents, and no more could be said in its praise.

SOME NOTABLE EXHIBITS AT THE GARDEN



A Glance Down the Right Hand Aisle After Entering the Garden Shows Artistic and Advantageous Arrangement

EARLY DAYS OF THE AUTOMOBILE SHOW

By COL. GEORGE POPE, Chairman Show Committee A. L. A. M.

TIME was not so long ago when the automobile was as much of a curiosity as is the aeroplane to-day. The modern motor car is no longer an invention merely to increase the pleasure of the wealthy. It has taken a place in the commercial field, and at present can be found in all its forms on the city streets and country roads. This is an age of rapid progress, and nothing better illustrates the rapidity with which developments take place than the automobile. In less than twelve years the motor car has been developed from a noisy, crude and complicated piece of machinery to its present high standard form.

It was quite an adventure to ride in an automobile only a decade ago, and it required several days of preparation for a "joy ride." The occupants of the cars garbed themselves in overalls and started out fully equipped with tools to meet emergencies, and they usually made use of their tool equipment before the "long and comfortable" ride was completed.

There are several things to which can be attributed the advancement of the motor car. Automobile shows have played an important part in the development, as have road racing and kindred contests.

The development of the industry parallels the growth of automobile shows, and an outline history of the shows will give an interesting enlightenment on the rapid strides made since the first show. At this show there were thirty-one exhibitors of cars and twenty exhibitors of accessories. There were not enough exhibits to fill the spaces, even with a board track on the main floor. Motorcycles and motor-tricycles were included with the automobiles. The track was used for gymkana events, starting, stopping and braking tests. The public was very skeptical concerning the automobiles on view, and occasionally a query was heard as to whether or not the cars would run up a hill. The first show was a financial success. The Garden was crowded at every session. The cost of putting on the first show was $11,000, not including the cost of decorations, which were paid for by the exhibitors. At this time it is interesting to glance over the complete list of the exhibitors at this early show. They were:

Elmer Motor Vehicle Co., Woods Motor Vehicle Co., American Electric Vehicle Co., Winton Motor Carriage Co., Waltham Mfg. Co., Peerless Mfg. Co., Ward Leonard Electric Co., Baker Motor Vehicle Co., American Bicycle Co., De Dion-Bouton Motorette Co., Buffalo Electric Carriage Co., National Automobile & Electric Co., Ohio Automobile Co., Autocar Co., Daimler Mfg. Co., Haynes-Apperson Co., Canda Mfg. Co., Duryea Power Co., Crest Mfg. Co., Automobile Co. of America, Knox Automobile Co., John T. Robinson & Co., Holyoke Automobile Co., Trinity Cycle Mfg. Co., Springfield Cornice Works, St. Louis Motor Carriage Co., Foster Automobile Mfg. Co., Diamond Rubber Co., Mobile Co. of America, Steam Vehicle Co., Stanley Mfg. Co., Chas. E. Miller, B. F. Goodrich Co., Dow Portable Electric Co., Locomobile Co. of America, Overman Automobile Co., Rose Mfg. Co., Goodyear Tire & Rubber Co., Janney Steinmetz & Co., New York Motor Vehicle Co., International Motor Carriage Co., Consolidated Rubber Tire Co., Badger Brass Works, C. F. Splitdorf, Veeder Mfg. Co., Gray & Davis, Strong & Rogers, Automobile Club of America, Munger Vehicle Tire Co., Beven Bros., Ware Bros., New Process Raw Hide Co., E. A. Brecher & Co., Dixon Crucible Co., Downing & Co., Gleason Peters Air Pump Co., New York Belting & Packing Co.

The second national show was held in the Garden during the week of Nov. 2-9, 1901. There were ninety-three exhibitors in this. The track was omitted, and again there was a loan exhibit of foreign cars. Among them was a Darracq, a Napier, a Renault, a Mercedes, and a Mors shown by Foxhall P. Keene.

About this time the industry began to develop, and with an increasing output by the factories the makers found it necessary to act as wholesalers only. It was during the year of 1902 that the commercial future of American cars became more certain. The National Association of Automobile Manufacturers was organized, and it was decided after several conferences that the next show would be held at the beginning of the year instead of at the close, and it should be managed by a committee, on which the N. A. A. M., the Automobile Club of America—under whose auspices the first show was held—and the Garden company should each be represented, and it was arranged that these organizations should share in the profits.

There was no show in 1902, and the third one was held in the Garden during the week of January 17-24, 1903. The number of exhibitors had now grown to more than 150, and for the first time a foreign exhibitor took space; this was the Paris Automobile Company, represented by H. Fournier.

The fourth national automobile show was held at Madison Square Garden on Jan. 16-23, 1904. This show had more than 185 exhibitors, and was held under the same auspices as the previous one.

The automobile industry was growing so rapidly that at the fifth show in the Garden, January 14-21, 1905, many firms seeking space had to be refused. The show was held under the same auspices as before, and 250 exhibitors secured space.

With the 1905 show, the contract between the National Association of Automobile Manufacturers, the Automobile Club of America and the Madison Square Garden Company, expired, and the Association of Licensed Automobile Manufacturers obtained a lease of the Garden for several years, with an option of renewing it.

When the show passed to the auspices of the Association of Licensed Automobile Manufacturers, a committee was appointed to take charge of the whole affair. Up to that time the individual exhibitors were permitted to decorate their booths as they pleased, and the general result was a mess of bunting, irregular and glaring signs, and there was a confusion of color to be seen everywhere about the Garden. The show committee took charge of the decorating and, in fact, everything connected with the show management. They formulated plans to make a harmonious exhibition, and the decorating was placed in charge of an expert. Thereafter the signs of the exhibitors were made of uniform size, color and design. Other details were carried out to conform with the ideas of the show committee.

The sixth annual automobile show was held in the Garden, Jan. 13-20, 1906, under the auspices and management of the A. L. A. M. There were 50 exhibitors of cars and 170 exhibitors of parts and sundries.

Under the same auspices as its predecessor, the seventh annual show was held in the Garden during the week of Jan. 12-20, 1907. That the public was now deeply interested in automobiles was strongly emphasized by the vast number of people who attended the show on the opening night. More than 7,000 people were there. At this show there were 42 exhibits of cars and 202 accessory exhibits. There was another show that same year. It was held in Madison Square Garden during the week of Nov. 3-10, 1907. This was the eighth national automobile show under the auspices of the A. L. A. M. There were 68 exhibits of complete cars, a number of commercial vehicles and about 225 accessory exhibits.

The ninth national automobile show under the auspices of the A. L. A. M. was held in Madison Square Garden, Jan. 16-24, 1909. At this show there were 117 complete cars, 28 chasses, 37 electric vehicles and a number of commercial vehicles.

The number of exhibitors at the present show in the Garden, the tenth national, indicates in a great measure how wonderful has been the growth of the automobile industry in America. Even with an increase over last year of many thousands of square feet of floor space for exhibition purposes, many would-be exhibitors could not be accommodated. The list of exhibitors shows that there are 323 different displays, of which 54 are exhibits of complete cars, 23 are motor-cycle displays, and 240 are exhibits of accessories and parts. It can be safely said that the present show is bigger and better than its predecessors.

Torpedo Types Representative of the Most Advanced of Comfort-Creating Designs of the Year

(A) Franklin, (B) Knox, (C) Winton, (D) Palmer-Singer, (E) Royal Tourist

Lighting by Latest Electric Methods

By Thos. J. Fay

Fig. 1—Pierce-Arrow limousine of artistic design with electric lighting on the same basis

MERIT, like the mill of the gods, is sure, but, unlike the great contrivance, it is not, of necessity, slow. This same merit, as it resides in electric lighting as applied to automobiles, seems to have copied the first characteristic of the mills of the gods, for its development has not maintained pace with the well-authenticated qualities of [illegible] lighting as it is generally applied. The retarded growth [illegible] branch of the industry was not due, at any time, to the [illegible] of desirable qualities in electric light, nor can it be conclusively shown that the discovery of the tungsten lamp is to account for the present activity.

At all events, electric lighting to all appearances is now with us to stay. Tungsten lamps will have an important part, storage batteries will also be in proper presence, but it is in the source of electricity that the present activity is centered.

[illegible]ROVEMENTS MADE IN METHODS OF DRIVING DYNAMOS

[illegible]mos, as they are used in conjunction with storage bat-[illegible] (if they have to do charging work), are as a rule shunt [illegible] meaning that the coils of wire (insulated), which are [illegible] around the fields for the purpose of exciting them, are in [illegible] with the armature windings, and this parallel relation [illegible] other advantages, the property of fixing the rotation [illegible]mature in one direction only, whether or not current [illegible] the dynamo (thus making it a motor), or leaving the [illegible] when the machine is performing its proper function as a [illegible]electric machine.

[illegible] shunt wound machine, if the speed and load is constant, [illegible]ge at the brush terminals will be constant also; if the [illegible]anges, however, the voltage will change also, and if the [illegible]anges, so will the voltage, due to what is designated as [illegible] "drop," which is due to I^2R losses, for the most part, [illegible] partly to heat increase, due to increasing load.

Constant Speed Required in Lighting—If lighting is to be [illegible] direct from a shunt wound dynamo it is necessary to run [illegible] at a constant speed, and if the load changes, then the [illegible]ance, as measured in ohms, of the field, must be adjusted to suit the altered conditions. A compound wound dynamo could be used (is used in general lighting work) were the speed constant, and with changing loads; this type of winding differs from shunt windings, due to the presence of a second winding on the fields, which supplementary winding is in series with the armature, so that the output of the armature passes around the fields, and they are strengthened in proportion as the armature reaction tends to weaken them. Moreover, I^2R drop, in the armature as well as in the series winding of the compounded field, is compensated for, in fine, by over-compounding, which is but a matter of adding a few extra series turns to the field windings. It is possible to compensate also for line losses outside.

All these devices so well known to the electrical engineer are put to naught by the changing speed which obtains in a gasoline motor as it is used for its conventional purpose, and, to add to the confusion, the motor is likely to be stopped betimes, perhaps to make an adjustment, perchance by night, and lights will then be in excellent demand. A tail light, for illustration, should not be allowed to go out, especially when a car is standing still by the roadside on a dark night, and electric lighting, to be a good success, must be capable of doing its work at all times.

Under plain conditions, then, electric lighting direct from a dynamo cannot be done if the power is taken (to drive the dynamo) from the motor which is placed to propel the automobile, for the very simple reason, as before intimated, that the motor is required to run at a variable speed, and the dynamo requires a constant speed. True, there is such a scheme as a "differential compounding," it having the facility, within limits, of rendering the characteristic of the dynamo that of a constant voltage machine under a variable condition of speed. Unfortunately, as it seems, the range of this type of machine is very limited, and it will be remembered that automobile motors change in speed over a broad range; possibly as much as 10:1.

Obviously it would be an extremely difficult task to so design a dynamo that the differential compounding would work satisfactorily under such wide conditions of speed change, nor has any designer ever succeeded in accomplishing this to extent, although, in connection with wind-motors (which run at a variable speed), some success was attained, and for a time it looked as if the task might be fulfilled within certain limits.

Special Forms of Windings Abandoned—The struggles for success through special windings on the dynamos used were long ago abandoned, and for a time it looked as if electric lighting would have to be accomplished through the use of storage batteries unaided by any automatic charging means at hand, which idea, from evidences afforded, seems not to have appealed to autoists, and as a result acetylene lighting was relied upon for the most part. The storage battery unaided, as will be readily appreciated, would have to be of large capacity, or it would be necessary to remove and recharge the same at frequent intervals. This might not be a task of great difficulty were all cars maintained in garages equipped for the work of charging storage batteries, but such is not the case, and, to care for the great majority of automobiles, it has been necessary to fit out with acetylene lighting equipment.

What This System Comprises—Referring to (A) Fig. 2, and to C in the figure, which is a camera, it will be noted that the same is focused on a dynamo D in the figure, and the photograph was taken utilizing the actinic rays, which emanated from the searchlight L just below and to one side of the camera. This illustration indicates that the light is of high intensity, and the dynamo, which is about to be described, was driven in this case by an electric motor for the obvious purpose of illustrating its capability under speed changing conditions.

The electric motor placed and connected with the dynamo was of the shunt wound variety, and a rheostat was utilized for the purpose of varying the speed of the motor, in order to approximate the conditions which exist when the lighting dynamo is connected with a gasoline motor as it is used on an automobile. This is done with a view of having the lighting dynamo run at a constant speed, notwithstanding speed variations over a wide range of the automobile motor.

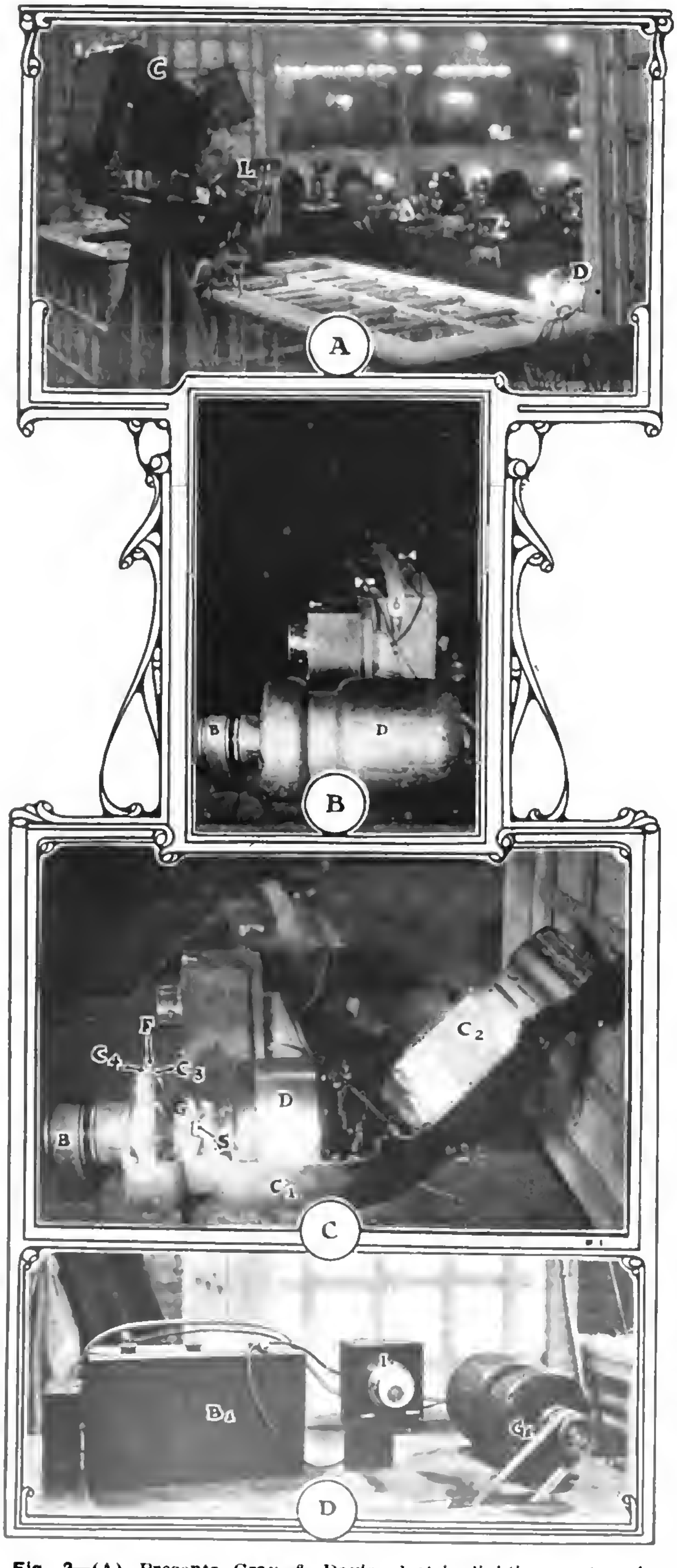


Fig. 2—(A) Presents Gray & Davis electric lighting system in operation aiding the camera
(B) Shows the exterior of the generator offering evidence of adequate protection
(C) Portrays the generator with the cover off and a view of the governor and speed regulating mechanism
(D) Depicts the Exide battery and measuring instrument

In order to indicate the compactness of the lighting dynamo, B, Fig. 2, is offered in which D is the dynamo, showing the exterior, and how thoroughly it is enclosed, while B is the belt running over a pulley, which also connects over a driving pulley, placed at some convenient point on a driving member of the automobile motor. The power which comes from the automobile motor is subject to wide speed variations, and these variations are transmitted along the belt B, thence to the dynamo pulley and shaft which protrude out through the shell D of the dynamo.

In order to appreciate the operation of the dynamo, it will be necessary to examine the interior, for which purpose (C) Fig. 2 is presented, in which C1 is the base half of the protecting shell, C2 is the detachable half of the same, D presents the dynamo, which connects its armature shaft with the shaft protruding through the case to the pulley, over which the belt B runs. In order to be able to vary the speed of the driving member (the automobile motor) without suffering speed changes of the armature of the dynamo D, a governor G, under the influence of centrifugal force modified by the pressure of the spring S, is then utilized to excellent advantage.

The speed changes, or rather a constant speed of the dynamo armature results from slipping on the clutch faces, F, by variations in pressure on the clutch members C4, brought about through movement of the clutch members C3, under the influence of the centrifugal (weighted) governor G, in view of the action of the spring S. The facing F, is asbestos fabric, and the area of the transmitting surface is so regulated that the speed of the dynamo is maintained at 1,200 revolutions per minute, irrespective of speed changes within all possible limits of automobiles under road conditions of performance.

The pressure of the transmitting faces of the friction members is but slight, it being the case that the output of the dynamo is 60 watts, which is not so very great, in view of the fact that there are 746 watts in one horsepower. It required a good deal of experimenting to arrive at the correct proportions of the governor weights G, and the proper resistance offered by the opposing spring S. The performance will be obvious from what has been said, considering the clearness of the view C, Fig. 2. It simply follows that one of the clutch members is sleeved, which permits axlewise motion, but the load on the dynamo being nearly constant, in view of the use of a storage battery, permits of designing the governor so that the slippage on the disc faces will be in conformity with the requirements.

A SPECIAL EXIDE BATTERY IS USED

Referring to (D) Fig. 2, G1 is the dynamo, looking at the pulley end I1 represents the measuring instrument which is used to ascertain the potential difference in volts across the terminals of the battery and the same instrument, by suitably manipulating, tells the output of the dynamo or battery in amperes. The battery is shown as B1, there being three cells within a suitably contrived hard-wood case.

The battery has been especially designed with a view to compactness, relatively light weight, and high watt efficiency. The life is guaranteed for three years under the conditions of operation as fixed in this system. This long life comes primarily through the adaptation of a special and particularly well-built battery, but the fact that it is "floated" on the circuit influences the life situation very materially.

This system of lighting affords the widest range of service, eliminates all other forms of illumination when it is used, because the battery has ample capacity to furnish current to tungsten lamps for head and side lights, as well as a tail lamp, for several hours, if the occasion requires, so that if the automobile motor is shut down for any reason, the lighting goes on without diminution of intensity, which condition would obtain for many hours, even under the most unfavorable conditions.

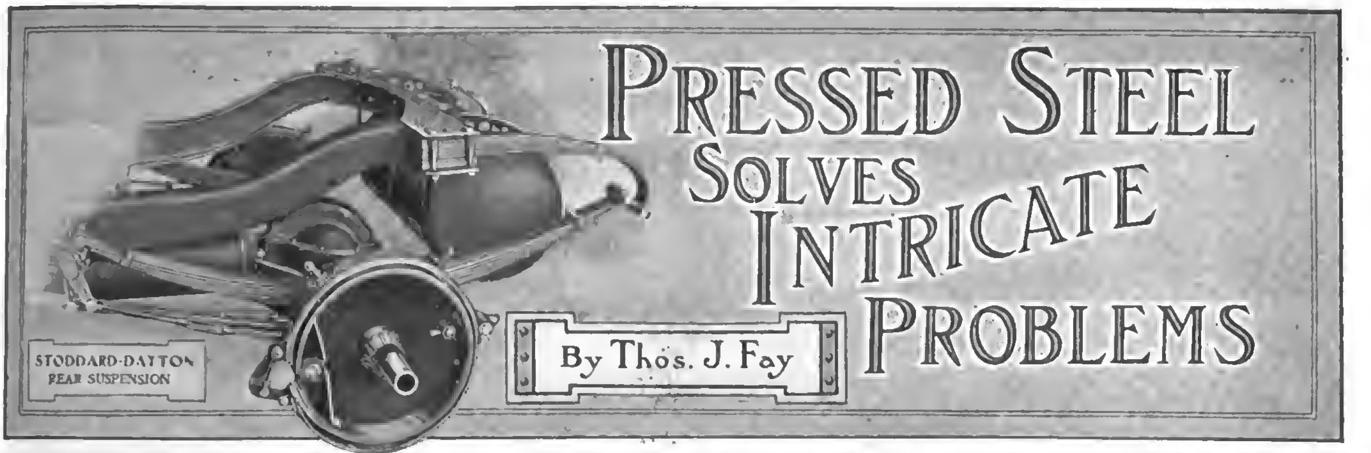


Fig. 1—Rear suspension of Stoddard-Dayton cars with 3-4 elliptic springs, and a shackle bar system of holding

FABRICATED materials differ from castings in important particulars, and while quality of material, that is to say, its chemical composition, is important, even so the extent of fabrication must be taken note of when an attempt is made to take an inventory of quality.

The difference between fabricated steel and steel castings is represented by the amount of work done upon the castings in rolling or forging. Direct steel castings are made by charging crucible pots, or Bessemer furnaces, and when the charge is brought up to the proper heat it is first poured into ladles and then transferred to moulds, the moulds being substantially the same as those used in gray iron foundries.

In the production of fabricated steel the ingots are first produced and they, after being suitably manipulated, are rolled or forged into the desired shapes. It will not be the purpose here to delve into the processes employed in the production of steel, but the above will be enough to show that, as before stated, the difference between a casting and fabricated steel is represented in the amount of work done upon the steel after casting.

If, in working or fabricating steel, it may be improved, which is true, it follows that shapes, as they are employed for different purposes, will have different qualities. This point is adequately brought out in connection with T-rails. When these were of light weight, varying from 40 to 60 pounds per yard, photo-micrograms showed a certain structural condition, which indicated the excellence of kinetic qualities, and the rails proved to be of great longevity in service. As rails were increased in weight, breakages were more frequently noted, and to-day, with rails ranging from 90 to 110 pounds per yard in weight, this question of breakage assumes the proportions of a paramount issue.

It is claimed by the steel makers that there was no substantial difference in the quality of material used, and nearly all rails were produced by the Bessemer process. The differences were directly traced to ills of fabrication, it being true that the heavier weight rails are not subjected to the same amount of work as that which was put upon the lighter sections in former times.

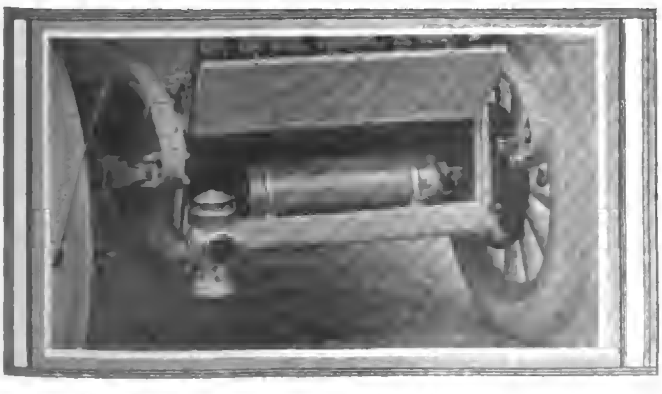


Fig. 2—Rear suspension of Pierce-Arrow cars with 3-4 elliptic scroll springs, flush with the side bars

Structural steel of the various shapes has proven to be of exceeding value, and much of this ability is due to the amount of work which must be put upon the material to reduce it to plate form. Quality of material, as it is reflected by chemical composition, is of moment, but it is not the whole story.

In kinetic work, the life of the steel, according to the best authority, seems to depend:

(A) Upon the carbon content;
(B) The carbon condition;
(C) The extent of metalloids;
(D) Ratio of other contents;
(E) Process;
(F) Method of fabricating;
(G) Extent of fabricating.

Taking (A), which is a carbon content, Harboard, after making many experiments, proved conclusively that the shock-resisting qualities decreased with increasing carbon. As to (B), which refers to the carbon condition, there is everything to be gained by resolving the same into the best form, considering the service to be rendered, so that heat treatment becomes of the first importance. (C) considering metalloids, as sulphur and phosphorus, they must be very closely held, particularly in flat steel, and it would not be too much to expect that these elements will come within 0.030, but this must not be construed as a license to reduce metalloids by the utilization of a basic process.

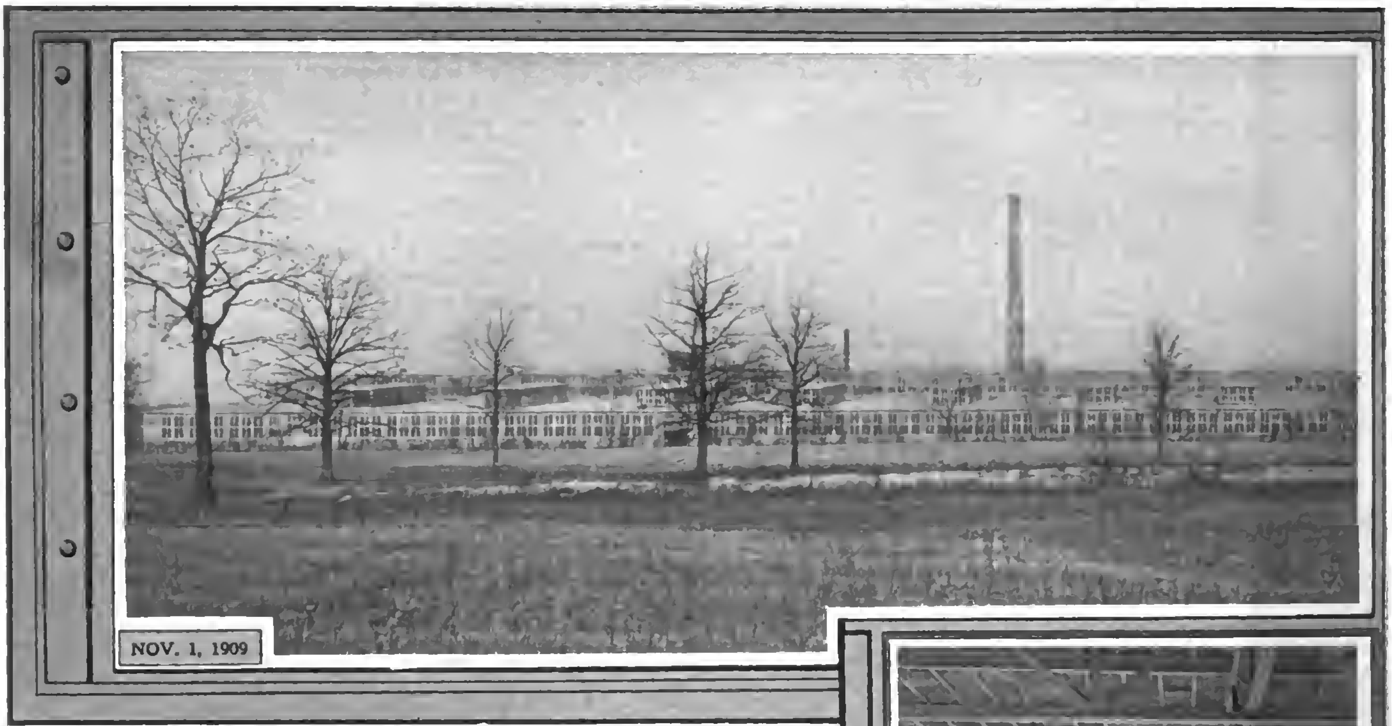
Harboard showed, among other things, that steel by the basic process, will not sustain under shock condition to nearly the same extent as will acid steel. Taking the metalloids by chemical analysis then, is not conclusive evidence of quality from this point of view, because the metalloids may be the same in inferior as in superior steel, depending only upon the process employed. (D) refers to manganese and silicon, assuming that copper and arsenic are but a mere trace.

The manganese and silicon contents will differ from the respective products, partly due to process, and, to some extent, with carbon, presence of metalloids, and alloy in elements. It will not be feasible then to discuss the presence of these elements more than to point out that they are suitably regulated under the several conditions of manufacture.

ALLOY STEEL LOW IN CARBON

The presence of chromium nickel, vanadium, tungsten, or other alloying elements, does not seem to alter the main fact, i. e., that carbon must be closely held. Experience in connection with the utilization of alloy steel is relatively limited, and the automobile has been at the bottom of this activity, more perhaps than the influence of any other art, not forgetting that armor plate and projectiles were previously (and are now) alloy steel products. There is a considerable difference between the alloy structural steel as used in automobiles and the material which obtains in the production of armor plate and projectiles.

The very difference between the composition of a projectile



and that of an alloy steel-side frame, as used in automobiles, will best illustrate one of the points to be here made. The projectile must be intensely hard, and yet it is expected to disrupt into fragments at the propitious time. The automobile side frame must be strong, but it is not expected to fracture if it is subjected to a load greater than it can sustain. The projectile is high in carbon, and if it is a chrome product, it will be very high in chromium also. The automobile frame will be very low in carbon, and if chromium is present, it too will be relatively low.

KINETIC ABILITY IS SOUGHT AFTER

In pressed steel work, as it obtains in the automobile zone of activity, every effort is made to induce kinetic qualities and to bring the elastic limit of the material as near to the tensile strength as possible without depressing elongation, as it is measured in a given length, say, eight inches in flat plates. The behavior of the material has to be considered as it relates to heating, drawing, pressing, or otherwise forming, and if the steel is to be worked up whole, it must have qualities to correspond, whereas, if it is to be worked under high heat this question must be taken into account as well. The quality of any piece of steel may be initially good and be ruined, in heating, due to a mal-temperature.

A considerable percentage of material, as it is used in automobiles, is probably in accord with the A. L. A. M. specifications, which, for side frames, may be stated as follows, on the opposite page:

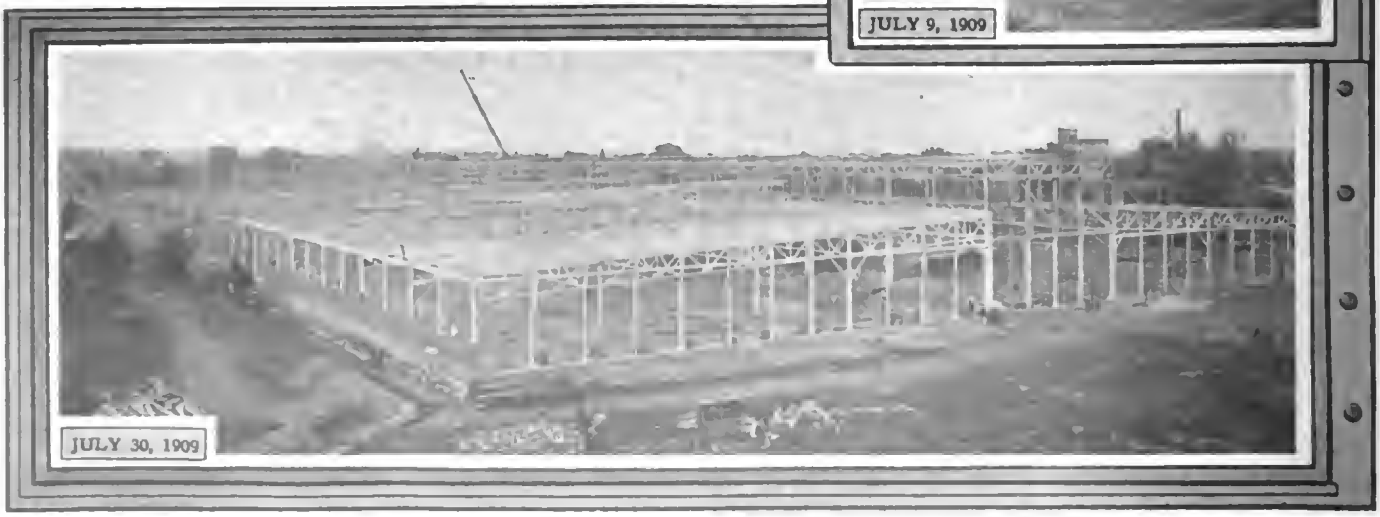
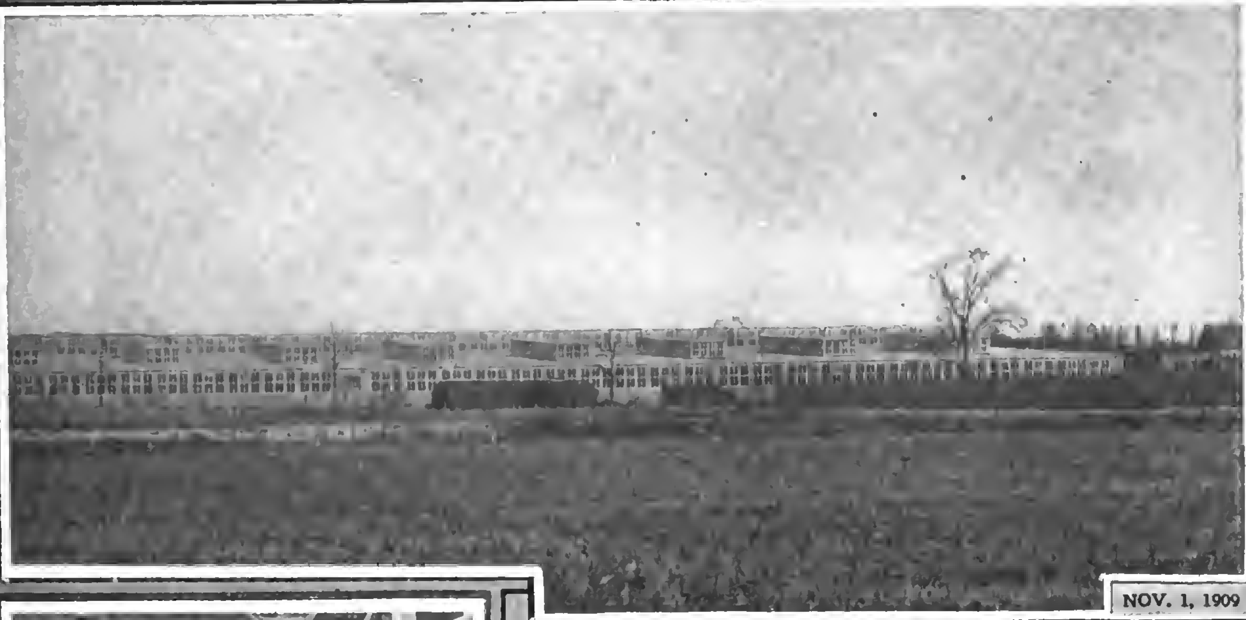


Fig. 3—New A. O. Smith plant, at Milwaukee, Wis., devoted to the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ALLOY STEEL FOR PRESSED FRAMES

Chemical Composition

Chromium, 0.50 to 1.00.
Nickel, 1.50 to 2.00.
Carbon, 0.20 to 0.30.
Manganese, 0.40 to 0.60.
Sulphur, 0.04 maximum.
Phosphorus, 0.04 maximum.

Physical Properties

Tensile strength in pounds per square inch, 80,000.
Elastic limit in pounds per square inch, 45,000.
Elongation per cent. in two inches, 20.
Reduction of area per cent, 40.
Physical condition, annealed.

The same steel, when subjected to the treating process, will perform as follows:

Physical Properties

Tensile strength in pounds per square inch, 150,000.
Elastic limit in pounds per square inch, 100,000.
Elongation per cent. in two inches, 8.
Reduction of area, per cent., 35.

Frames of this material are hot pressed, and in the heat treating process are first quenched in oil, after which they are partly annealed, the idea being


NOV. 19, 1909


NOV. 15, 1909

production of pressed steel, transmissions, steering gear, etc.

Fig. 4—Pressed steel brake drum, as used on the Cole 30, with a flat steel band in constricting relation

to fetch up the elongation to the point as given, as a minimum value. If the quality of the steel is up to specifications, physically and chemically, when in the annealed state, it should perform as noted when it is properly heat treated.

Many of the best examples of chassis frames, as they occur in automobiles, are made of this class of material, and here the strength is adequate for every possible need, although it has been found that the use of material of this character does not warrant diminishing the weight of the section employed, because it has not been shown that chassis frames of the customary channel section and weight per unit length, when made of Bessemer plate, were sufficiently strong to serve under certain conditions. The introduction of alloy steel, then, was not for the purpose of reducing weight, but it was with the intention of bringing up the strength to meet the most severe requirement. This view is not generally well understood.

SILICO-MANGANESE STEEL FOR FRAMES

Chemical Composition

Carbon, 25 to 35 points.
Manganese, 1.50 to 2.00.
Silicon, 0.75 to 1.00.
Sulphur, 0.035 maximum.
Phosphorus, 0.035 maximum.

Physical Properties

Tensile strength in pounds per square inch, 120,000.
Elastic limit in pounds per square inch, 80,000.
Elongation, per cent., in two inches, 15.
Reduction of area in per cent., 40.
Condition of test proof, annealed.

This steel, when quenched in oil and partly annealed, should test as follows:

Physical Properties

Tensile strength in pounds per square inch, 160,000.
Elastic limit in pounds per square inch, 120,000.
Elongation, per cent., in two inches, 10.
Reduction of area in per cent., 30.

This steel as a type is much used in chassis frames and is frequently employed for springs. In the frame stock as it comes from abroad the carbon is somewhat lower, possibly 10 points, and the silicon is frequently considerably lower, whereas the manganese is held at about 1.60. At all events, this material ranks relatively high and many automobile engineers prefer it to the alloy steel or side frames as hereinbefore mentioned.

TYPES OF CARBON STEEL MUCH USED

Cold-pressed side and lateral members are generally of carbon steel, and generally the carbon content in this type of steel, for this class of work, runs well below 20 points, and 10 points carbon seems to be the prevailing limit. In some of the very excellent examples of carbon steel-side frames government specification boiler plate is used, and experience rather goes to show that this material, when used in sufficient presence, is entirely satisfactory for the purpose.

Government specification boiler plate, besides having carbon approximating 8 points, is an acid open-hearth product, with sulphur and phosphorus below .04, with well-regulated silicon and manganese. The tensile strength is not remarkably high, but the elastic limit approximates 55,000 pounds per square inch, and the elongation, in 8 inches, is better than 24 per cent. A specimen of this steel will bend over and flatten down to 180 degrees without showing any sign of fracture, and a silky structure exists.

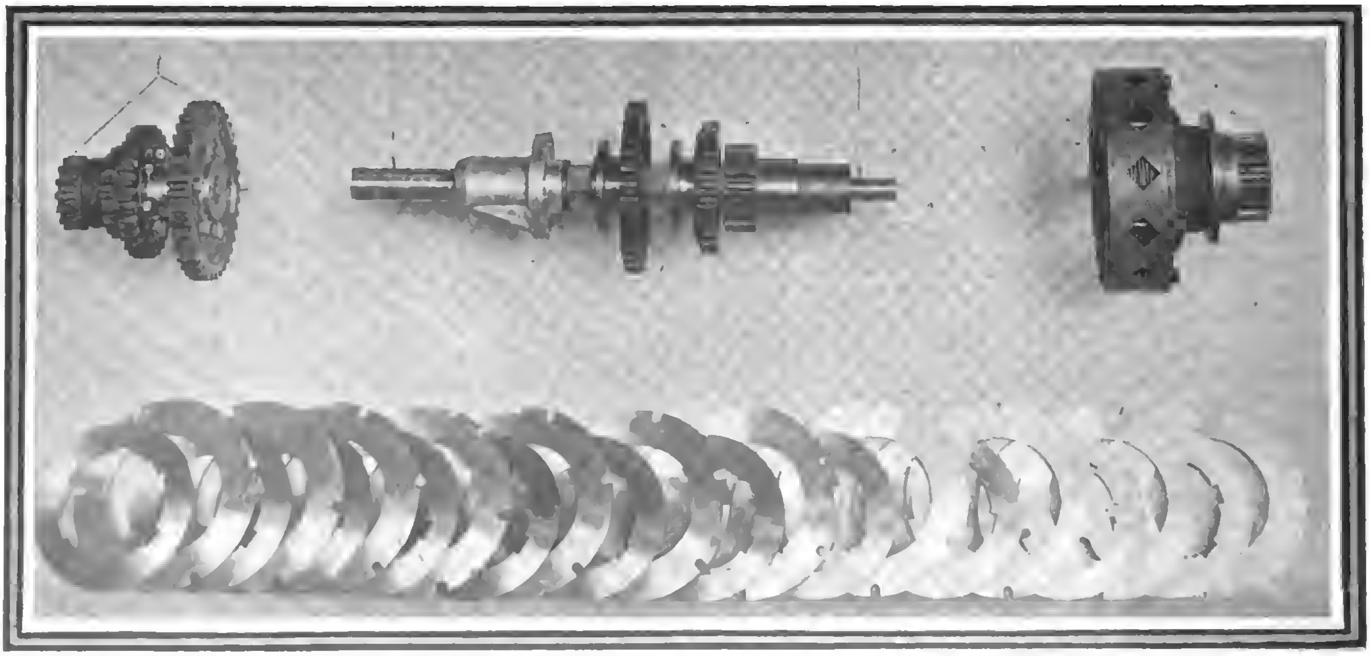


Fig. 5—Discs of stamped steel, as used in the clutch of the unit power plant in Demotcars

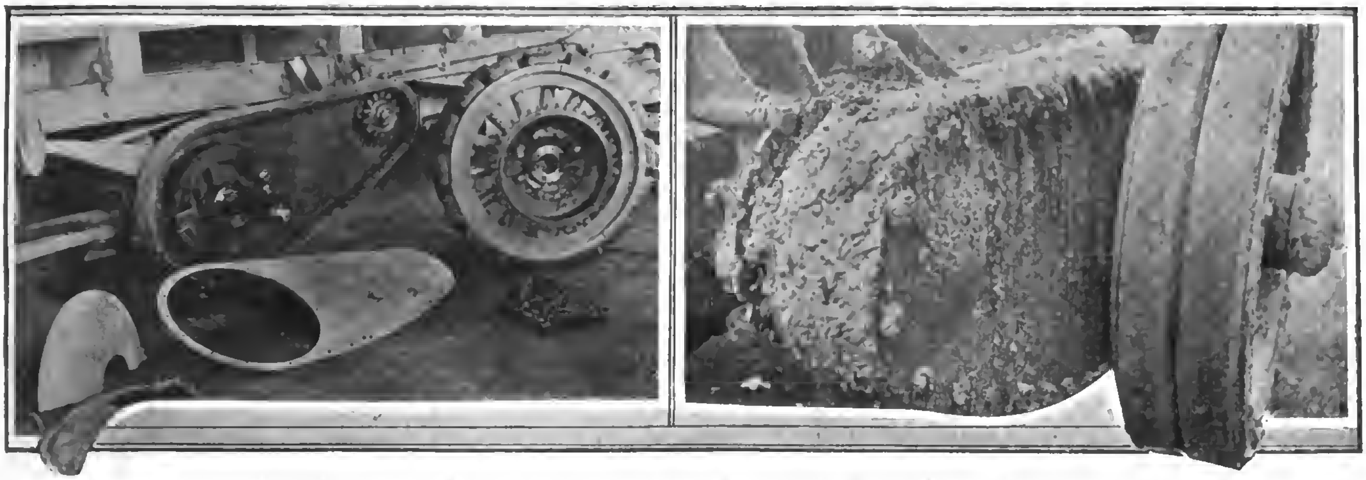


Fig. 6—Pressed steel chain boot, dissembled and in service, as used on Alden-Sampson trucks

In some of the earlier efforts Bessemer plate of a very ordinary grade was cold pressed into side and cross members, and frequently fracture was brought about by a 90-degree bend at a 3-8-inch radius of a 3-16 thickness of plate. This class of material failed in service, and frequently the failures were disastrous. It was probably the original basis for a considerable effort in the direction of universal joints, inasmuch that in the earlier types of automobiles, the respective units were mounted upon the chassis frame and an attempt was made to join these units into power relation without introducing flexible members.

Chassis frames of this character deflected under the load and the rigid relations of the units, which made up the power and transmission system, led to early trouble in the life of these cars in service. Designers desiring to get away from this trouble formed the habit of introducing universal joints, but in the meantime the incentive was there for improvements in chassis frame work, and in the long run it was found that no chassis frame, however made, could be regarded as sufficiently rigid to serve as a machinery platform with several machinery units in rigid relation.

UNIVERSAL JOINTS DESIRABLE IN ANY EVENT

The later introduction of special grades of steel in the chassis members eliminated troubles in the chassis itself, but tests soon showed that there was a certain amount of deflection under stress, due to road conditions and to the very flexibility which was courted by the utilization of fine grades of material. Under the circumstances it was found desirable to retain universal joints, the principle of the three-point suspension, and all the other methods which would permit the machinery units to operate with freedom, despite deformations due to shock brought about by high speed and considerable road undulations.

Excepting for a few examples of wood chassis frames, as in the Franklin (which is laminated) and in the Brush, not forgetting the armor type of wooden frame as used in the Panhard-Levassor, chassis members are almost invariably of the channel section and relatively deep, involving the flanging. Considering channel sections, there are classifications as follows:

(A) Straight side members.
(B) Narrowed in front.
(C) With a rear kick-up.
(D) With a rear kick-up narrowed in front.
(E) Underslung.
(F) Underslung narrowed in front.
(G) The several types with subframes.

Straight side members (A) were formerly much in vogue, but owing to the increase in diameter and sections of tires which are now used, it is extremely difficult to realize a sufficient canting angle of the steering road wheels, without having the chassis members closed in considerably more than usual.

With side frames, which are straight on the top edge, they are frequently narrowed (B), in order to afford an adequate canting angle of the road wheels, and in such frames with a view to offsetting the weakening effect at the narrowing point, the flanges are made somewhat wider and crossarms are placed to support the cranking moment.

Frames (C) with a rear kick-up (drop frames) are so made in order to bring the running board on a line with the curb and to have the height of the step from the running board to the side entrance that which is convenient. It is also claimed that the center of gravity is lower in these types of cars, but it is highly improbable that the difference is very great, because the power plant and transmission system will be a distance from the ground which is dictated by the diameter of the flywheel, considering the desired road clearance. To illustrate this point, it is only necessary to say that the axis of rotation of the power members will be 18 inches from the ground if a 16-inch diameter flywheel is used, and if the road clearance is 10 inches. This clearance requirement, considering the diameter of the flywheel as used in any given case, comes very near to fixing the center of gravity independently of the type of chassis frame employed. The condition (D), which calls for a narrowing at the front-side frame with a kick-up in the rear, obtains in nearly every case, although there are one or two examples to the contrary.

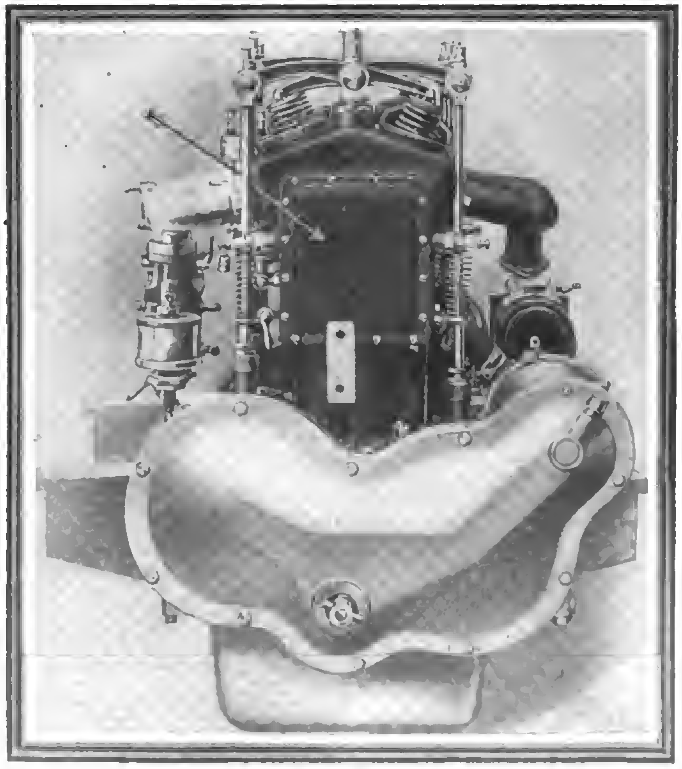


Fig. 7—Stoddard-Dayton motor, with pressed steel covers over the openings of the cylinder water jackets

Underslung frames (F) are narrowed in front, and, as utilized in connection with American cars, such as the American Tourist and other types by the same makers, take into account the use of large diameter road wheels, thus permitting the chassis frame to pass below the axle and allowing of ample vertical clearance besides the necessary ground clearance. So it is that the general appearance and performance of these cars is commendable. This type of frame was originally brought out for racing work and, barring the influence of a body, it induces a lower center of gravity, while the large diameter road wheels makes for easy riding qualities.

Subframes (G) are used in a considerable number of examples and it has always been claimed by a certain school of designers that it is a particular advantage to place the machinery equipment on its own independent subframe. The length (span) of the motor support arms is considerably reduced when the subframe is employed, and, since the arms are almost invariably of cast aluminum, it is claimed to be an advantage to have them relatively short. Since the subframe does not have to interpret the stresses, which play on the side frames through the springs, there is just a chance that this same subframe acts as a more stable machinery platfrom than does the side frame.

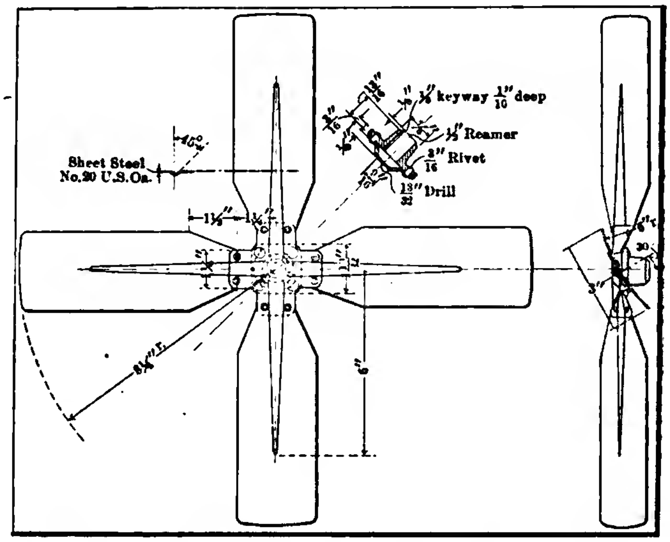


Fig. 8—Premier fan, with four blades of pressed steel, ribbed and beaded for strength

IN THE MANUFACTURE OF CHASSIS FRAMES

Work of this character is now conducted in a large way in plants especially fitted out for the purpose, and special heats of steel of a required composition for each type of material are ordered in such vast quantities that quality is very readily obtained on a basis of proven quality.

The material comes to the pressed steel mills in flat sheets of the required thickness, specified as to width, and sufficient in length to turn out the members to be made with very little waste, frequently without any trimming at all. If the work is to be done cold, which is a matter depending upon shape and the quality of the material to be used, the sheets are cut to approximately the right area, and through the use of suitably formed dies, which are fixed in the presses, the sheets are pressed into the required shape, generally in one operation, although some of the intricate cross-member sheets have to go through two or three operations and in many cases hot.

If the material is alloy steel, either with chromium nickel or vanadium, the work must be done hot, in which event the sheets, after they are trimmed to the right size, are brought up to the desired heat in a furnace and then passed to the dies in the press when the final operation of pressing is conducted—generally in a single operation. From the press the members go to the heat treatment room where they are raised to a correcting temperature, then quenched in oil, and subsequently annealed in order to increase the elongation and bring up the other physical properties to conform to the original specifications, unless, under conditions of great skill, better results are evolved.

When the work is done cold, as it is with carbon steel, instead of oil quenching and annealing, the members are corrected by a simple annealing process, excepting in the cases of superior grades of specification carbon steel.

When the side bars and cross members are heat treated or otherwise completed in the absence of a heat-treated operation, they are then trimmed and put into final shape for assembling, which includes making the holes for rivets in some one of the ways as follows:

(A) Punching.
(B) Punching and reaming.
(C) Drilling.
(D) Drilling and reaming.

In this work special machine tools are used, among which pneumatic riveting equipment occupies the prominent place. The rivets are invariably very low in carbon for the content, and of a grade of material which will stand much heating abuse without showing deterioration. In hot riveting, as in the Cadillac and numerous other examples, advantage is taken of the shrinking of rivets when they cool. This pulls

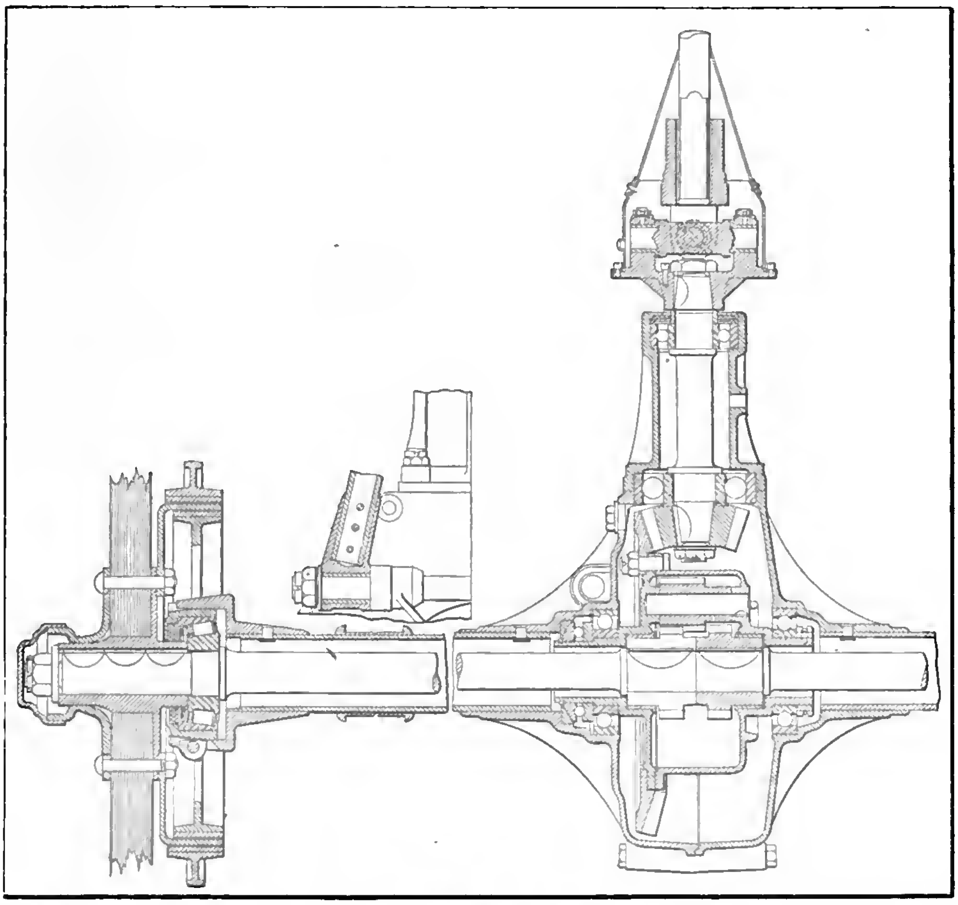


Fig. 9—Drawn steel brake drum and housings for universal joints, as used in Pierce-Arrow live rear axles

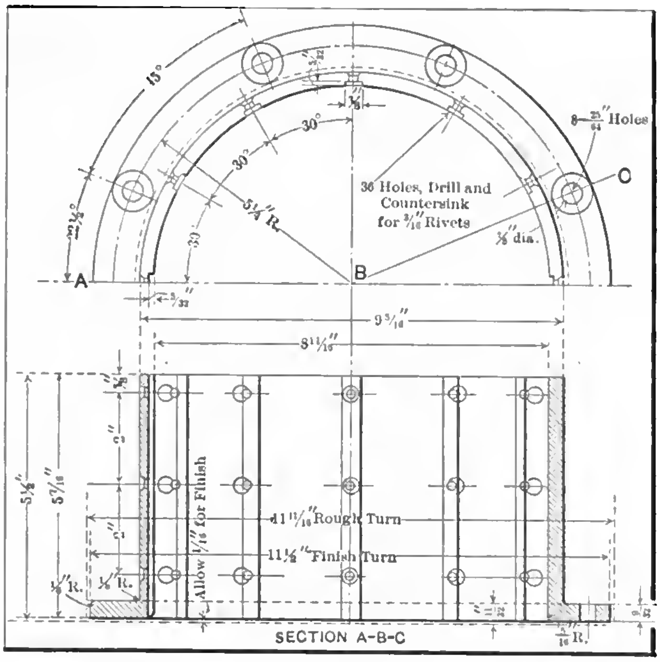


Fig. 10—Packard clutch casing of drawn steel housing the 1910 type of dry disc clutch

the plates into tight relation, thus preventing a tendency on the part of the members to work.

Cold riveting is very much in vogue, the rivets being of the same stock as when hot work is done, but with pneumatic tools it is possible to head up the rivets, considering good clamping during the performance, so that the members are brought closely together, and much pressure is exerted. It would seem, under the circumstances, as if riveting may be done by either of the methods, always with excellent results, provided the side bars and cross members are properly fitted, securely clamped and skilled labor performs the riveting operations.

WIRE WHEELS REPRESENT PRESSED AND DRAWN STEEL WORK

In wire wheel work the hubs (complete) are of drawn steel, the material being an excellent grade of acid open-hearth steel from a blend of Lancashire with Swedish ores, referring to the English wheel work, because in England wire wheels are considerably used. True, in England, second growth hickory is not available in quantity sufficient to allow of its use to the wide extent to which it is utilized in this country. It is believed that the enthusiasts who are booming wire wheels by calling attention to their wide adoption in England fail to appreciate the true reason.

The relative advantages of wire and wood when reference is had to wheel building is likely to be in favor of wood in the long run, and history, if it is worth anything at all, reflects credit upon wood in this class of work. At all events, following within the prescribed limits of this story, pressed steel is utilized now more than ever in hub, flange, cap, and even in the construction of the cup and cone bearing work, not to mention the almost universal adoption of drawn steel brake drums, rims for tires, and the parts which go into live rear axles at several points, this much, indeed, even if the whole axle housing is not of drawn steel, as it proves to be in such products as are turned out by the Timken Roller Bearing Axle Company and some others.

Pressed steel brake drums have many advantages, among which lightness is very noticeable indeed, but utility must have a resting place in the system if lightness is to take rank as an advantage. In many of the earlier types of automobiles the drums were cast from bronze, and after a few weeks' service they "spun" into a conical shape, it being the case that the brake-shoes acted exactly as does a tool in the hands of a workman who in the act of spinning metal applies pressure to a rotating sheet of brass, and gradually the metal eases away from the pressure, taking on such fanciful shapes as the workman may desire. The cast brass or bronze brake drums acted in the same way, and bronze, however good for other purposes, failed to give satisfaction in this class of service.

Drawn steel brake drums do extremely well in this service; they do not spin out; the rigidity of the metal is enough to absorb this action, and the close grain of the drawn steel is decidedly advantageous, since the surface afforded is well defined and very satisfactory as a friction surface, over which the friction lining of the brake shoes are enabled to run without being damaged, whereas for the coefficient of friction it is high enough for the purpose when the shoe-linings are of suitable materials, as follows:

(A) Parsons manganese bronze with cork inserts.
(B) Pressed steel shoes with copper facings and cork inserts.
(C) Steel casting shoes with copper facings and cork inserts.
(D) Pressed steel shoes with asbestos fabric facings.
(E) Steel casting shoes with asbestos fabric facings.

The coefficient of friction when the shoes are faced, if the facing is of the above or equally good materials, will range be-

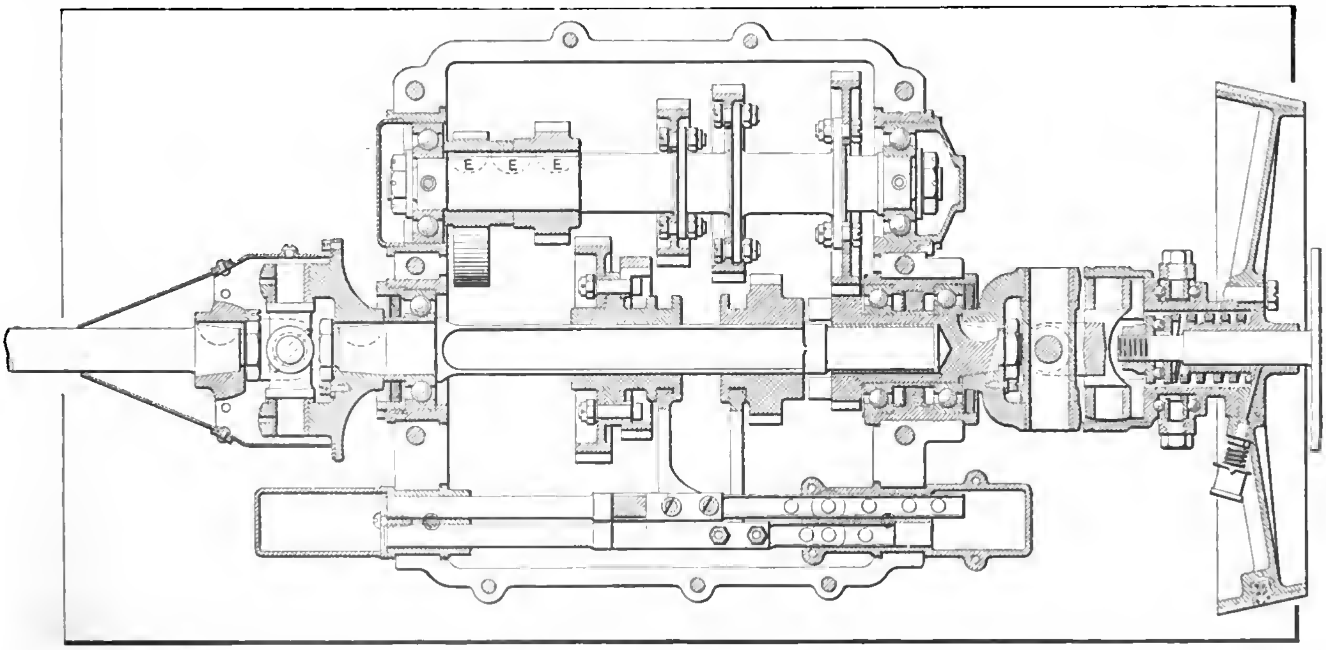


Fig. 11—Pierce-Arrow transmission gear and clutch assembly, with pressed steel housings over joints

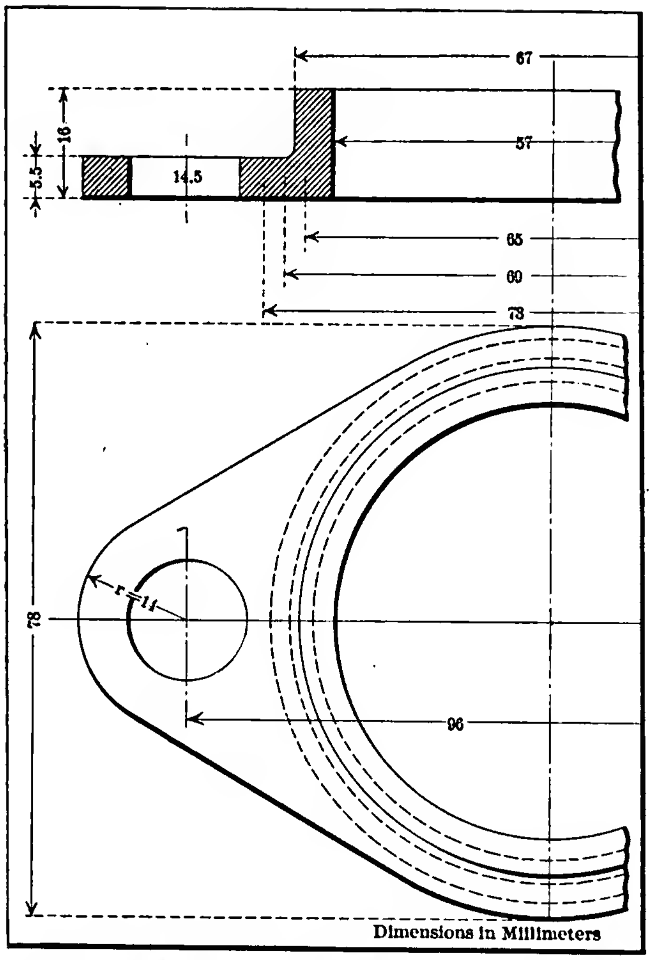


Fig. 12—Pressed steel flange for use with inlet and exhaust manifolds of motors

tween 0.20 and 0.30, nor does it seem to make much difference if oil is allowed to spread over the surfaces under certain conditions.

For illustration: In Premier cars the shoes are provided with cork inserts, and it is the usual practice there to apply grease to the drum faces, experience proving that the results are even better than they would be otherwise. The surface available for Premier brakes is something over 500 square inches, and it seems to be a property of cork to work quite as well with lubrication as without it. With such a large surface over which to spread the pressure, the brakes take hold softly but with great promptness, while the cork, being in sufficient presence, scrapes the grease from the pressure surfaces just as a rubber scraper removes water from a plate glass when the workman is cleaning windows.

Considering brakes: In the Marmon cars the drums are very wide, there being two sets of brakes side by side, and these drums being of pressed steel, of good diameter and suitably shaped, afford a large surface for the brake shoes. Nor do the drums show a noteworthy tendency to flare out, as they would were they of bronze.

Steel castings are used to some extent in brake drum making, but it is scarcely to be expected that the cost of the drums will be so low as when drawn steel is selected. The steel castings work very well indeed, although it has not been found in side chain drives, when the sprocket teeth are cut out of the steel castings, that they are not sound in every case. The enlargement which must be formed on the periphery of the casting to allow for cutting the teeth for the chain is very prone to cause trouble, owing to shrinking phenomena during the process of cooling of the castings, excepting in establishments of great competence, in which this class of work is dealt with continuously.

Brake drums in the best examples of the day arc from 12 to 16 inches in diameter, made of drawn steel, and are either integral with the hubs or flanged and bolted to the hub-flange proper, in which work the same bolts which are used to clamp the wood at the miter act as the flanging bolts for the drums. In shaft drive cars, and in view of the absence of sprocket teeth, steel castings serve very well indeed, and they frequently offer special advantages, it being the case that the design is such as to indicate their use. The steel castings are a little more rigid than drawn steel; the carbon content is much higher in the metal, and in view of this the hardness of the metal is greater. Some of the steel foundries make a specialty of this class of work, among which Isaac Johnson & Company, New York City; Lebanon Steel Casting Company, Lebanon, Pa; Thomas Prosser & Sons, New York City; Henry Hess, Philadelphia, Pa., and others, may be mentioned.

RAMBLER CUP AND CONE BALL BEARINGS

Cup and cone ball bearings are pressed from high-carbon plate, or they are case-hardened after being pressed from a suitable grade of cementing steel in which the carbon is very low, possibly as low as eight points. In the Rambler plant at Kenosha this work is conducted on a considerable scale, the facilities there being adequate for every need, and this is one of the plants which, primarily devoted to the making of automobiles, also

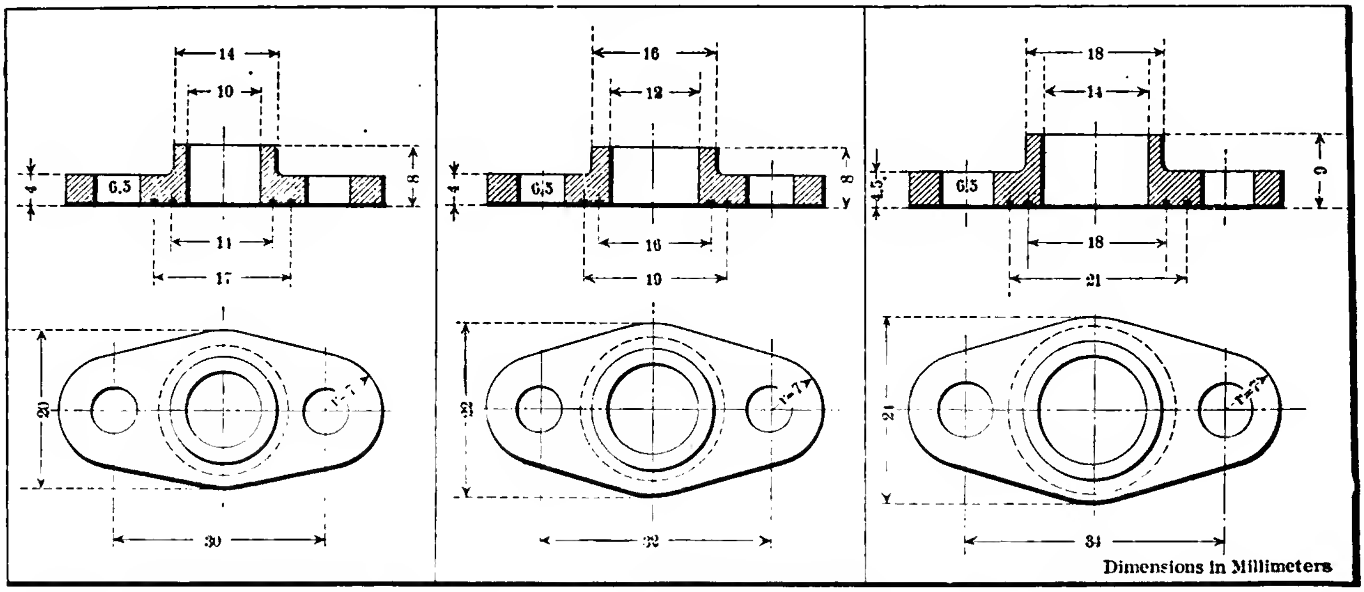


Fig. 13—Pressed steel flanges for use on motors in connection with water and gasoline piping reducing weight and adding quality

turns out all the anti-friction bearings used. The cup and cone bearings, of which there are a few excellent examples in Rambler cars, are also examples of pressed steel work. They are made from sheets of cementing steel, which are first reduced to the right blanking size, then pressed into the desired shape to produce cups or cones, after which they are heat treated.

In the heat treatment the cups and cones are first packed in hardening powder, which is largely ground bone, and the boxes of packed caps and cones are then placed in the cementing furnaces, raised to a cementing heat and allowed to "stew" for a length of time sufficient to grow a depth of dense carbon which will be sufficient for the needs. This growth of carbon will be a full thirty-second of an inch before the boxes will be removed from the cementing furnaces, and when they are withdrawn the mass of cups and cones are quenched in a bath for the purpose, thus rendering them nearly as hard as diamonds.

After cementation, the carbon in the shell is about 110 points, whereas the carbon in the core remains that of the original analysis of the metal, which is, say, ten points. After quenching, the parts are tempered to impart dynamic qualities. They are then ready to go to the grinding department to be finished. After grinding, the cups and cones are almost exact to size; the shell is highly polished all over the surface, and the hardness is that of the hardest steel balls, while the depth of the hard shell is 1-32 inch approximately. Under the hard shell is the relatively soft core; the shell rests on this core just as a frozen lake, so-called, has a sheet of hard ice over a cushion of water. The ice is stronger for the elastic support, it being impossible to deform it at a local point, as pressure is applied the ice bends, but the bend is spread out over a considerable area, and the extreme fiber strain is minimized.

PRESSED STEEL IN TIMKEN ROLLER BEARINGS

That pressed steel is limited to its application to cup and cone ball bearings is not to be held as true. It is employed in Timken roller bearings for the purpose of separating the rollers, the spacing member being a stamping in one piece from mild steel, and of a shape to be admired. In several of the examples of roller bearings, for that matter, the end spacers are of pressed steel, they being in the shape of washers.

REAR AXLE HOUSINGS NOW OF PRESSED STEEL

When the Ford car first came out the rear axle looked rather light, considering the type. In those days all live rear axles were of cast housing members engaging Shelby steel tubing. A closer examination of the Ford axles disclosed the construction—that of a drawn steel tube, which in appearance was a good imitation of a blunderbus of Colonial days. The tube started near the road wheels with the usual tube diameter, and as it approached to the differential gear system it was flared out to a sufficient radius to pass over, bulb-like, thus forming a housing for the differential gear and bevel drive.

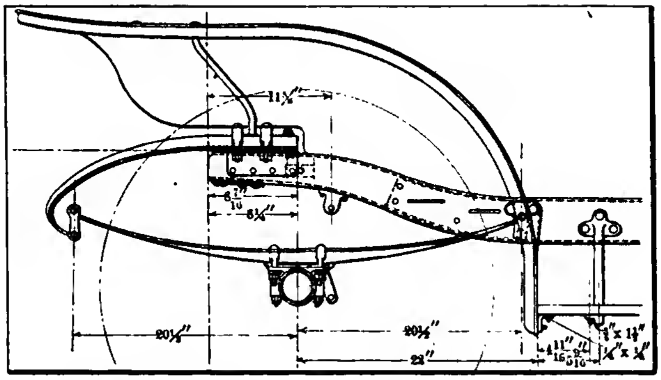


Fig. 14—Rear end of frame of Pierce-Arrow 6-36 Runabout, showing fastenings of 3-4 elliptic scroll springs

This idea of Ford's possessed the advantage of great strength; the material used was highly kinetic, and the weight complete was all that it should be. Prior to this innovation of Ford's it was proven in side chain work that rear axles should not be heavy, and in racing, as it thus obtained, in which I-section axles were used with side-chain drives, designers reduced the weight of rear axles of 90-horsepower cars down to as low as 36 pounds.

This construction proved to be good, and the Fiat people,

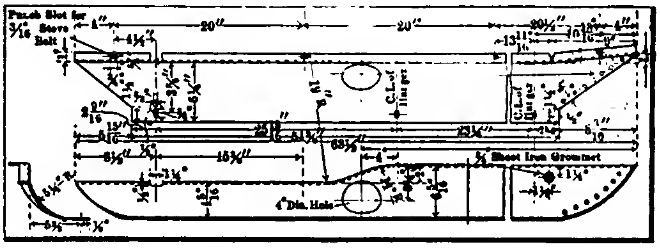


Fig. 15—Chalmers-Detroit mud shield, reaching from chassis frame to fenders

taking kindly to the idea, utilized the scheme, making some deviations from that as shown by Henry Ford. The drawn steel scheme, like every good construction, survived, and last year the Timken type of drawn steel axle was used on many automobiles, in which type the bell-shaped halves terminate in such a manner as to allow of the removal of the differential gear system, including the bevel drive. As a unit they nested within the confines of the drawn steel shell. This type of axle, like the Ford, has proven to be a diamond of the first water, and the Standard Welding Company, Cleveland, Ohio, make a specialty of the drawn steel as it is used in this class of work. As a matter of fact, one of the best attractions in the E. M. F. cars when they were launched on an unsuspecting public was this type of live

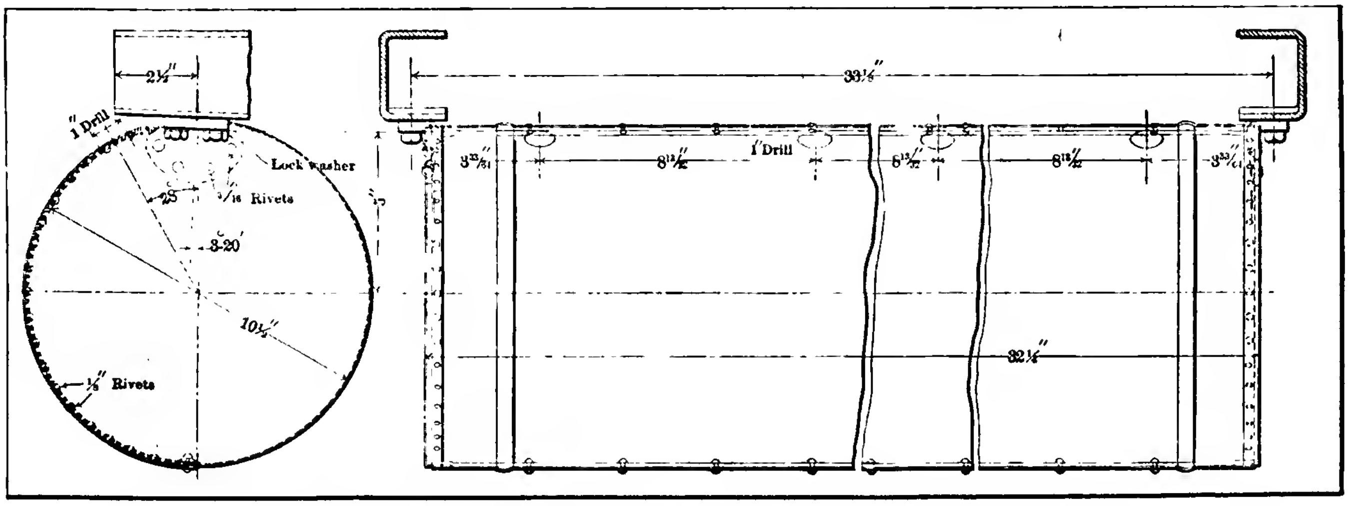


Fig. 16—American Simplex muffler shield, which protects the muffler in its position at the rear of the chassis

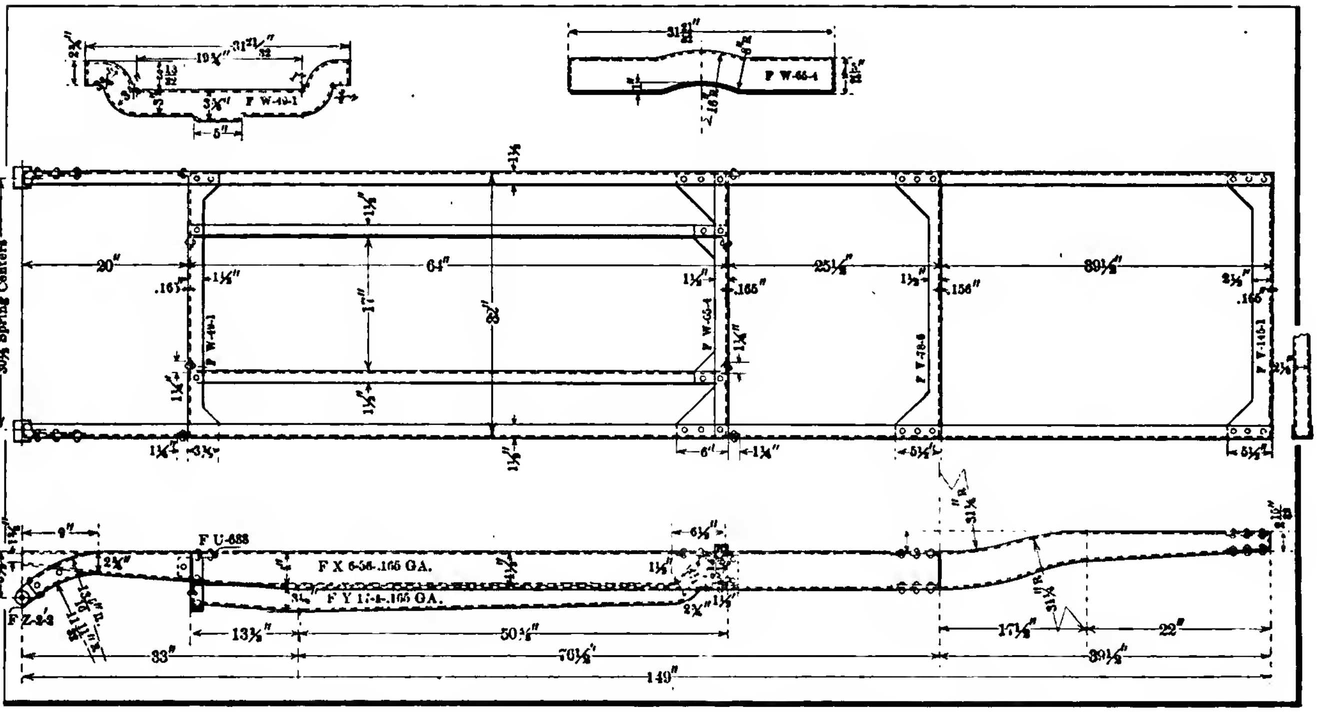


Fig. 17—Example of chassis frame with straight sides, a kick-up at the rear, and a subframe for the power plant made at the A. O. Smith plant

rear axle, and it proved to be one of the permanent features in the E. M. F., adding materially to its value.

DISTANCE RODS OF PRESSED STEEL

Another advanced investigator, Edward R. Hewitt, even before he formed the Hewitt Motor Company, took kindly to pressed steel, and in the long run the distance rods in the Hewitt trucks were of pressed steel. Moreover, they worked out to the entire satisfaction of users. It is better to put it this way, since designers may be satisfied without convincing users. In the Hewitt truck work the distance rods are of pressed steel, flanged and tapered, with neutral metal blanked out, and at the chassis frame end the female of a turnbuckle is riveted on; the other end is flanged to a bearing member, which in turn engages the rear axle in the right relation.

In some of the shaft-drive cars the radius rods are of pressed steel, one end of which members is flanged to the axle housing.

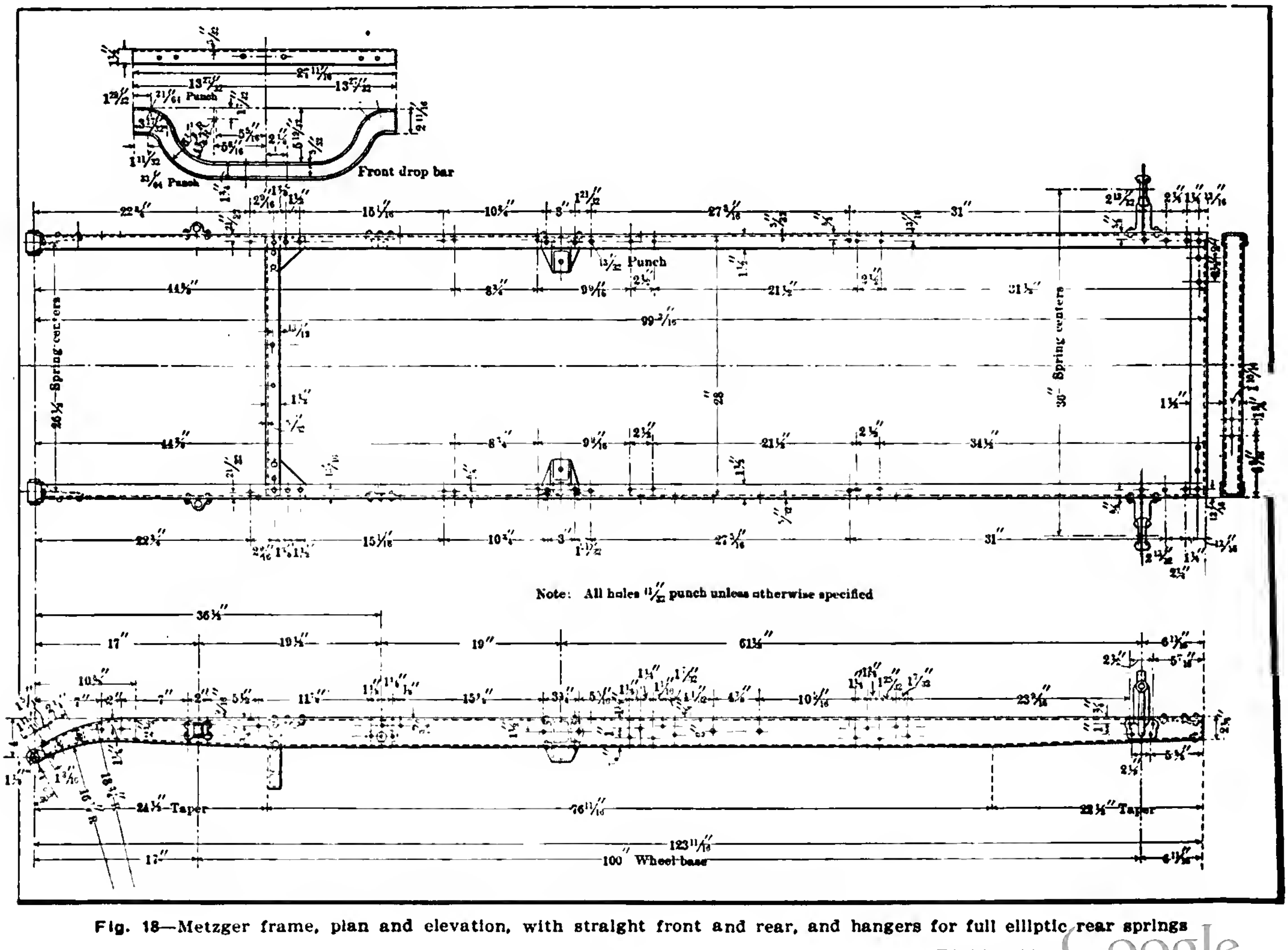


Fig. 18—Metzger frame, plan and elevation, with straight front and rear, and hangers for full elliptic rear springs

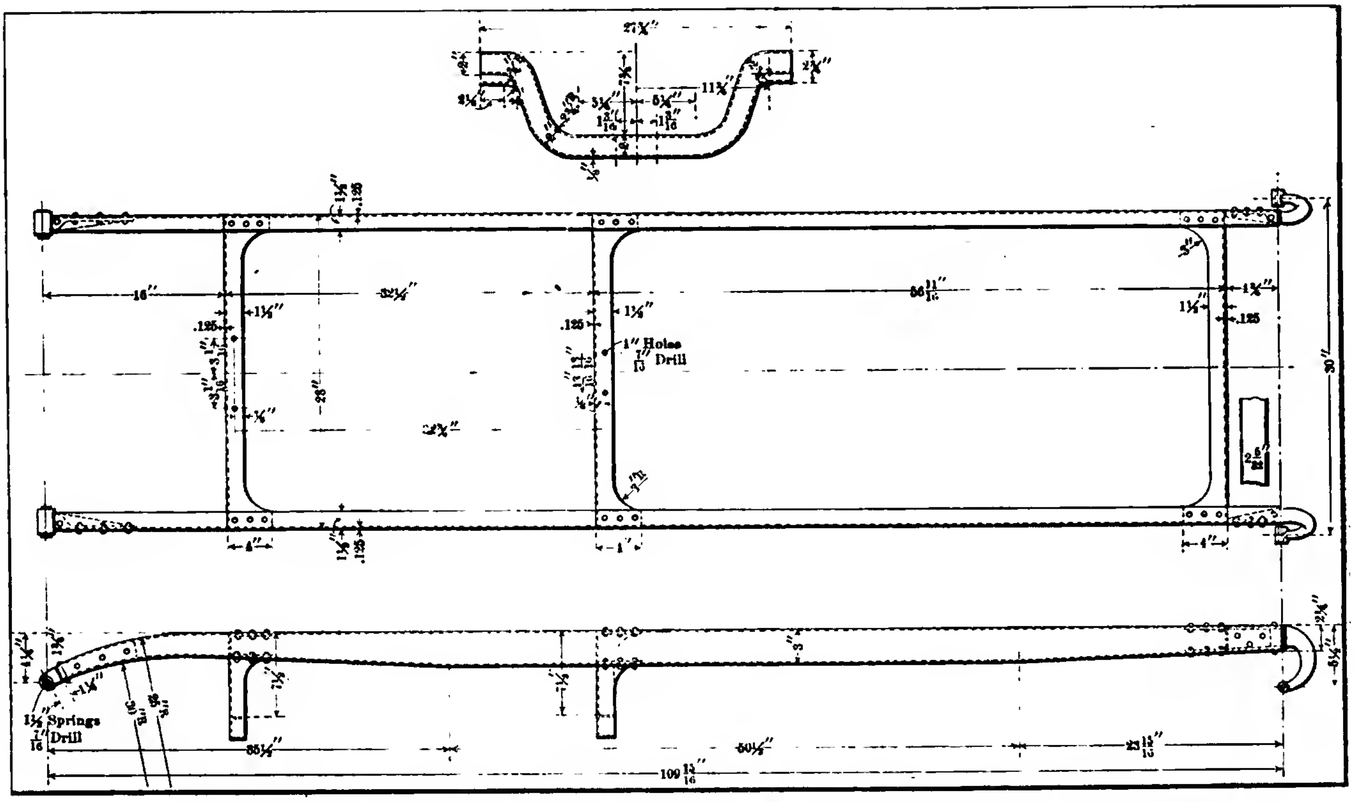


Fig. 19—Demot frame in plan and elevation, with straight front and rear, for semi-elliptic springs, and deep cross-bars

and the other end terminates at the universal joint, in suitable relation with the cross-member there placed, to take the torsion and thrust. This class of work has the virtue of being light; the strength of the material is in the plane of the work, and the general appearance is that of bridge building; bridges compel respect; they outlast man.

Housings for universal joints, which were formerly of castings, are now of drawn steel, and they offer advantages in several ways, among which are lightness, strength and neatness. Then there are covers for the bearings of transmission gears, they being formed in dies from mild steel, and when finished afford all that the situation indicated, besides having the virtue of being lighter, stronger, and at a far less cost than that of cast brass.

MOTORS HAVE PRESSED AND DRAWN STEEL

When water jackets have covers over them, the covers are sometimes of cast material, such as aluminum and bronze, but the examples of this class of construction, employing pressed steel, are growing. The steel work is, of course, lighter; the material used is much more stable than castings, and the finished motors look much neater. In some motors the crankbox has handholes for the purpose of inspection. They offer the further facility of adjustment of bearings if the occasion requires. The covers, while they were in former times of cast material, are now in some fine examples of pressed steel.

Motor cases, for the top half, either of cast gray iron or aluminum (the iron being now much used), in some of the good examples have pressed or drawn steel for the lower pan. Ford cars came out with this construction a couple of years ago, and while it was then recognized that Henry Ford had forced the hand of the pressed steel makers, it is nevertheless true that the idea was an advanced one, and after events proved that it was founded on good practice.

It is not now uncommon to observe that the lower half of motor cases are made in this way, and since the bearings for crankshafts are supported from the upper half, there is nothing

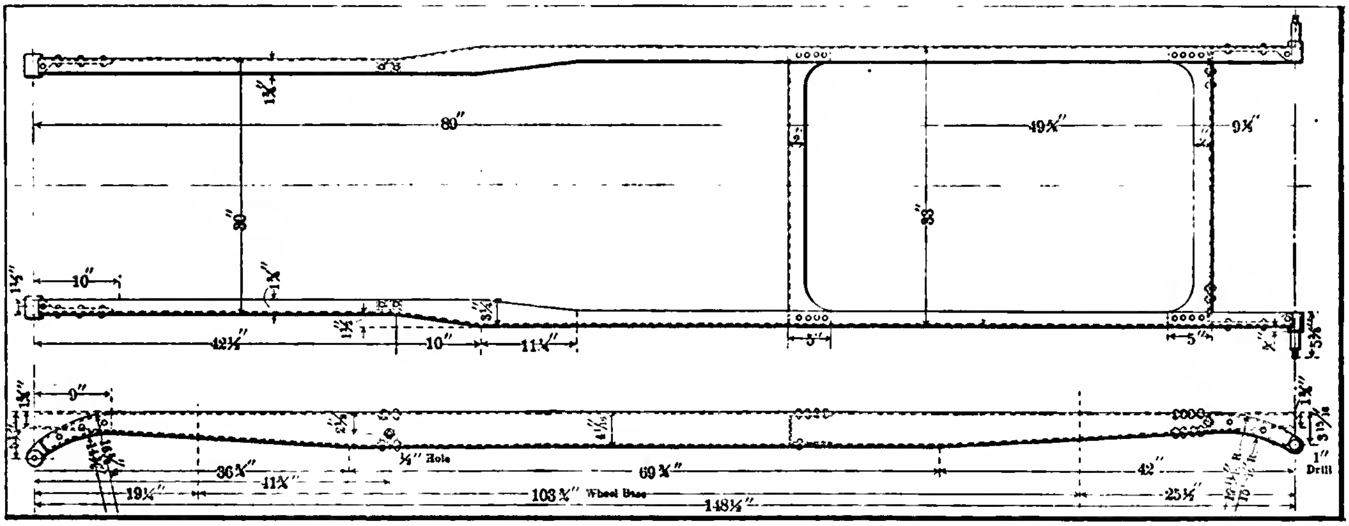


Fig. 20—Plan and elevation of Knox frame with narrowed front, straight rear and hangers for semi-elliptic springs

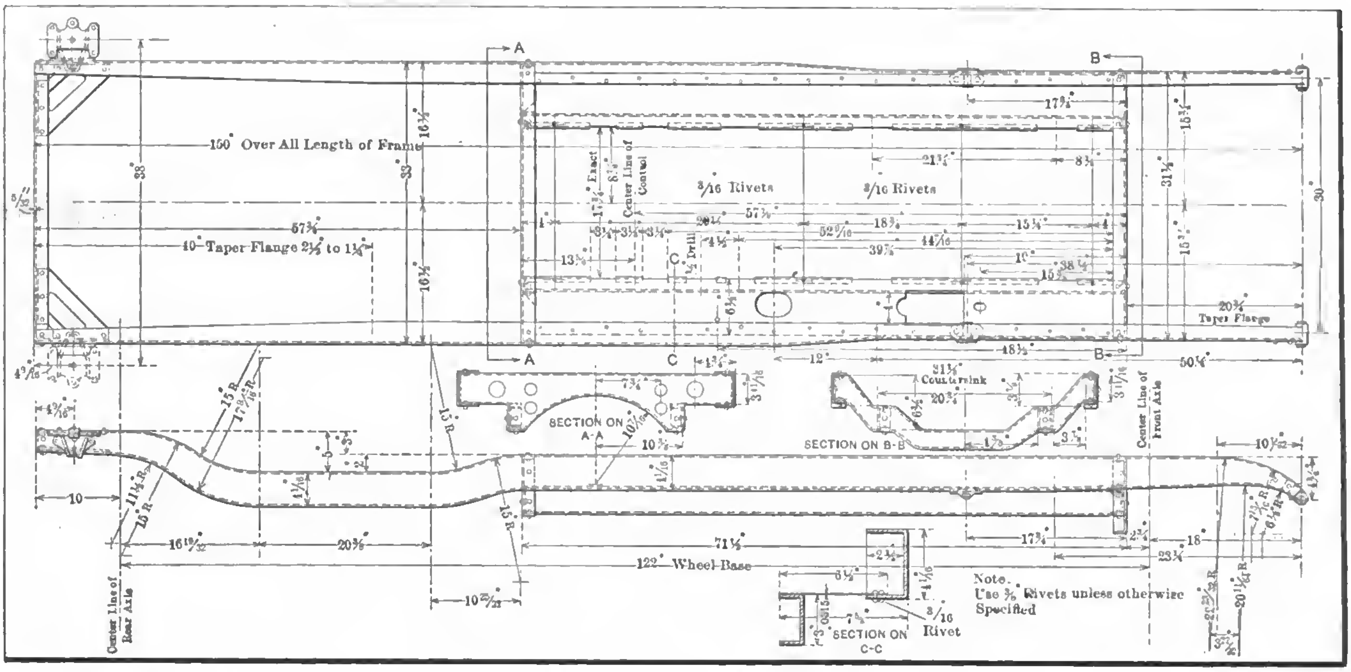


Fig. 21—Chalmers-Detroit frame in plan and elevation, with double drop rear and narrowed in front

for the lower half to support but its own weight and the lubricating oil that makes the foundation for splash lubrication. These pans, if such they may be called, are pressed hot in dies, and while it is something of a job, requiring several operations, the cost is reasonable and the weight of a motor is reduced to a minimum.

NOISE RESIDES IN BELL-LIKE MEMBERS

How to employ thin, bell-like members, and at the same time abort noise, is one of the first-rate problems of designers, simply because automobiles which are noisy will not be taken to kindly. When pressed steel is used:

(A) For the under half of motor cases;
(B) Covers for handholes in motor cases;
(C) Covers for housings of halftime gears;
(D) Plates over openings of water jackets;
(E) Housings for flywheels.

The metal being thin, of very rigid steel, and capable of making a considerable sound, must be so applied that this sound will be damped. Some of the designers resort to the expedient of applying a sheet of (thin) lead all over the inner faces of the covers, and in this way all noise is eliminated. To a considerable extent, if a packing is applied at the joints, noise is done away with, and if the plates are zinc-coated they are relatively still. That this problem is still to be coped with to some extent may be taken for granted, although in the Ford and other examples of lower halves of crankcases there is no trouble, owing to the damping effect of the lubricating oil which rests therein, it serving as a noise-killer as well as for lubrication. It is very likely that an electroplating of lead on one face of the plates would have the effect desired, referring to other pressed steel parts than the lower half of the crankcase, and the plating of lead, while it would act just as does a sheet of the same material, would be more cheaply applied, and less of it would have to be used, so that the added weight would not have to be tolerated to so great an extent.

OTHER PRESSED STEEL MOTOR REFINEMENTS

In Pierce-Arrow automobiles, and in some other makes as well, baffle plates made of pressed steel are placed at the bottom of the stoke in the cylinders, it being the idea to eliminate excesses of splash, and since the connecting rods play in a slot in the plates, and a restricted room is afforded for oil to be sucked by into the combustion chamber. This, as well as serving in the capacity

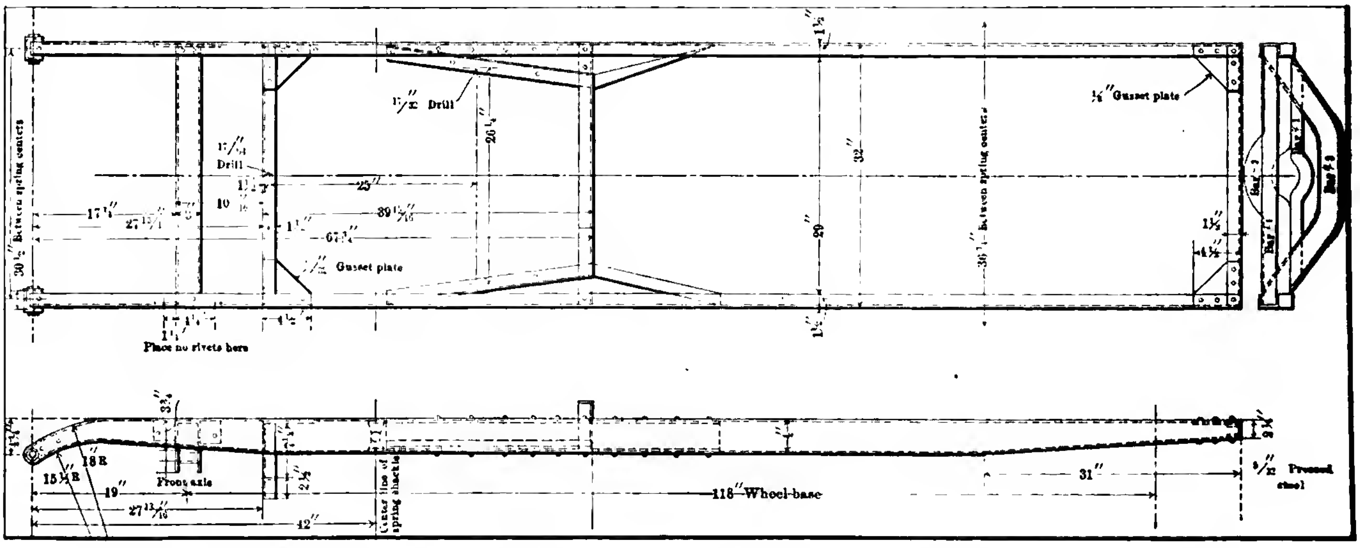


Fig. 22—Inter-State frame in plan and elevation, with four cross members, and side bars straight in front and rear

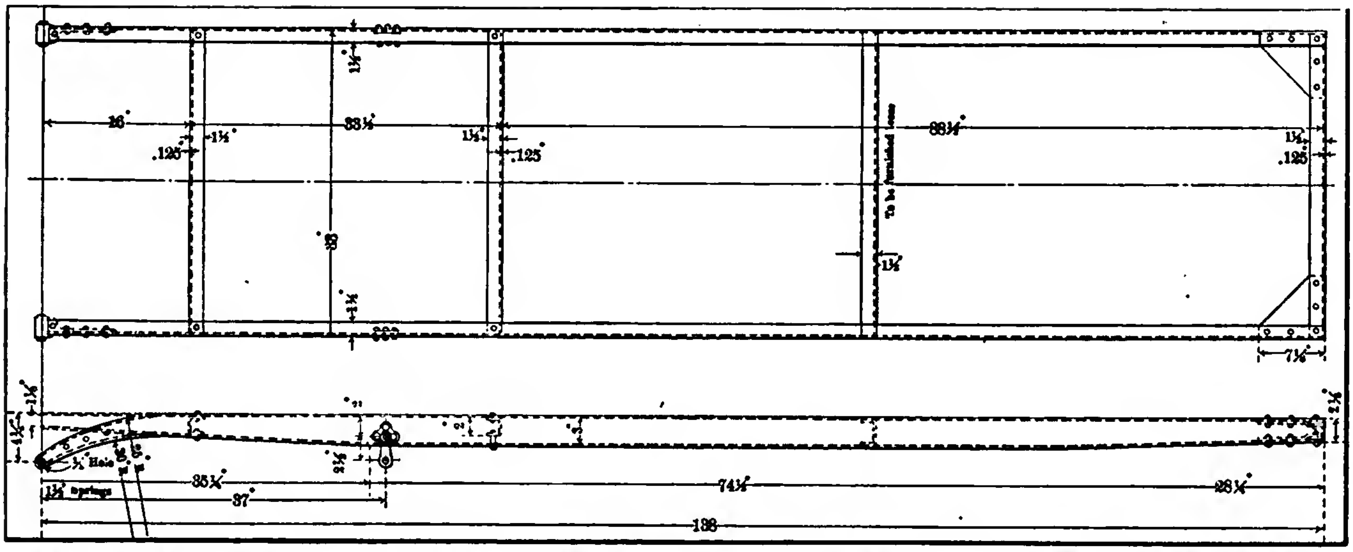


Fig. 23—Schacht frame in plan and elevation, showing straight front and rear, and four stout cross members well disposed

of a lubricating trouble preventer, makes for lubricating economy, because a considerable amount of lubricating oil will migrate by the pistons if it is allowed to perch on the walls of the cylinders, and carbon trouble will present itself.

Moon automobiles, as made by the Moon Motor Car Company, St. Louis, Mo., offer still another application of pressed steel in connection with its lubricating system. In this example, which has the added virtue of working extremely well, the lubrication to the crankshaft bearings is controlled by plates (which look like saucers) so placed on the ends of the main bearings that the lubricating oil, as it is forced through the main bearings and out, dribbles down over the surfaces of these pressed steel plates and is whisked off by the throws as they travel around, thus landing the oil on to the crankpin bearings, where it enters. That a state of positive and profuse lubrication is the result has been adequately proven by many cars in service.

National cars, in connection with the National system of lubrication for the motors, have a false bottom in the motor case, the same being formed in dies from steel, with a flange which engages a ledge around the aluminum case and a packing of piano felt is placed between the faces; this packing serves the dual purpose of making a tight joint and aborting noise.

This false bottom is provided with openings at eqnidistant points from the extremities, which openings are flanged upward and the height of the flanging measures the depth of the lubricating oil, which is held in the false bottom for use in the splash system of lubrication. The true bottom in the National is formed in the lower half of the crankcase proper, and a pump is there placed, its function being to raise the lubricating oil up into the system through its proper passageways, and it is this oil, on its way back to the basement of the crankcase, which catches in the false bottom, serves for splash purposes, and the excess runs down through the flanged openings to the sea of oil below It is filtered and screened in transit.

A DIVERSITY OF PRESSED STEEL MEMBERS

Some magnetos are provided with a leather hood, the function of the same being to ward off water and the silt of the road, which in bad going enters through the radiator. In many excellent examples instead of leather pressed or drawn steel is used and it has the especial virtue of fitting down over a packed face, thus rendering the magneto immune from attacks of dirty water, and, with proper quick detachable fastenings, it is allowable to quickly remove the cover and get at the magneto.

Battery boxes are now almost invariably made of pressed or drawn steel, and besides being neat in appearance, they are strong, water tight, and are particularly suited to the work

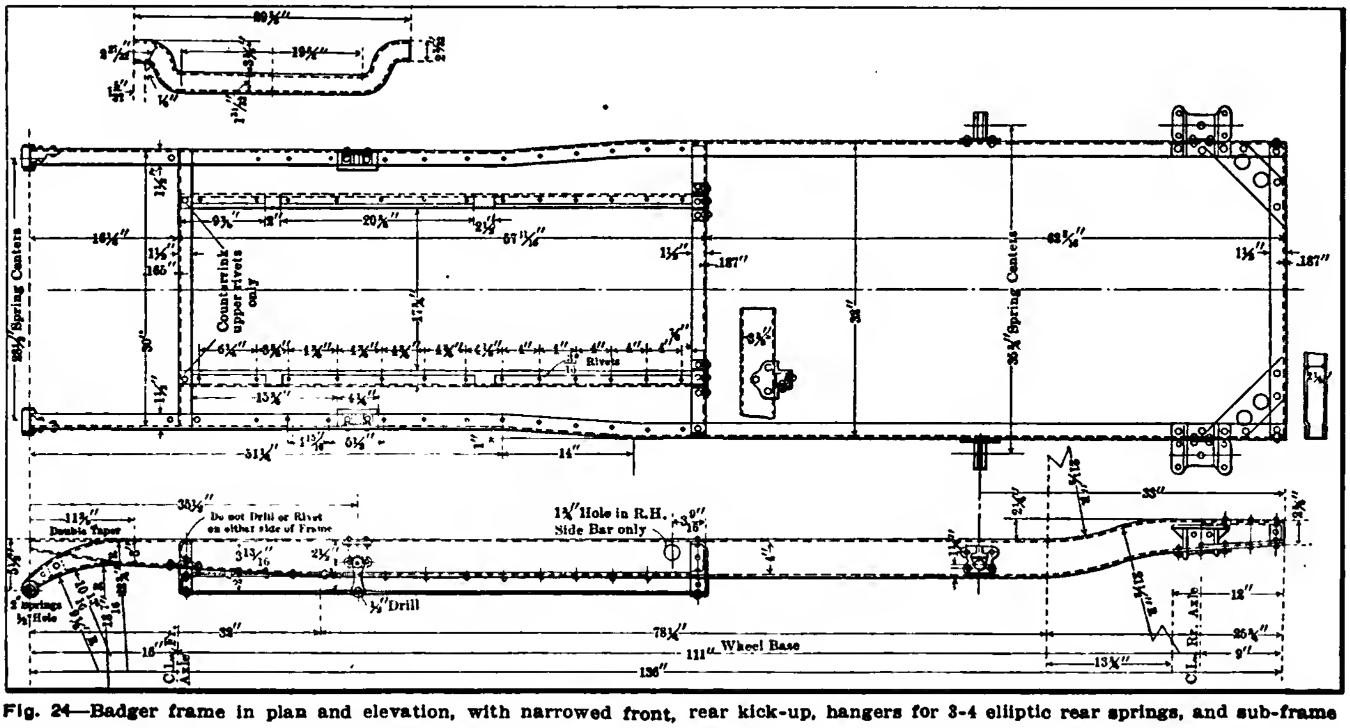


Fig. 24—Badger frame in plan and elevation, with narrowed front, rear kick-up, hangers for 3-4 elliptic rear springs, and sub-frame

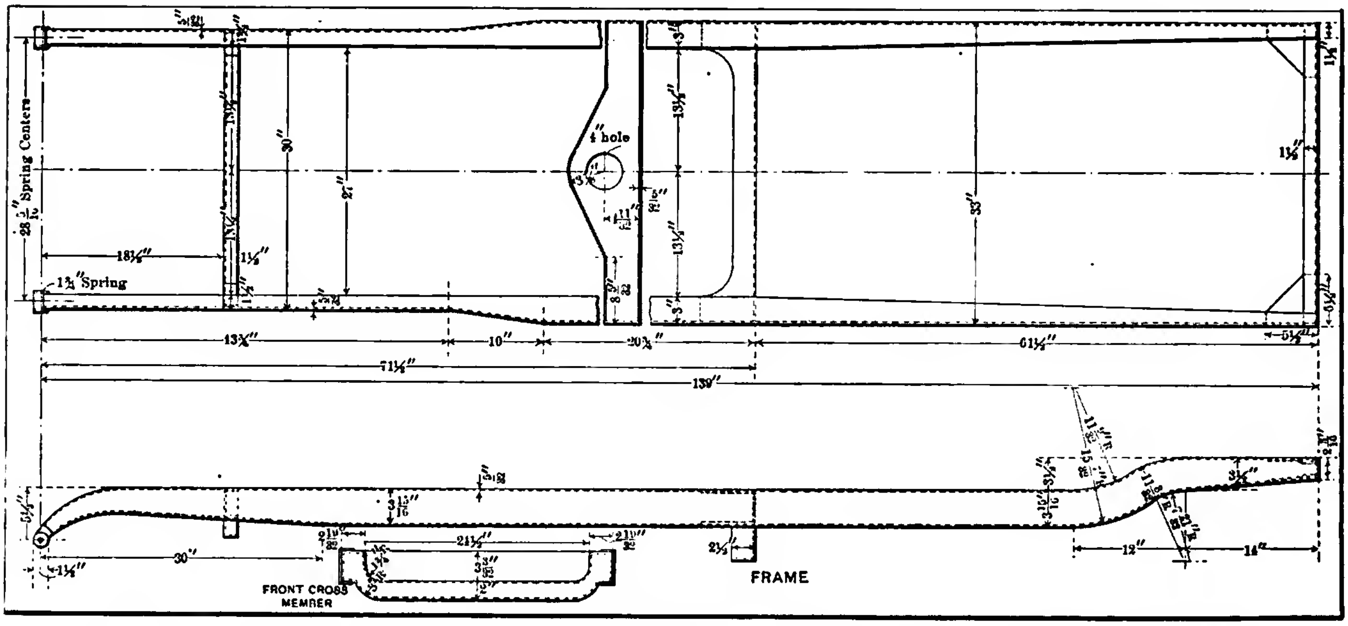


Fig. 25—Moon 30 frame in plan and elevation, showing straight front, rear kick-up, drop cross members, and stability

These boxes are provided for the dry batteries and in connection with the Patterson system of battery connections as made and sold by Stanley & Patterson, New York City, there is every evidence of refinement adequately associated with service.

Gasoline tanks of drawn steel coated with zinc (galvanized) are now in quite common use, and, being made with hemispherical heads with a single lap-joint at or near the midposition around the girth, they are strong, even though the weight of metal used is relatively light. These tanks are made in divers sizes, are provided with all connections as (a) inlet, (b) outlet, (c) filler, (d) for pressure, and when desired a measuring device will be provided with them, this having the utility of showing how much gasoline is in the tank. These tanks are held in stock at supply houses. Charles E. Miller, for illustration, invariably keeps a supply of the several sizes in his several stores, and will fit to the tanks the measuring instruments before shipment.

Tool boxes are quite generally of pressed or drawn steel, and in many cars the battery and tool box are of precisely the same general appearance, both being provided with locks. These boxes are seamless, made of a good weight of metal, and if securely placed on the running board they cannot be entered by a sneak thief, excepting at the expense of more labor than a person of this caliber will willingly contract for.

Pressed steel dash work is much in vogue, it being used in all automobiles excepting the ones which cling to the mahogany dash, and a few of those which go out with an overhang. In this latter instance the dash portion is of wood in some cases. This pressed steel work is very serviceable and the appearance is satisfactory as a rule, although in some of the earlier examples it did not compare favorably with mahogany work from the point of view of appearance, which has its influence.

Steering wheel spiders to some extent are made of pressed steel, this material having originally been brought out in the B. L. M. cars. The general appearance of the spiders so made was a little against them because they looked light to purchasers, they, to some extent, failing to appreciate the difference in strength which exists between pressed steel and cast aluminum.

Windshields, especially the framing (sash), are made in such a way as to accommodate a packing between the engaging members and the glass, and while some of the material used in the

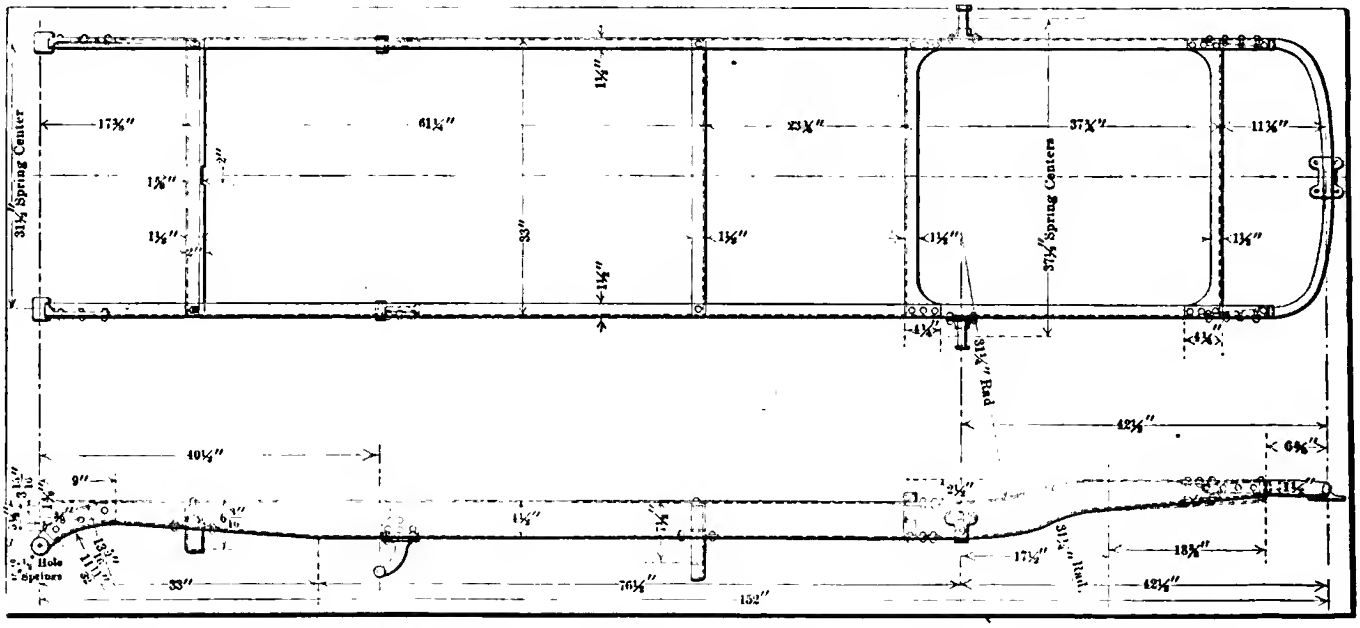


Fig. 26—Corbin frame in plan and elevation, with straight front, rear kick-up and supports for platform springs

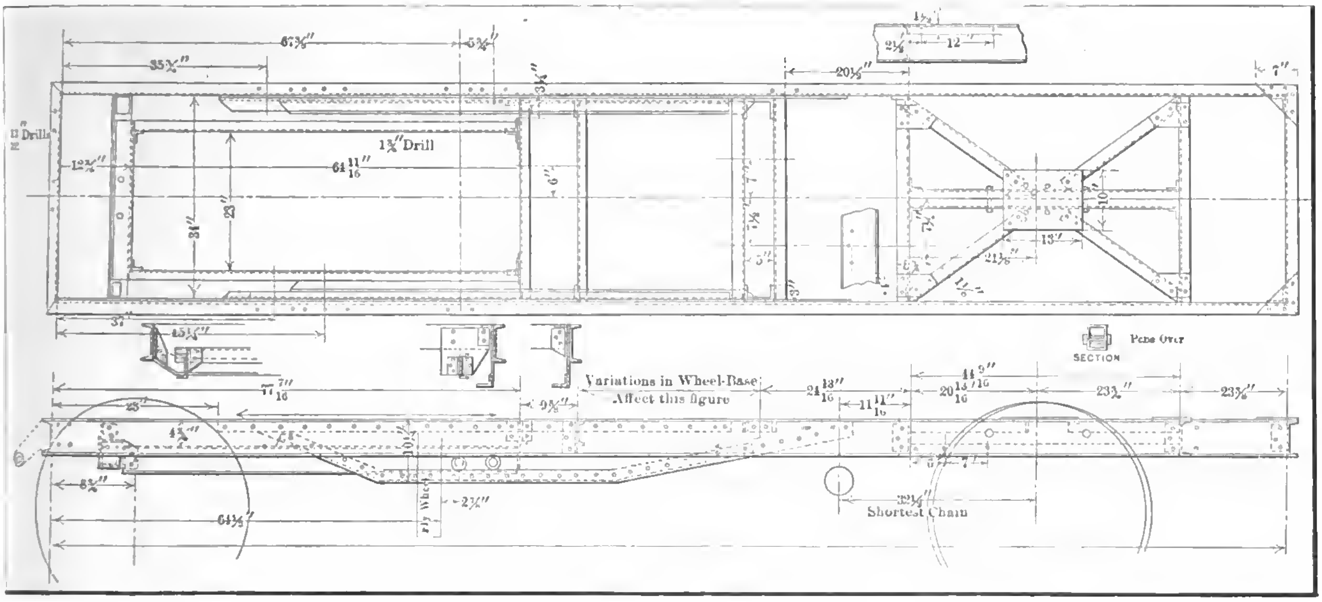


Fig. 27—Alden Sampson frame in plan and elevation,, channel section with flanges out, designed for heavy trucking service

sash work may class as other than pressed steel the most of it is either pressed, rolled or stamped. It is the aim of makers of windshields to get away from the use of brass castings to the greatest possible extent, and plated steel offers the widest opportunity. Some excellent examples of windshields were shown on the cars of this year's vintage.

Lamps, to some extent, are of drawn steel. Then there are parts of the lamp-shells which are pressed, although to be sure brass and copper stampings or sheet brass dominates this field. As an extreme example of pressed steel work, reference will be made to the steel plates used in the making of the elements of the Edison battery.

SOD APRONS AND MUD GUARDS OF PRESSED STEEL

Sod aprons, so called (under pans for motors) are made of sheet steel and in the best examples they are formed in dies. There is still some room for improvement in this line of work, notably in the methods employed for fastening the aprons in place, for if they are not securely fastened they will fall off, or noise will greet the ear of the owner of the car in any such event. If the fastenings are secure, but difficult to undo, the time required in which to examine the under side of the car, or make a repair, will be excessive in all probability.

Mudguards in nearly all of the recent examples are formed of steel. Aluminum is still in vogue to some extent, but steel answers every requirement, is more lasting, taking it on the whole, in view of the mudguards which now extend down to the chassis frame, steel is suitable metal, and for a good shape it is necessary to employ dies in the process, so that this work takes rank as pressed steel, although a press of the conventional sort may not be used in the process.

Running-boards are now almost invariably of pressed steel, the stock being relatively heavy in pounds per square foot, but to make the running-boards light as well as rigid, they are punched out, leaving about 50 per cent. of the total weight of the original metal. These boards are rendered strong by having flanging at the two edges, and they are also properly shaped to neatly engage the mudguards, to which they are bolted. The running-boards are properly bolted to brackets, which are also of pressed steel, and in this undertaking, it may be as well to say, it is a distinct advance over the older method of forging brackets out of iron, in which forgings welds were necessary, and they did not always hold securely. It is also true of the newer pressed steel brackets that they very materially add to the general appearance of the cars, and are much lighter.

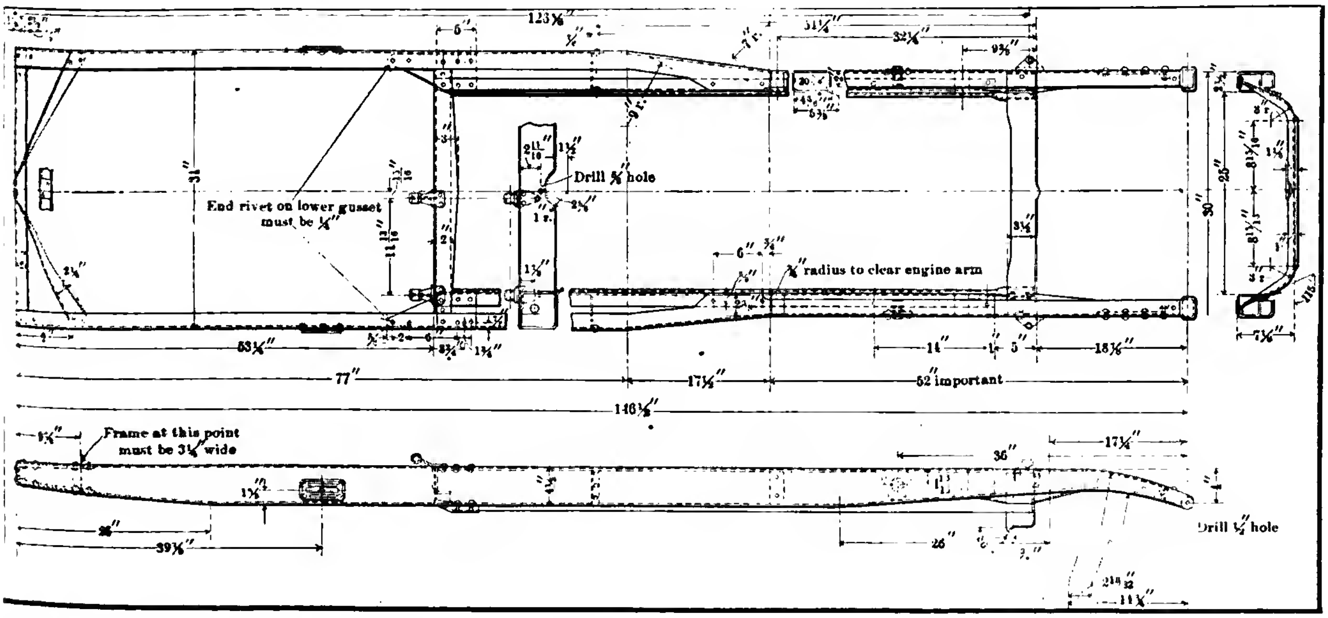


Fig. 28—Premier frame in plan and elevation, with narrowed front, for semi-elliptic rear springs, and extra means of support at offset

STOVE BOLT FASTENINGS OUT OF FASHION

In many of the earlier examples of cars, when tinsmiths were held responsible for the proper fastening of the mudguards, it was not uncommon to observe that the work was done on a basis which obtains in fitting up a kitchen range, with this exception: it was not so good, due to lack of familiarity of the range-fitters with automobiles. This stove-bolt idea clung to automobile work with a good deal of tenacity and it is a great gain to be rid of it.

MUDGUARDS ARE JAPANNED FOR PERMANENT FINISH

With the increased use of sheet steel in connection with the production of mudguards and like parts, the question of a permanent finish had to be coped with, and in such cars as the Cadillac, Rambler, Premier and others the parts are japanned in any desired color, and after the japan is baked on it takes a high finish, besides having the necessary virtue of being permanent.

EXPERIENCE IS FULLY TAKEN ADVANTAGE OF

That pressed steel has materially reduced the repair accounts of the owners of automobiles is one of the matters that can readily be taken for granted. Were failures properly tabulated and compared, it would probably be found that fully 50 per cent of all troubles are in connection with the injudicious use of castings, whereas, in connection with pressed steel, it is not far from the truth to avow that there are few, if any, failures come from the use of this excellent material when it is judiciously applied. Even when it is subject of an unfair amount of work it is far more likely to survive than will be true of any other material, due, in some measure, to shape.

Pressed steel is superseding drop forgings to a far greater extent than would be supposed. With modern facilities for making dies, and the relatively large presses now in use, the process lends facility to many undertakings, and, to a considerable extent, even drop forgings are being displaced by them. In a certain measure pressed steel is superior to even drop forgings, due to the better condition of the material after the process is completed, even when the work is carelessly done.

When parts come from the forge in the drop process they are in a poor state, and, unless they are subjected to a correcting process, it is even possible to say of them that they are not fit to use. There is no process which can be devised that will lend itself without any failures, and, as is generally well understood, heat-treating work is not simple, and failure is courted to some extent every time a bulk of steel is brought up to a temperature above its critical point without due regard.

In a certain degree this is true of pressed steel; it too should be annealed after it is formed. The dangers involved are, in magnitude, relatively slight, owing to the shape of the metal and to the amount of work previously expended upon it to bring it into the flat state.

Before concluding it is desired to state that the dates on the views of the A. O. Smith plant, as shown in Fig. 8, tell of the speed made in the erecting of this plant, and, as to its size, it is over 1000 feet long and has a foot in width for every day in the year (approximately), representing, in a sense, the growth of the accessory industry and magnitude of building operations.

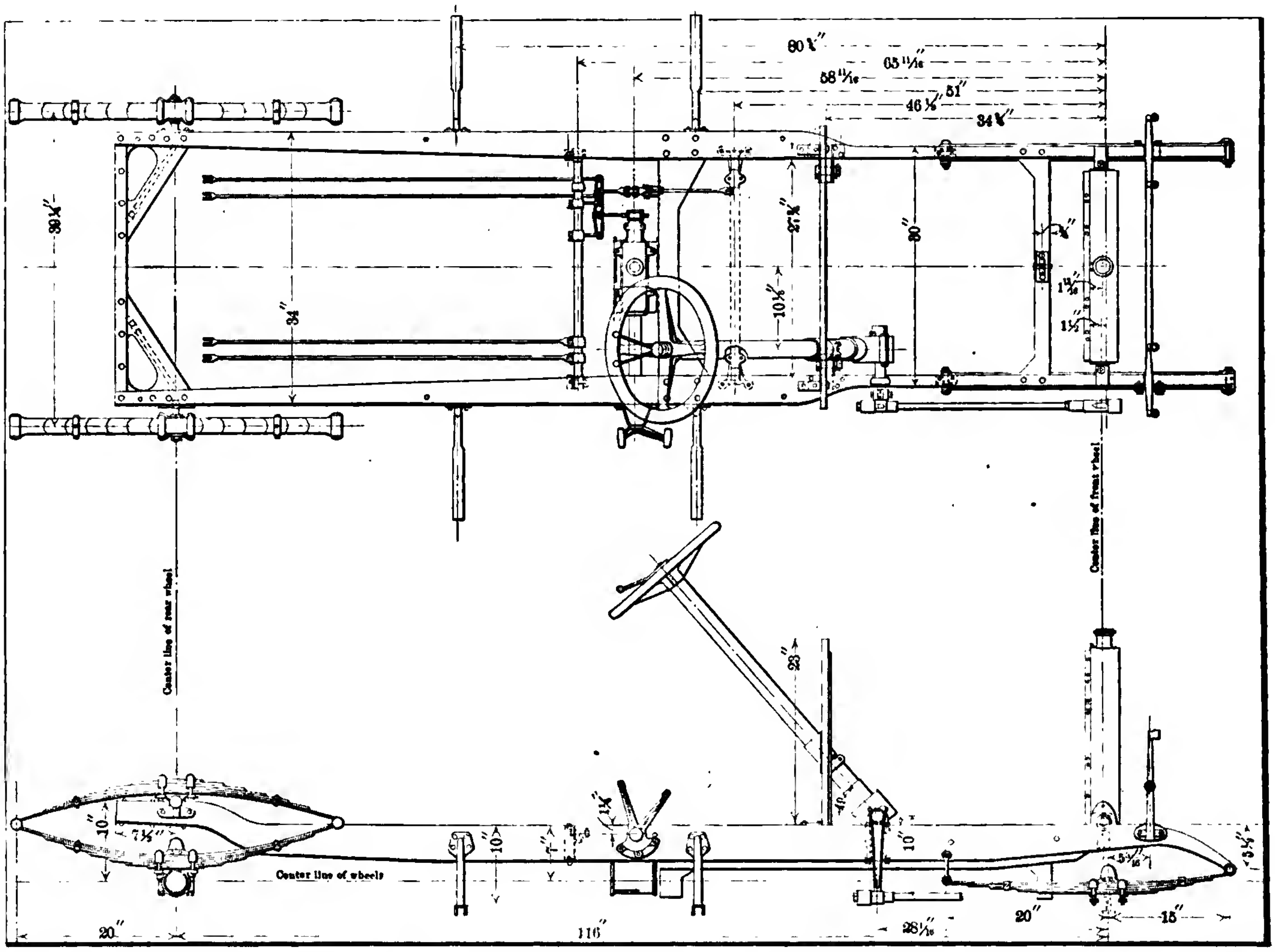


Fig. 29.—Marmon chassis, plans and elevation: frame with radiator, steering column, wheel, gear and link, controls and linkage, and springs, showing relations and design features, with dimensions

TYPES OF POWER PLANTS

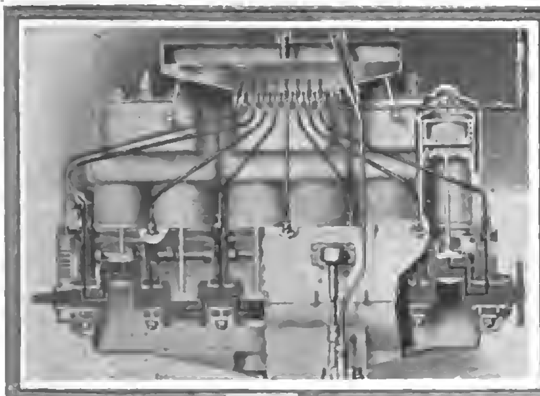


FIG. I

Section of Pierce "six" motor, showing crankshaft, half-time gears, twin cylinders, and method of oiling

ELECTRICS were the first to come into vogue, and while the electrical undertaking, considering it as a whole, may represent a very considerable effort, during which divers ideas were tried out and some of them found wanting, still commercially the principle remains, and in its refined state, as it is presented today, electrical vehicles serve with great distinction in a definite field of usefulness. In discussing types of power plants as they are utilized in automobiles generally, it would be to cover the subject but poorly were the electric situation ignored. In view of restricted space, there being so many points to cover in reviewing the exhibitions under the auspices of the A. L. A. M. at the Garden, it will be necessary to limit illustrating and discussion so that the electrical situation is reduced to a single display merely to afford it the recognition to which it is due, which illustration (Fig. 2) is of a Waverly power plant as it is placed under the body of a Waverly electric vehicle.

LONG STROKE MOTOR IN GOOD PRESENCE

It is in gasoline work that the greatest strides were made, and it would take many pages of space, with hundreds of illustrations, to adequately indicate the extent of activity in this field. If the electrical power plant ranks first in the line of development, it is true in gasoline work that the "six" comes at the end.

The title illustration, which is of a Pierce-Arrow, presents evidences of the refinements in this class of power plants, and this refinement is very general in all the products. The condition is reflected in the fact that the "sixes" are confined to the higher priced automobiles. At the Garden these plants were present in

Cars costing from $1,500 to $2,500..................	5
Cars costing $2,500 to $4,000.......................	12
Cars costing $4,000 or more........................	40

In the "sixes" there are few indications of innovations, it being common practice to adhere to well authenticated plans, with cylinders cast in pairs, lubrication by special definite pumping methods in addition to splash systems, and ignition by means of a magneto in every instance, and always attended by a coil and battery which is used in cranking, noting exception that Winton has an automatic starter.

The long stroke has taken a hold in this class of work, and in the Thomas Model "M," which is a 4 1-4 x 5 1-2 bore and stroke, respectively, for illustration, this idea is regarded as of excellent virtue. This long stroke advantage, instead of being confined to a few cars, is very generally maintained, the Winton, for instance, being a 4 1-2 x 5; Mitchell Model S, 4 1-4 x 5; Premier 6-60, 4 1-2 x 5 1-4; Lozier-Briarcliff model, 4 5-8 x 5 1-2; Pierce-Arrow 36-horsepower, 4 x 4 3-4; Pierce-Arrow 66-horsepower, 5 1-4 x 5 1-2; Matheson 50-horsepower, 4 1-2 x 5; Alco 60-horsepower, 120 x 140 (milimeters), bore and stroke respectively.

It will be observed that the length of the stroke, as compared with the bore, does not represent a large percentage, but the extent of agreement in relation to the long stroke is fairly reflected in these figures. With a view to showing the other side of the story, attention is called to the Knox Model S, which is 5 x 4 3-4; Oldsmobile "Limited," 4 3-4 x 4 3-4; Franklin Model H, 4 1-4 x 4; Stevens-Duryea Model XXX, 4 3-4 x 4 1-2, bore and stroke respectively. Taking the motors as they actually obtain, and considering the designs on both sides of the long stroke question, the situation favors the conclusion that departure from the square cylinder, in which the bore equals the stroke, is but slight in favor of the short stroke, and just enough to notice in the direction of the long stroke. There are fine examples of automobiles on both sides of this question, and they have all been on the road doing good work long enough to inspire confidence.

This question of bore and stroke, as it relates to the six, is substantially reflected in about the same way down through the "fours," and possibly into the "twos," but there is a distinct change when it comes to one-cylinder cars, of which the Garden, however, presented none at all, so that this phase of the subject will not have to be discussed here.

VARIOUS TYPES OF FOUR-CYLINDER MOTORS

Valves in the head seemed to favor a high-weight efficiency, and the excellence of performance in other respects commanded the attention of some recognized designers. Fig. 3, of a Stoddard-Dayton, shows one of the very competent engineering methods by which this type of motor is consummated. There are other good examples of valve-in-the-head motors—for instance, the Moon, Model 45, and others. In the Stoddard-Dayton, as illustrated, it will be observed that the valves may be quickly removed, and that ample means are at hand for assembling to tightness, because the cage is so fashioned as to compensate for heat changes. The carbureter on this motor is a multiple nozzle type, connected through a well-designed manifold, and the motor is said to operate with rare flexibility. The cylinders are cast in pairs, which is quite a common practice.

The Premier Model 30 motor, as shown in Fig. 4, is offered as an example of a four-cylinder motor with T-headed cylinders. The motor is shown on a working stand, turned 90 degrees, with the under half removed, exposing the crankshaft, showing that it runs on three bearings and that the lower halves of the journal

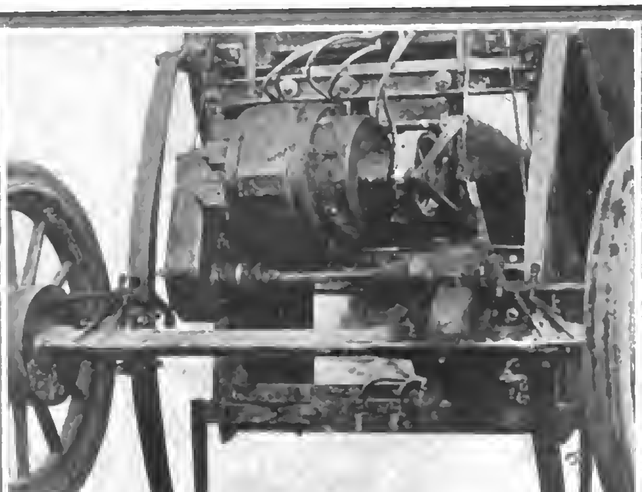


FIG.2

Waverley Electric hoisted and photographed to show power plant, transmission, and methods of fastening

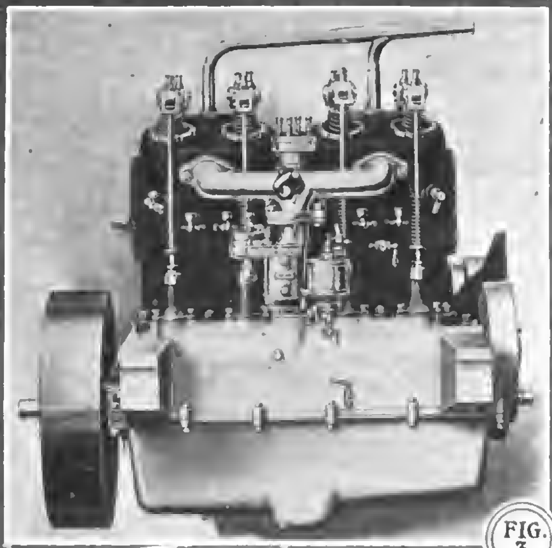


FIG. 3

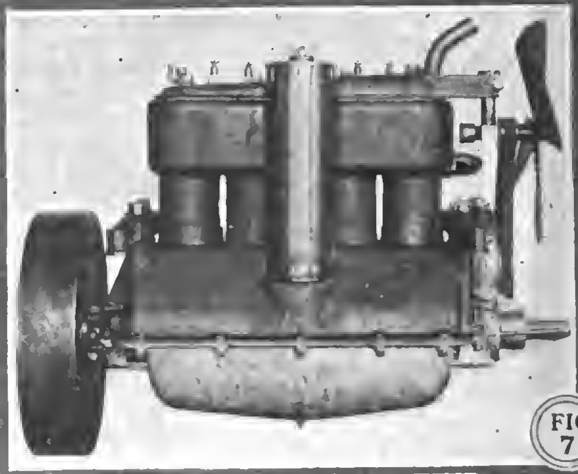


FIG. 7

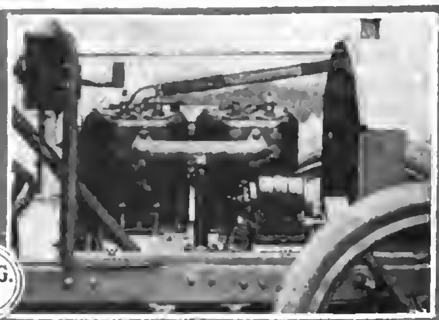


FIG. 8

FIG. 4

FIG. 5

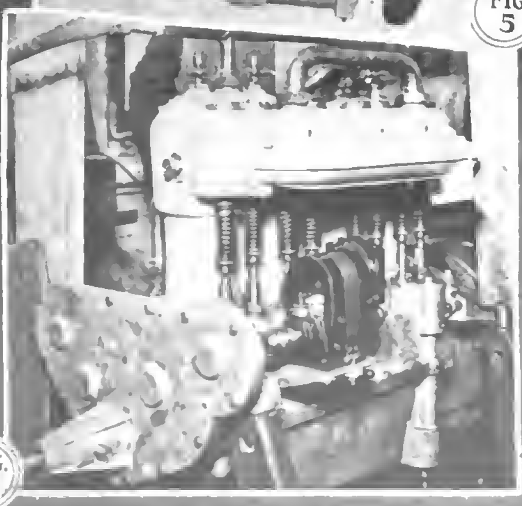


FIG. 6

Fig. 3—Stoddard-Dayton, showing cylinders in pairs, valves in the head, multiple nozzle carbureter, and refinements

Fig. 4—Premier motor tilted on workstand, showing crankshaft in three bearings, with T-type twin cylinders, detached

Fig. 5—National motor, showing left side, magneto flexibly mounted, centrifugal water pump, and timer in accessible position

Fig. 6—Excelsior motor with four cylinders in pairs, flexibly mounted magneto, enclosed half-time gears, and neat workmanship

Fig. 7—Metzger motor with cylinders in block, in integral relation with crankcase upper half, special oiling facilities, and a large flywheel

Fig. 8—Moon 30 motor in car, showing thermo-syphon system T-cylinders in pairs, and accessibility of accessories.

boxes are bolted to the top half of the case. This practice is regarded as thoroughly good in every way, and is utilized to quite some extent in representative motor work. The cylinders are shown detached below, cast in pairs. Fig. 5, which illustrates a National four-cylinder motor, shows by way of distinguishing features that the magneto is flexibly assembled, there being a double universal joint between it and the shaft which drives it.

Fig. 6, of an Excelsior four-cylinder motor, is of the L-type of cylinders, with the magneto driven from a gear which meshes directly with the half-time gears. A double Oldham joint gives flexibility of the mounting.

Fig. 7, of the Metzger motor, which is a relatively new product, differs from all the others shown, and represents a new feature of construction which will be watched with much interest. The four cylinders, which are L-type, are cast integral with the other half of the crank box, all of gray iron, and the round tank which nests in the mid-position is for lubricating oil. It is of a commodious size, and so situated as to collect heat units from the cylinders nearby. The motor has the virtue of being very completely enclosed with relatively few parts, and the commodious flywheel adds materially to its ability by way of flexibility and the facility of operating at a very low speed.

INDIVIDUAL CYLINDERS ARE IN EXCELLENT PRESENCE

In the Rambler plant at Kenosha, Wis., the power plants for all models are designed with individual cylinders, as shown in Fig. 9, and the crank box is the possessor of a distinct innovation, which cannot be disregarded in the search after quality.

FIG. 13

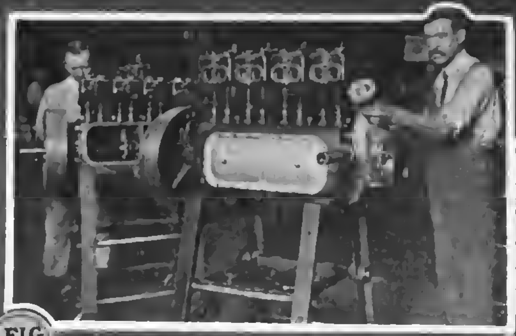


FIG. 9

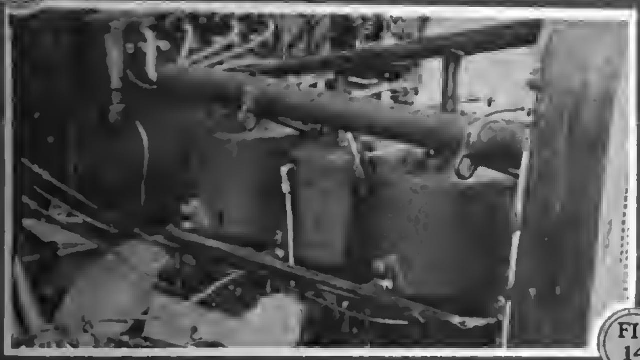


FIG. 14

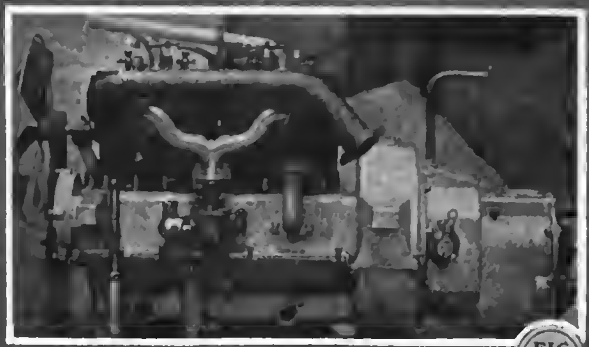


FIG. 10

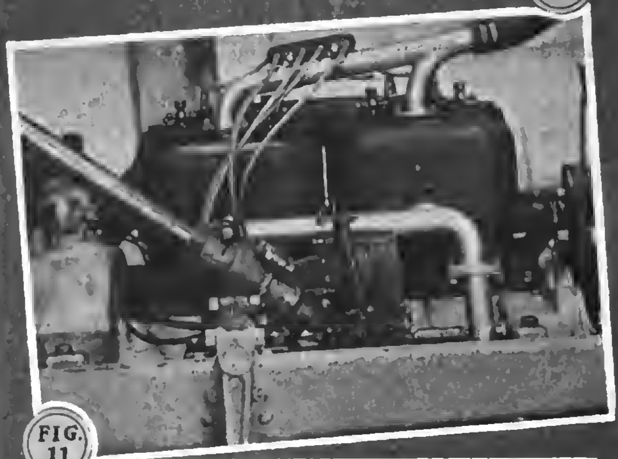


FIG. 11

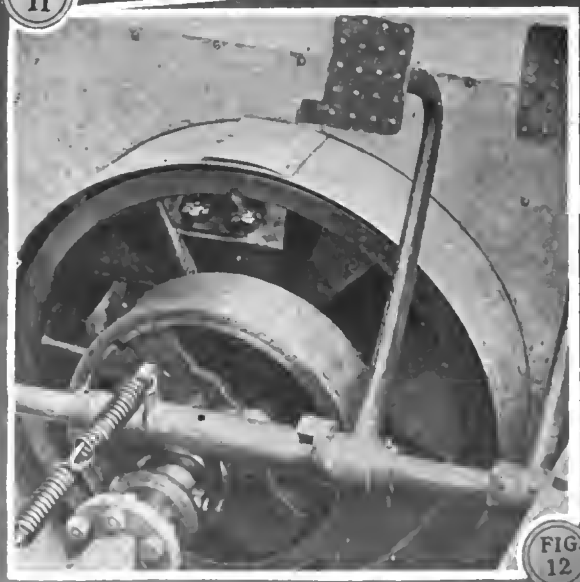


FIG. 12

Fig. 9—Rambler motor with individual T-type cylinders and undivided crankcase, using one camshaft

Fig. 10—Patterson 30 motor, showing individual power plant, enclosed clutch and transmission, and Schebler carbureter

Fig. 11—Cole 30 power plant, unit type, with four cylinders cast in pairs, and enclosed clutch and transmission

Fig. 12—Moon power plant, showing fan in flywheel, expanding band clutch, and means of control

Fig. 13—Alden-Sampson power plant, showing half-time gears, positively driven fan, and refinements

This crank box is made without being split on the horizontal center, and a large handhole which is placed on the working side permits of inspecting and adjusting ball bearings on the crankshaft and connecting rods at will. The further advantage which is present in this design lies in the fact that the thrust on the pistons due to gas work comes on the solid section of the crank box, rather than upon holding bolts, which would be true were the box made in two halves. This example presents evidences of a distinct school of design.

UNIT TYPES OF POWER PLANTS VERY PREVALENT

The Patterson 30, as shown in Fig. 10, is an excellent example of the unit type of power plant, as it is being exploited in a considerable percentage of the relatively low-powered automobiles as they were shown this year. In nearly all these examples the cylinders were cast *en bloc*, and while the Chalmers 30 has a sufficiently husky power plant to show that this type of construction is by no ways limited, the fact remains that it is much favored in the relatively small cars.

Departing from the block cylinder feature, it will be possible to point out that the unit type of power plant is utilized to excellent advantage in connection with other cylinder designs—as in the Stevens-Duryea power plants. Fig. 11, of a Cole 30, is an illustration of a unit type of power plant with the cylinders cast in pairs and thermo-syphon cooling. Fig. 12, showing the flywheel end of the Moon car, illustrates one way of propelling air through the radiator in front, over the surfaces to be cooled and out under the car. In this example the fan blades in the flywheel are so designed as to draw all the air which can be efficiently utilized even in the absence of a disc fan back of the radiator.

HOW CARBURETER PROBLEMS ARE SOLVED

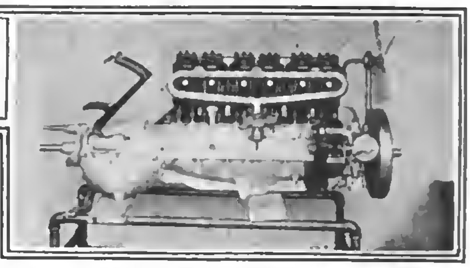


Fig. 1—Anhut motor, showing application of Stromberg carbureter

SINCE Daimler's time, the vaporization of liquid fuels has been a big problem, which, as time passed and the supply became poorer and poorer, increased in difficulty of solution. In the meantime, as the fuel became worse and worse, designers made much progress, and would have made more had the fuel remained uniform. However, with the present day fuel, poor as it is, the present day designers have arrived at a nearperfect condition of vaporization. Following a number of important moves toward and away from several specific designs or, more correctly, principles, a general type has been evolved from which all carbureters differ slightly, but from which no one carbureter differs in its entirety.

For the present season, few manufacturers show marked or radical changes, the alterations which make the 1910 product different from the 1909 devices being confined to details of small consequence, and in some cases, of microscopic size. One noticeable change which the year has brought forth, and which might have been reflected by the infinitesimal changes in the actual product, is the action of many prominent manufacturers in buying instead of making their own. This throws the business into the hands of the carbureter specialists. In any list of prominent details, which now show widespread adoption, the first to be mentioned would undoubtedly be the venturi tube, while much attention is being given to multiple nozzles, auxiliary air valves, and improved ease of starting.

Wheeler & Schebler—In the Schebler carbureter, made by Wheeler & Schebler, Indianapolis, Ind., and prominently exhibited at both shows, the venturi shape of strangling tube is not quite as apparent as on some other makes, but the general idea of the venturi tube is carried out, the shape being straight below the nozzle level, narrowed into a small neck just at the nozzle tip, and expanded above in approved form. The concentric float is used on all models as is also the auxiliary air valve. The latter may, however, be had in about any position desired, either vertical or horizontal being regularly supplied, while other angles may be had upon special orders. The design of this is the same in all cases, being a poppet type of valve with a long central sleeve which slides upon a central shaft.

For starting purposes, provision is made to allow of holding the float down, so that gasoline will continue to flow, while, at the same time, the suction will not be strong enough to open the auxiliary air valve. The throttle used differs in detail, being of the butterfly type on Model L, and of the flat, cutoff type in Models E and others.

Stromberg Motor Devices Company—This Chicago concern makes two principle types of carbureters, which, in a word, differ but in the location of the float and minor details. Model A has the float in a chamber separate from the vaporizing chamber, and connected to it by means of a horizontal passage. In Model B, on the other hand, the float is concentric with the vaporizing chamber, and the gasoline flows into the latter through a number of small passages sloping downward, toward a common center, the foot of the standpipe. In both types, the main air enters around the outside of the standpipe, passing upward, through the vaporizing chamber, which is of a slightly modified venturi shape. This modification takes the form of rounding all of the surfaces, so that they present a spherical surface rather than a plain conical one.

In both, too, the auxiliary air is constructed similarly, with the same form of adjustment, and similarly located with regard to the vaporizing chamber, that is offset is a horizontal plane. This auxiliary air inlet has a cone-seated poppet valve, very similar to ordinary engine valves, which valve works against a pair of light springs, both being adjustable. A locking means for each one is provided to retain the proper adjustment, once it is obtained. Fig. 3 shows a section through each one of the two models, designated A and B.

Byrne-Kingston & Company—At this booth is shown the Kingston carbureter, which is of the concentric float, venturi tube type. Around the latter, the main air also enters, the passage for it being concentric with the standpipe. To this air passage, the air is led up from the side by a long pipe shaped like a double elbow. In both Schebler and Stromberg, the needle works from below, from which point it is adjusted for either more or less fuel, but in the Kingston, the needle works down from above, so that it is adjusted from there, just the opposite to the other two. The makers claim that this gives a more accessible adjustment. At the top, too, is found the throttle, which is of the butterfly type, with limits of motion. The passage of the air to the inlet pipe describes a passage of the shape of a channel, that is to say, with two turns, and two only.

Allen Fire Department Supply Company—Chief among the distinguishing features of the Allen carbureter, made by this Providence firm, is the throttle. This differs from the conventional in that it is neither of the butterfly, nor of the piston type, these being the two ordinary ones. It consists of a long slide, semi-circular in section, the flat upper surface forming the diameter of the circle. In the other direction, this is pierced by a circular hole, corresponding to the circular pipe to the engine. By sliding the throttle along on its ways, the hole in it may be made to register with the inlet pipe hole, which corre-

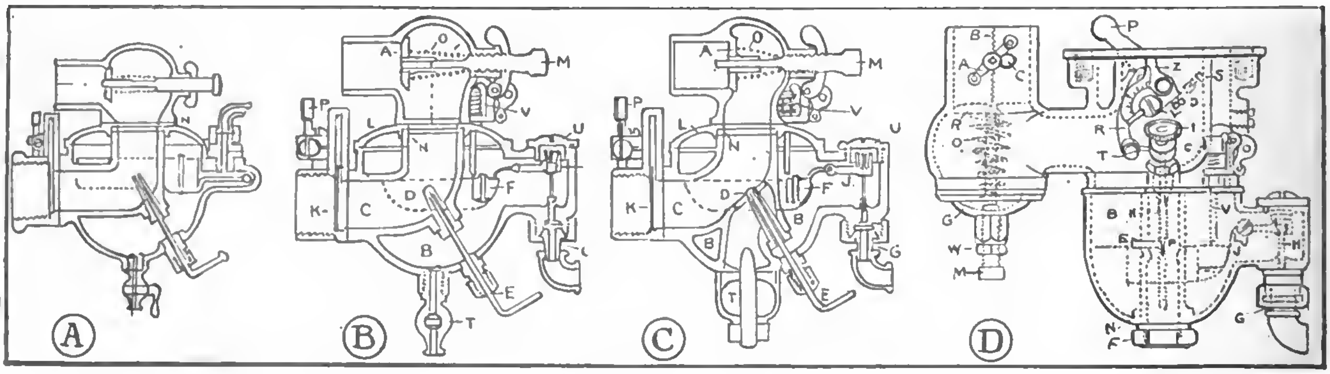


Fig. 2—Schebler carbureters A, B, C, and D, in section

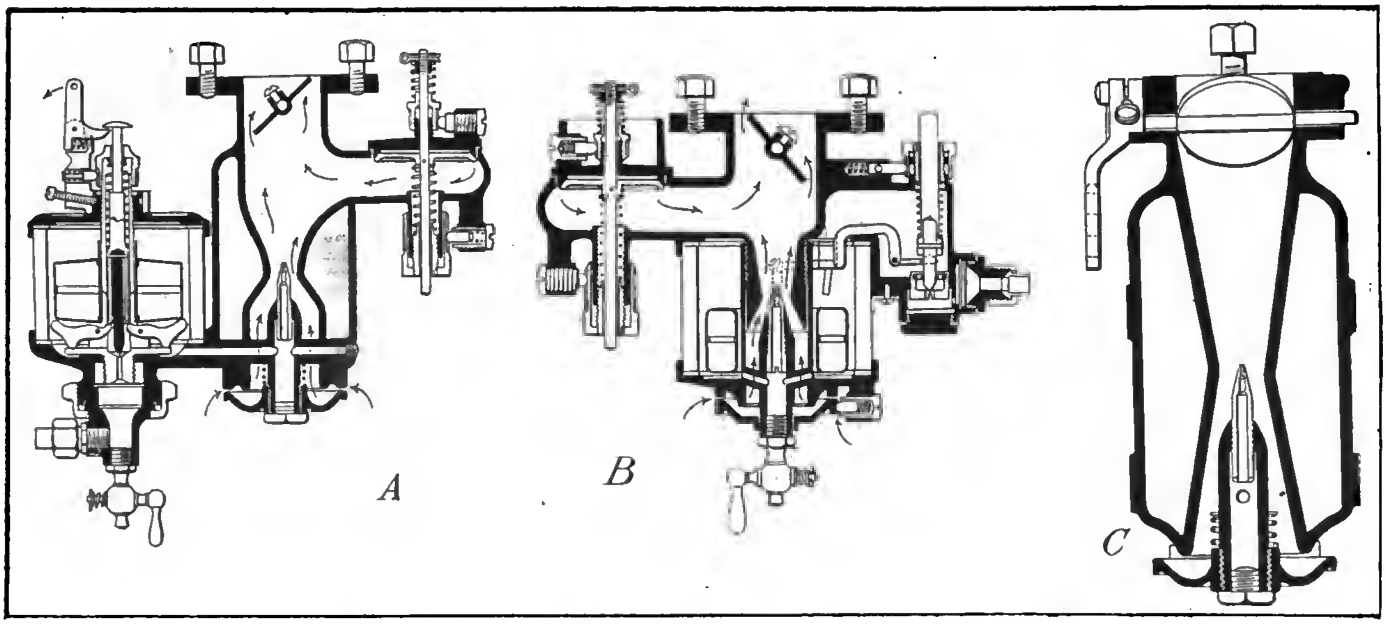


Fig. 3—Sections through Stromberg carbureters A and B. C is a venturi tube of different section

sponds to a wide-open throttle. Other positions on each side of this give partially open throttle, according to the position.

To limit the movement, the slide carries at one end a headless set screw, which at the extreme of the movement in that direction hits against the body of the carbureter base, thus limiting the movement that way. By screwing this set screw in or out, the movement is either increased or decreased. At the other end, a screw with a wide flat head which the slide hits against, limits the movement. This, too, is movable, to change the adjustment. The float is concentric with the vaporizing chamber, but the entrance of the fuel is decidedly out of the ordinary.

Instead of entering directly, the gasoline flows into a small vertical standpipe, from which it overflows at the top, as the needle, entering there at an angle, allows. The vaporizing chamber is a straight tube, the air entering at the bottom, passing straight through to the inlet pipe, picking up the gasoline spray in its passage.

Siro Carbureter Company—In external appearance the Siro carbureter, made by the company of the same name, located at Springfield, Mass., looks like the letter U with a circular attachment at the bottom of the letter. The two uprights of the letter are formed by the air inlet and the pipe to the engine, while the circular base attachment is the float chamber. The engine outlet may, however, be made horizontal instead of vertical, in which case the shape becomes more that of a letter L. The float is of spun copper, made in two pieces, carefully soldered, and thoroughly tested to find leaks. The arrangement of the throttle and the mechanically operated air inlet is such that they operate together, that is, when the throttle valve is being opened, the auxiliary air valve is also opening and in the same proportion. The needle is also connected to the throttle and air proportioner, so that any movement of the others will result in a corresponding opening or closing of the gasoline inflow. Despite the interconnection of these three parts, each one may be adjusted separately from the others, so as to obtain the correct air and fuel proportions.

Watres Manufacturing Company—The Duryea carbureter, made and shown by this company, is somewhat on the U shape also, being of what is known as the "puddle" type. The air enters at one end of a curved tube, forming a very flat U, into the center and bottom of which the gasoline enters, and normally lies in a puddle. The air, with the entrained gasoline in finely divided form, flows out at the other end, through the butterfly throttle to the engine inlet pipe. The float is concentric with the central portion of the carbureter body. That is, it is as near concentric as its H shape would allow.

The needle valve is interconnected with the throttle, allowing gasoline to enter according to the opening of the throttle, which in turn varies with the demands of the engine. The needle has a rather unusual spring controlling device, this consisting of a

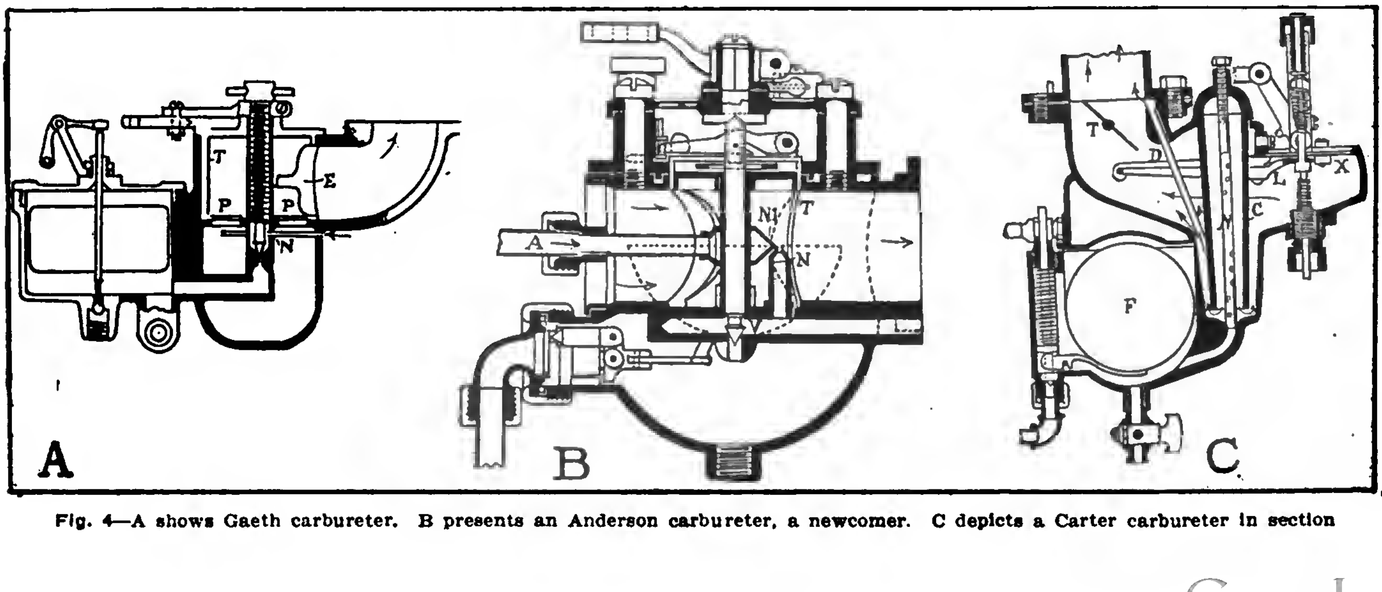


Fig. 4—A shows Gaeth carbureter. B presents an Anderson carbureter, a newcomer. C depicts a Carter carbureter in section

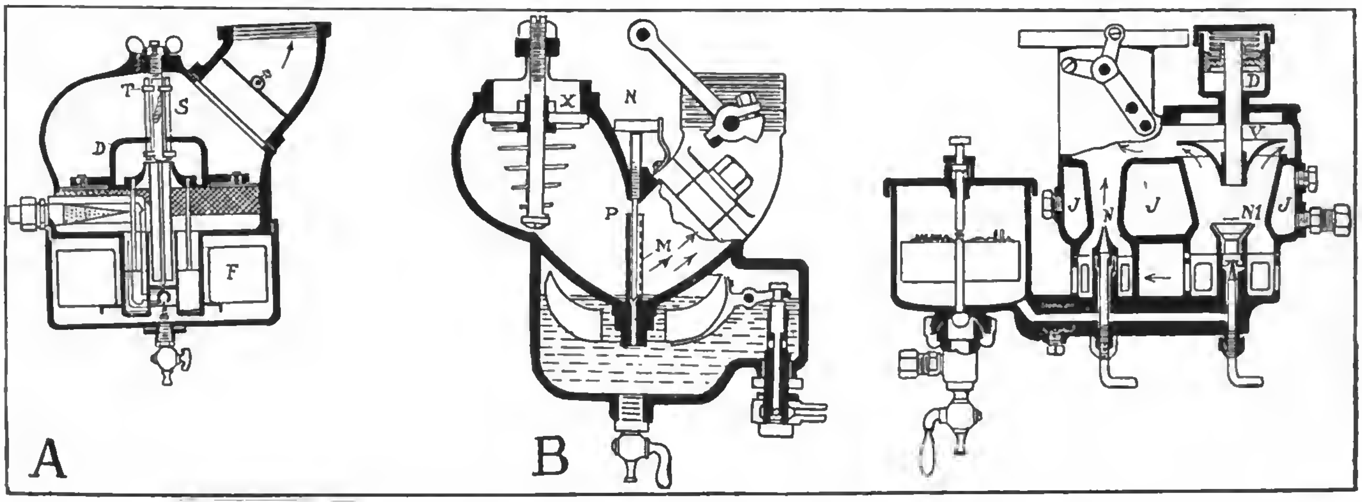


Fig. 5—A is a Duryea vaporizer. B presents the Bennett carbureter. C depicts a Willet carbureter in section

twisted shaft, which is embraced, so to speak, by a pair of parallel arms set so closely together as to move with the turning of the shaft. These arms are pivoted at the top to the end of the spring, so that the motion of the former is opposed by the latter.

Wilcox-Bennett Company—As Fig. 5 shows, the Bennett carbureter, made by this Minneapolis firm, is of the puddle type, the fuel entering at the bottom of a figure U formed by the air inlet and outlet. The nozzle presents some unusual ideas, being not only different, but the point upon which the action is based.

It is a rather high standpipe, with a two-diameter central hole, bored with a series of smaller holes of equal size, one above the other, reaching from the base, close to the bottom of the U, up to the top of the standpipe. Within this the needle valve stem occupies the larger hole, terminating in the needle point and seat at the bottom, where the smaller diameter commences.

Now, as the motor demand is small, the gasoline flows up to say the first hole only. But, with increased demand from the cylinders, more fuel is sucked up, and passes out through several holes, this action continuing until at the full limit of the motor's suction, all of the holes are spouting gasoline out into the vaporizing chamber. A butterfly throttle is used, a semi-concentric float, and a flat-seated air valve, there being no auxiliary air.

Willet Engine & Carbureter Company—Although developed primarily for the two-cycle engine manufactured by this Buffalo firm, this carbureter is placed on the market, and in four-cycle service has been fully as successful as in the two-cycle work, if not more so. This, as shown in Fig. 5, is really two carbureters in one. There is a float chamber which supplies both through a horizontal passage, while each vaporizing chamber has its own air inlet, these being fixed in area by the makers. For ordinary work, at low and medium speeds, the single jet of the first carbureter is the only one to work, the air entering around the base and passing straight upward to the engine.

As the suction increases, however, the piston or cover for the second carbureter is drawn upward by it, thus allowing the second carbureter to get into action. In this there are four nozzles, radiating from the center supply pipe, and all four supply fuel once the vaporizing chamber is put into action. In this, also, the air enters around the base, passes straight upward, then makes one turn into a horizontal passage, connecting it to the main inlet opening, at which latter point the gases from the second vaporizer makes a second turn and join the gases from the first.

Otto Sales Company—This firm imports the Economy carbureter, which is produced in Switzerland by the makers of the Saurer truck, also imported by this firm. The unusual success of the commercial cars fitted with this vaporizing device, winning as they have every contest in which they were entered, has called particular attention to this make and its salient points. It might be described broadly as a multiple jet, clack throttle, non-concentric float type. There are two jets, alike in all respects, set side by side, and fed with fuel through a common horizontal pipe from the float chamber. The clack or flap throttle is pivoted in the center of the vaporizing chamber just above the nozzles. This construction and location allow of the throttle lying over to either side, in which case only the nozzle left uncovered is feeding fuel. With a marked increase in the suction, the flap valve will be pulled up into a central position, when both nozzles will supply fuel. Lest the throttle move quickly back and forth, with consequent uneven action of the engine, a dampening dash pot is provided on the exterior projection of the throttle lever.

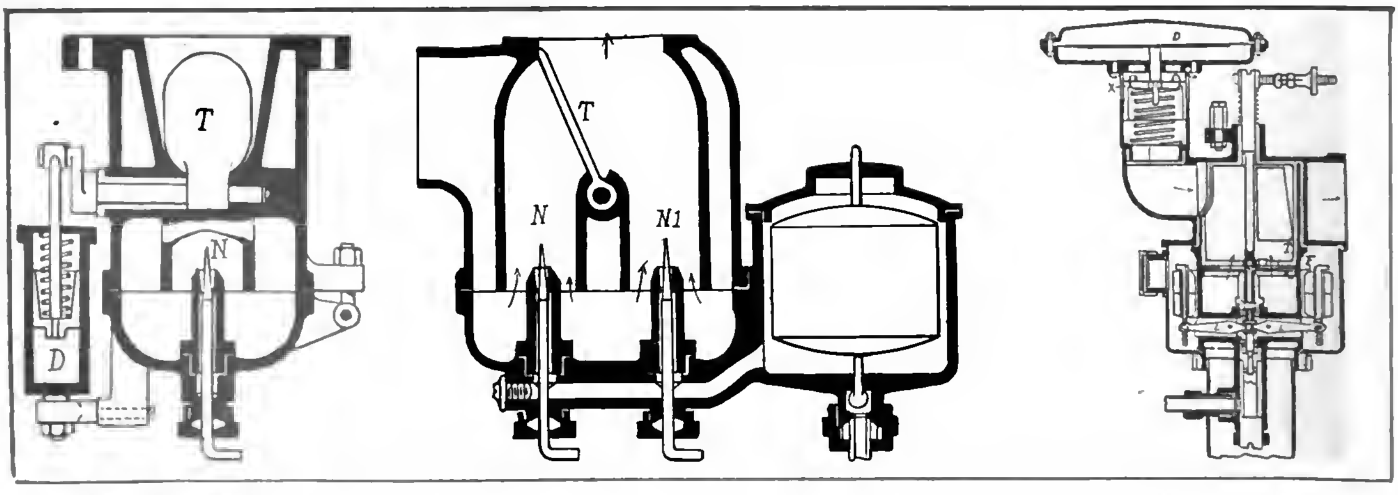


Fig. 6—A and B are sections in two planes of the Economy, a European carbureter. C presents a section through the Chadwick

IN THE FIELD OF ACETYLENE GAS LIGHTING

FAMILIARIZED by many years of service, the acetylene headlight holds its own in the affections of the veteran automobilist, in spite of the wonderful increase in popularity of the various electric forms. Therefore, although the lamp makers almost unanimously show electric lamps, either for combination with the older form or for the exclusive use of the magic current, they do not abate the prominence of the acetylene types. The 1910 lamps show many improvements over the earlier forms. Most of these, it is true, are in external appearance, for the time-tried principles have not been touched. Yet in these days when satisfactory performance is taken almost for granted, appearance is often the only guide.

The most remarkable single feature is the universal adoption of means for reducing the glare of the lamp for city driving. This has been made imperative in many places by traffic ordinances, and many automobilists have been driven to the makeshifts of whitewashing the inside of the door, or pasting brown paper over the glass. Although they secure the results, these are clumsy methods, and the new anti-glare devices, in their many forms, will meet with a hearty reception.

Atwood-Castle Company—Three styles of headlights and a searchlight summarize the acetylene-using product of this company for 1910. In their exterior appearance the feature which immediately attracts the eye is the use of diamond-shaped holes in the upper ventilating hood. These holes, emphasized by moldings stamped in the metal, give the lamps a distinctive touch by which they may easily be recognized on the road.

The first of the styles of headlights may, for purposes of comparison with the others, be designated as the standard. It is of pleasing proportions and neat in appearance. The second will be found more adapted to particular types of cars, being compact, large in diameter and short in length. The third is a popular-priced model. The searchlight has an adjustable gas tip, by means of which the flame may be concentrated directly in the focus of the mirror, for long-distance work, or diffused to give a maximum illumination at close range. All the lamps are constructed of extra heavy gauge material, with all screws placed on the interior, giving a smooth exterior surface for cleaning. Bausch & Lomb and Atwood-Castle short-focus Mangin mirror lenses are used on all models.

Badger Brass Mfg. Co.—The latest development in acetylene lamps for city driving is the "Solar Raydeflector." This is simply a movable gas jet, by means of which the flame may be brought in or out of focus as desired. Normally, of course, the flame is in focus, but for city driving, or when meeting horses on a country road, the jets can be raised slightly. This causes the rays which ordinarily form the long-distance beam to be projected downward so as to strike the road just in front of the car. The only light which continues to be projected directly forward is the direct light from the jet, which does not dazzle any more than that of an ordinary gas jet.

On another Solar product the same result is accomplished in a different way by the use of the Besnard eclipsing system, which is incorporated in the "Solarclipse" headlights. The eclipsing mechanism consists simply of a round, blackened disc on the end of a pivoted arm. The disc can be swung at will down behind the gas jet, between the jet and the parabolic reflector. The effect of this is to cut off the long-distance beam, for although the disc is comparatively small it is close enough to the flame to intercept all the light rays which otherwise would strike the mirror. On looking into one of these lamps with the disc down, only the acetylene flame can be seen against a black background.

The "torpedo type" is another recent development. Like the style of body from which it takes its name, it is very simple in appearance. The body and flare are of a single piece of extra heavy hrass. The door is set deep in the front end, the glass being recessed in such a manner that the front reflector, which is formed by part of the door frame, is outside.

R. E. Dietz Company—Novelties are few on the Dietz stand. This company made up its mind several years ago as to the line it desired to carry, and has found no occasion to change. The only important development has been the weeding out of useless patterns and the concentration of all energies on a few which were found to best meet the demands and needs of the public. The Dietz "Majestic" style is a flare-front design of the type which experience has shown to be the most popular.

The makers of the Dietz line have always laid stress on the strength and solidity of their product. Dietz lamps are said to be considerably heavier than others of the same size, and the extra weight is due to the use of heavy gauge sheet brass and brass castings throughout. Thus, although hardly adapted to act as buffers in the case of a collision, as lamps are frequently called upon to do, the Dietz lamps still will not be damaged by the minor mishaps which will always occur.

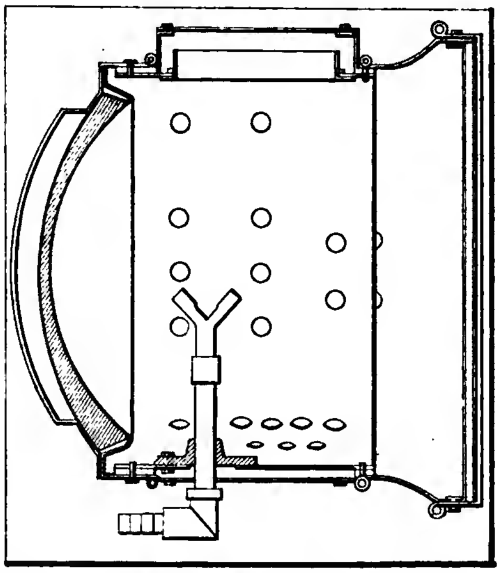


Fig. 1—Section of a Rushmore searchlight type presenting evidences of strength and utility

Edmunds & Jones Mfg. Co.—The E. & J. acetylene headlights are continued in their 1909 forms practically unchanged; they are distinguished by a rather unusual length, which gives them a rakish appearance. The flare fronts are integral with the cylindrical bodies, and the surface as a whole is smooth and easily cleaned. The few parts are strongly riveted together.

Few automobilists have escaped being annoyed by watery gas, even with the best generators. The least excess of water in the generator feed will cause sputtering and uneven action in the lamps, and often will put them out altogether. To overcome this objection to the use of acetylene with generators, the E. & J. Company has brought out a "condensation cup," which is expected to do away with this annoyance. The condensation naturally collects in the lowest part of the tubing connecting the generator with the lamps. The condensation cup is a brass receptacle, to be screwed to the under side of the running-board and provided with a petcock at the bottom. It is connected in the system in such a way that all the gas passes through it. Owing to its position, the cup is much the lowest part of the tubing system, and all the water collects in it.

Gray & Davis—The feature of this exhibit is the new "patent leather" finish, which is the logical outcome of the reaction against excess brass work on other parts of the car. The

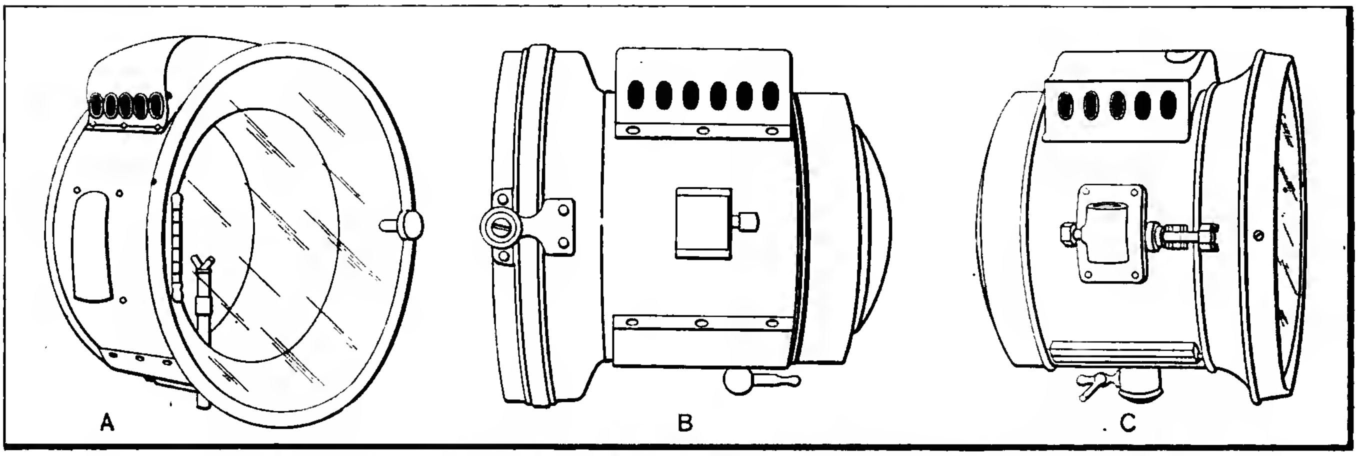


Fig. 2—A presents a Solar lamp; B portrays an E. & J. headlight; C depicts a Dietz type of headlight; all acetylene

"patent leather" gives a metallic lacquer-like lustre, impervious both to heat and moisture. It is made in several combinations with brass and nickel, as well as in the all-black style. The black bodies with the door rims in brass or nickel give an effect that is found especially pleasing, and it is likely that many cars will be seen equipped with these lamps during the coming season. The finish does not need to be polished, and requires no especial care.

The "close coupled" is the latest style in gas headlights, and is particularly adapted to harmonize with the type of body to which it owes its name. The body of the lamp is drawn from sheet brass, and is all one piece up to the door. The brass is carefully selected and annealed. The hood is also in one piece. The mirror and glass front are secured by concealed screws, allowing easy replacing if necessary. The lens mirrors are made of the best imported white glass, carefully annealed, ground and silvered to give the best results. In shape the "close coupled" is unusually short, and the hood runs into the front flare in a distinctive fashion.

Apart from its looks, this type is said to have distinct structural and optical advantages over the longer forms. There is less space horizontally, and therefore no useless currents of air to make the flame flicker. On the other hand, there is more air vertically, where it is needed to carry off the heat, and there is always a sufficient volume of air inside the lamp to give a healthy white flame.

C. M. Hall Company—The headlights of this company are another example of one-piece construction. The bodies are 20-gauge sheet brass, to secure the maximum strength and solidity. The feature of the exhibit is the lamp called the "New Yorker," because it is especially adapted to comply with the traffic regulations of that city. It has a combination gas and electric burner, the gas jet and the electric bulb being arranged on the ends of a Y-shaped brass casting. The "Y" is pivoted at the bottom of the lamp, so that by means of its exterior projection it can be swung to bring either the jet or the bulb into the focus of the mirror.

Rushmore Dynamo Works—The most important development in the 1910 line of this company is the adoption as standard of the "multiplex" door. This door consists of a number of vertical lens strips, the front sides of which are ground to a convex curvature. The effect of these lenses is to spread the light out in a horizontal plane. When the beam from the lamp is cast on a wall the illuminated area takes the form of an ellipse with the longer axis horizontal. All the light is thus thrown on the ground, without wasting any on the sky or the front axle of the car. It has a further tendency to project in the right direction, the light coming directly from the front of the jet.

These lamps will greatly increase the security and peace of mind of pedestrians who happen to meet cars to which they are attached, as the light is kept low down and below the level of the eyes of a person standing within dazzling distance of the lamp. Another advantage is that they overcome flickering, even at high speeds. Their popularity is already so great that it has been found necessary at the Rushmore factory to install additional machinery for grinding the multiplex lenses.

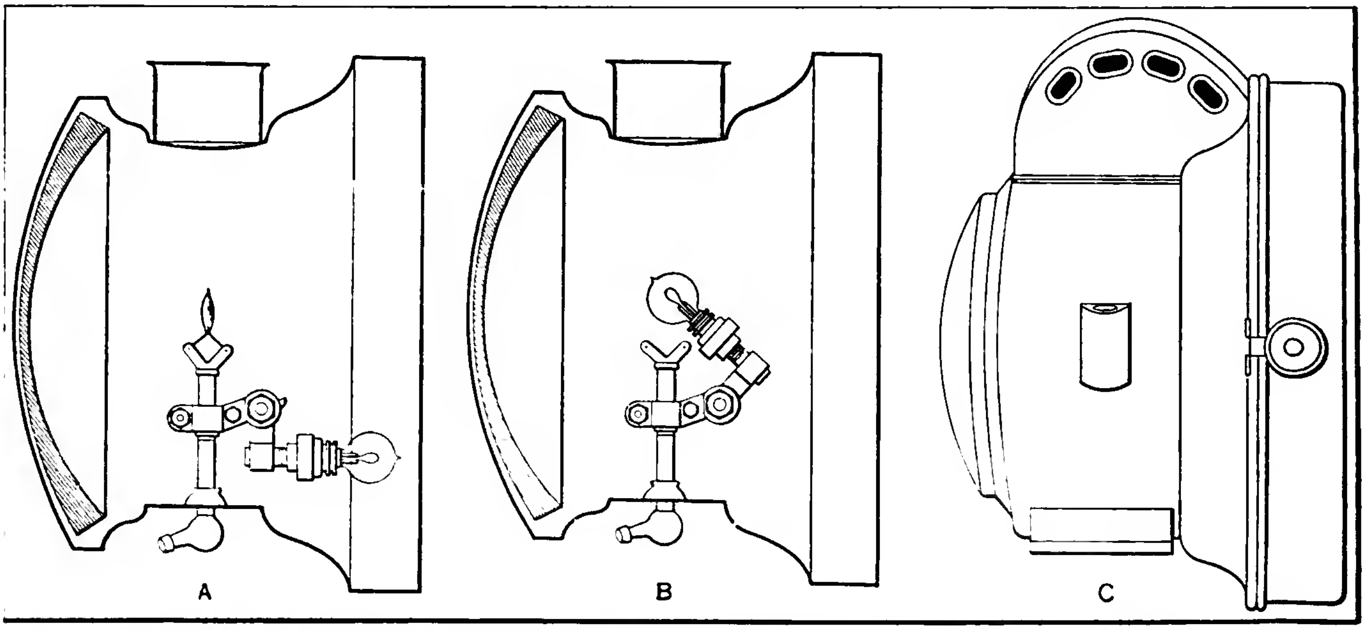
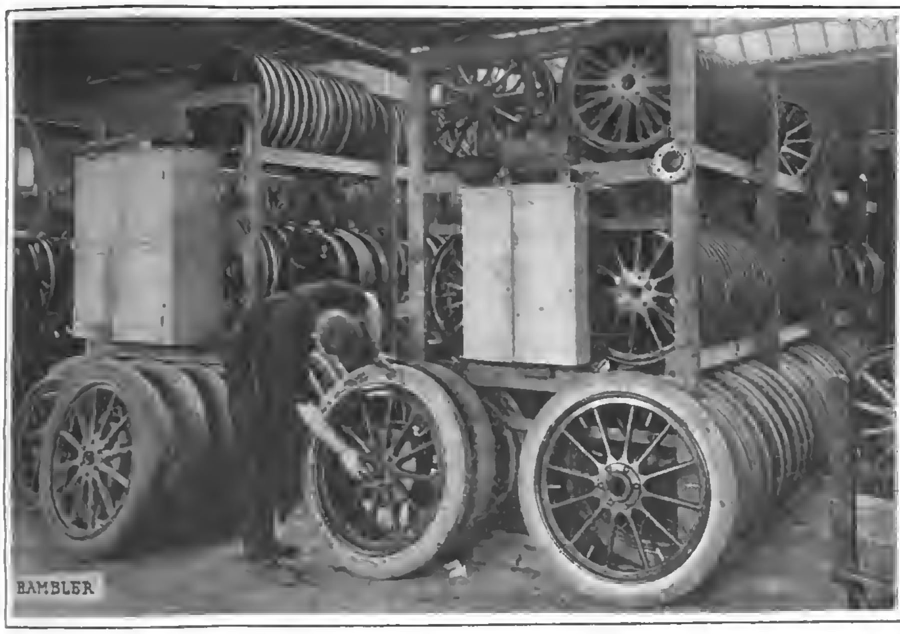


Fig. 3—A depicts a Gray & Davis lamp adjusted for acetylene; B portrays the same lamp ready for electric lighting, and C shows the exterior of the same lamp



WHEELS, RIMS AND TIRES

AUTOING under pleasurable conditions or on a basis of profit depends more upon tires, perhaps, than upon any other division of the units which comprise cars. Pneumatic tires, while they swallow up road inequalities if they are small, have a further use in that they cushion shock when the inequalities surmount to and assume the proportions of obstructions. In addition to the duties as above indicated, pneumatic tires possess traction far in excess of the tractive ability of steel tires.

In recent times, the tendency has been in the direction of increasing diameter and section of tires in relation to the weight put upon them. It has been determined that the tires should be capable of sustaining the whole load when they are normally inflated, under conditions which will show but slight deformation of the tire section at the point of road contact. If, when a tire is inflated, it still shows a considerable deformation, it is then assured that the tire is not large enough for the work it will have to do, and the life of the same will be relatively short. Life in a tire is almost independent of the quality of the same, if the size selected is below the needs of the occasion. In other words, the difference in life between the best tire made and the most inferior product obtainable will be but slight in the presence of excess flexure.

There is one other lesson to be learned from this: autoists must keep their tires fully inflated; they must pump up to some definite right pressure. This cannot be done haphazard in the absence of a gauge for use in determining the pressure, and be sure that the condition will be right. The ordinary way is to pump (using a flimsy pretext for a pump) until the pumper is tired, give the tire a kick, say it is all right, and let it go. Under these conditions tire life will be short.

WISDOM OF SELECTION ADEQUATELY PORTRAYED

Notwithstanding the considerable cost to makers of automobiles, which is incurred in the adaptation of relatively large tires to their cars, they have elected to suffer a loss of profit in the interest of stability, preferring to deliver satisfaction with automobiles on the ground that satisfied customers expand sales out of all proportion to the cost of selling.

The exhibits this year included a wide variety of anti-skids, non-skids, and other ingenious treads which serve as a protection to the carcass. In the construction of the tires, machine processes are finding a wide use, but the fabric is probably not different from that which has obtained for several years. This fabric comprises from six to ten plies of cotton duck, which is said to be a sea island cotton, and it is "frictioned" before it is laid up. The number of plies vary from six with probably 14-ounce duck, to ten with probably 8-ounce duck. The inner ply is frictioned on one side only in order that the tube will not adhere to the inner surface. The process of frictioning is conducted with a view to coating the duck with a layer of rubber, and this frictioning is done on both sides of the respective plies, excepting the inner ply as before stated. There are a wide variety of details which might be discussed profitably, as they relate to the manufacture of tires, but these are matters which are capably disposed of in the plants of the makers, and there are but two interesting points beyond, i.e., (*a*) the selection of sufficiently large tires for the work to be done, (*b*) the proper inflation of the tires in service.

Hartford Rubber Works—As a non-skid leader, the wire-grip anti-skid tires of this make are attracting a good deal of notice, and the regular line of Dunlop clinchers and quick detachable tires are holding the conspicuous position to which they are entitled in view of the service rendered, autoists having taken kindly to them from the start.

Swinehart Rubber Company—The well-known solid tires of this make, in the regular Swinehart shape, are sustaining the Swinehart reputation, and at the exhibit the clincher truck tires and demountable rims occupied a position of prominence, while the cellular tires for taxicabs, touring cars, and light delivery wagons, represented the Swinehart idea in these fields of commercial activity.

Dayton Rubber Manufacturing Company—The Dayton airless tire is shown this year substantially as before, with the exception that detail structural changes have been made as experience seems to have dictated, particularly in relation to the treads which best serve, considering the respective duties to which these tires are assigned. For 1910 the Dayton line will include a double grip non-skid tire, which shows a flat corrugated tread, with diagonal depressions about one inch apart.

Republic Rubber Company — Referring to Fig. 4 B, the staggard tread is the special feature of Republic tires, and it will be remembered that the Republic company was one of the first to introduce these forms of non-skid treads. It is claimed for this particular shape of the non-skid portions that they are efficient in resisting

Fig. 1—Depicts Firestone tire for non-skid work

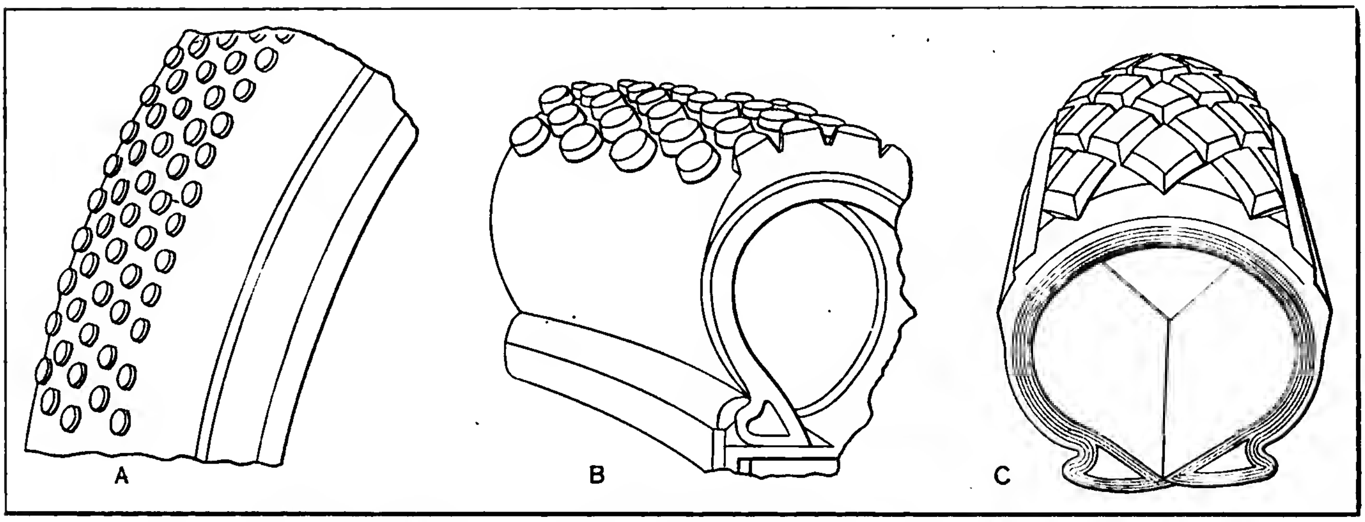


Fig. 2—(A) Shows the Calman non-skid, (B) Presents the Diamond non-skid, (C) Depicts the Ajax non-skid

skidding, but that they do not consume power to anything like the extent which obtains under certain conditions. The elongated oval stud offers a wide surface in the lateral plane, and at the same time permits the tire to swallow road inequalities without introducing a considerable amount of fabric resistance.

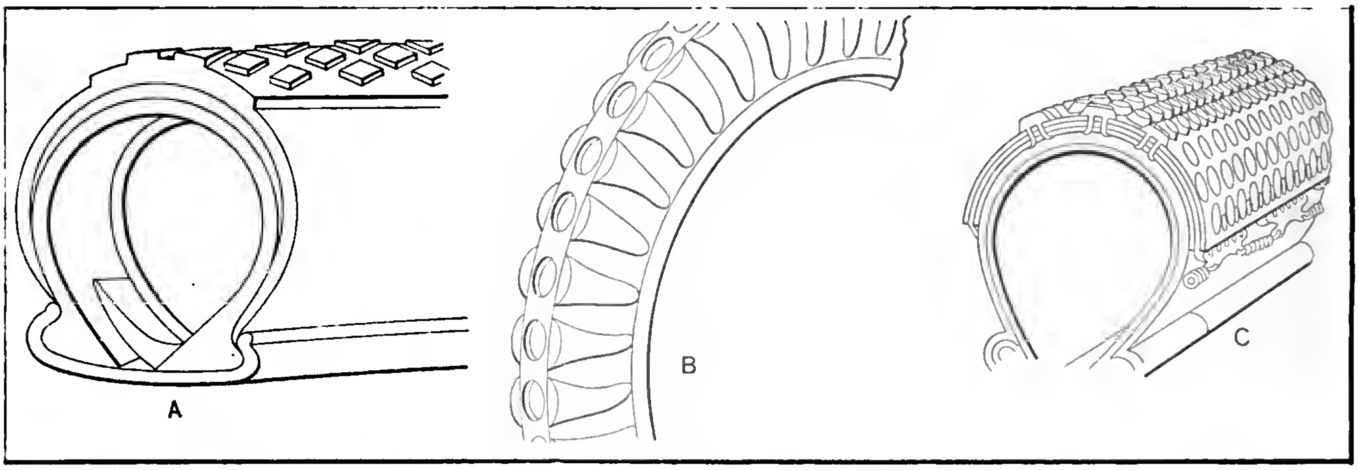


Fig. 3—(A) Indicates the Empire non-skid, (B) Shows the Kempshall non-skid, (C) Presents the Woodworth adjustable tread

Rutherford Rubber Company—This is the concern which makes Sterling tires and tubes. The company claims that it employed a special pre-cure of the rubber adjacent to the bead, and that this process has the virtue of resisting rim cutting to so marked a degree that tire depreciation from this quarter is eliminated. The company also manufactures solid tires for carriages, which are made of a tough interwoven knotty mass of rubber. The Sterling inner tube is distinguished by its blue color.

G & J Tire Company—This line comprises clincher, Dunlop, and quick-detachable casings, and a line of inner tubes which are now so well known among autoists of discrimination as not to demand lauding. Both the round and Bailey treads are used on the three types which are made by this company, and it will

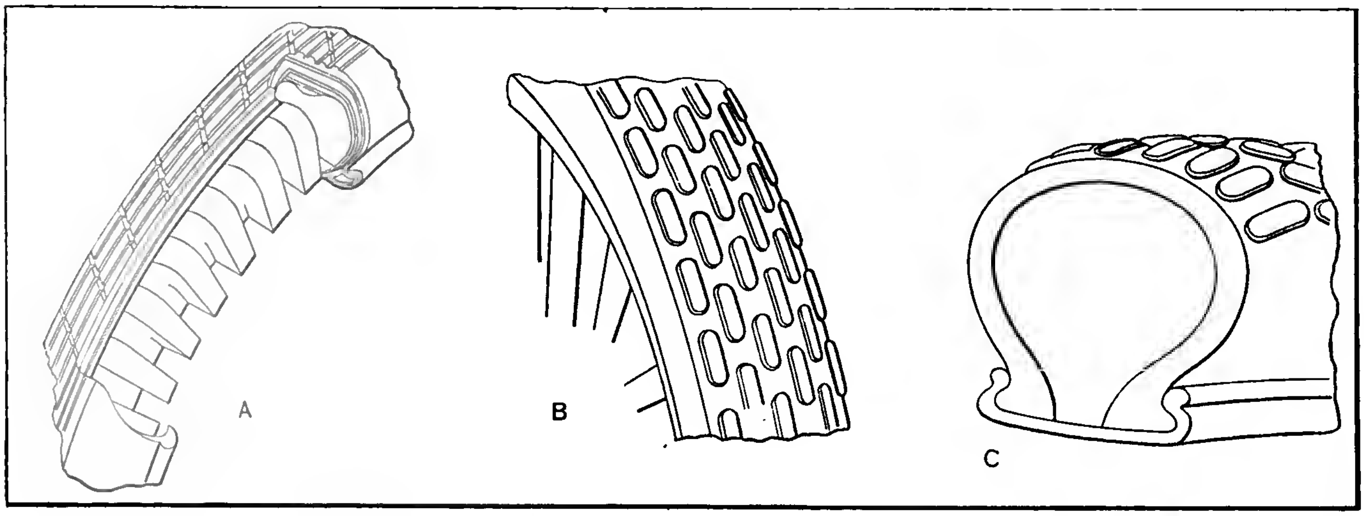


Fig. 4—(A) Depicts the Dayton airless tire, (B) Presents the Republic staggard tread, (C) Shows the Morgan & Wright non-skid

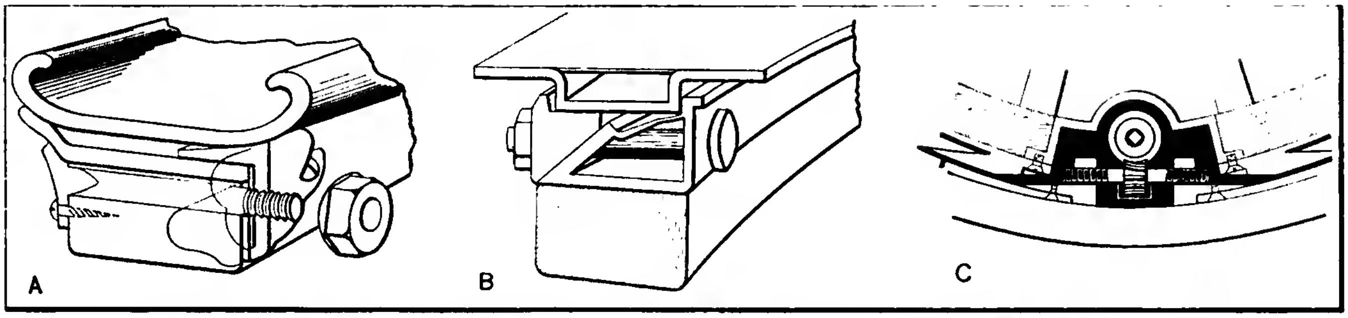


Fig. 5—(A) Is a section of a Diamond demountable rim, (B) Represents a section of a Fisk demountable rim, (C) Depicts the mechanism placed to lock Howard demountable rims

be remembered also that the industry includes a line of motor sundries consisting of tire sleeves, rubber axle bumpers, etc.

Michelin Tire Company—As per the custom of this well-known concern, its exhibit took on the atmosphere of a university, the idea being educational to a marked degree. The Michelin anti-skid tires occupied a prominent place, and they were admired, partly because the anti-skid feature is an integral part of the tire rather than an attachment, the tread proper being made of leather. In the leather tread, three to five rows of steel rivets are incorporated, the steel being mild in its characteristic,

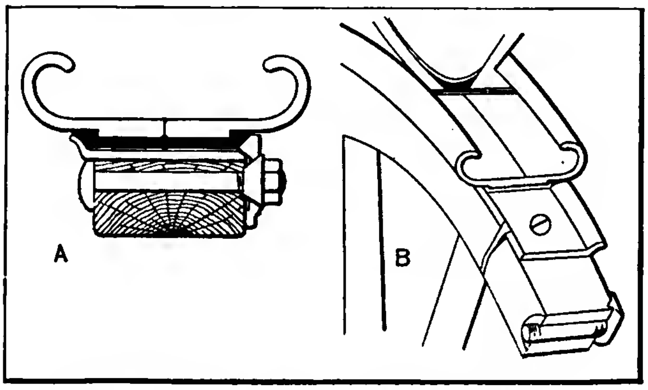


Fig. 6—Nadall combination demountable and detachable rim

hence soft, whereas the novice would expect to find the hardest grade of tool steel, hoping perchance that its hardness would accentuate its wearing qualities. A new idea is the Michelin valve spreader which holds the bead of the envelope firmly.

Pennsylvania Rubber Company—The rubber-wrapped tread and flat tread clincher tires of the Pennsylvania make, showed improvement by way of a tufted wire tread, securely held to the body of the tire by a specially woven fabric impregnated with a compound which the company claims has more than the usual merit, the composition of which is not stated. It is in winter service that these tires show up best, and autosists who ride Pennsylvanias are wont to put forward the pleasing contention that inclemency of weather is no longer a factor in view of the non-skid qualities of these tires.

Empire Tire Company—It is known by the checker tread as shown in Fig. 3 A in which it will be observed that a tread stripped with diamond-like embossed figures holds the position of road contact responsibility, and from indications to be seen it is not an excess when it is said that the result obtained was in keeping with the best requirement.

Goodyear Tire & Rubber Company—In addition to the Bailey non-skid tire, a diamond shape heavy tourist type of tire is also in the Goodrich line, and is made in all the usual sizes. This tire is recommended by its maker for use under the most severe conditions, as in taxicab work, and for big limousines. The Goodrich Universal Q.D. rim is as popular as ever, and was one of the particular attractions at the Goodrich stand.

Diamond Rubber Company—Referring to Fig. 2 B, which shows the Diamond anti-skid, which is a tread of special rubber composition, out of which the anti-skid rivets appear, they being integraled with tread proper. This type of anti-skid tire has made a sufficient name for itself to warrant autoists to depend upon it under the most exacting conditions of service. The Diamond exhibit included its customary wide line of casings and tubes, and it is very likely that the rubber steering wheel exhibited attracted the greatest amount of notice. Besides this steering wheel, the Diamond Rubber Company puts out a line of battery boxes and rubber goods in general.

Ajax-Grieb Rubber Company—The line for this year includes a new Diamond tread tire, as illustrated in Fig. 2 C. It is an all rubber non-skid and guaranteed for 5,000 miles, and attention is particularly called to the design which is shaped to prevent flattening and squeezing into a smooth surface under severe conditions of load. This company offers in addition to this leader, its customary line of smooth and other designs of treads in casings, together with an accompaniment of inner tubes, and it is claimed for Ajax tires that the fabric is selected with particular reference to its mileage guaranteed, and that there are other structural details which will repay investigation.

B. F. Goodrich Company—This company offers this year a variety of sizes of its famous Palmer web tire, which has long been used on electrics, particularly in view of the small tire loss involved, it being the desire of electric vehicle owners to conserve the life of the battery, and obtain the greatest radius of travel per charge. The Goodrich wireless solid tire for motor trucks attracted notice. Then, there is the smooth and Bailey tread Goodrich, and beneath the surface will be found some carefully worked out designs with a view to interchangeability of tires, and other points of more than a little moment, which, to

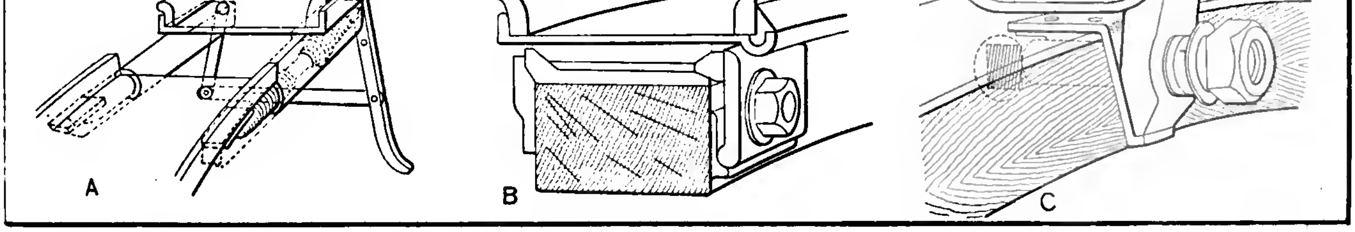


Fig. 7—(A) Shows Goodyear Doolittle demountable rim, (B) Presents the Firestone demountable rim, (C) Offers a section of the Empire demountable rim

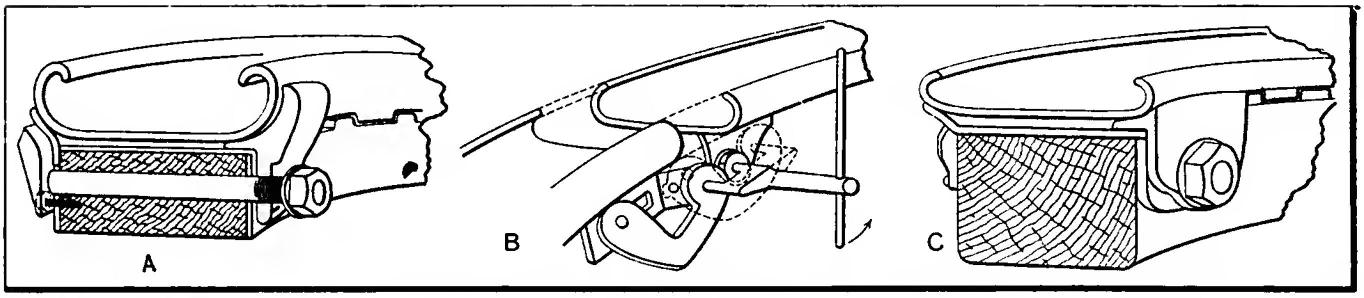


Fig. 8—(A) Is a section of a Michelin demountable rim, (B) Shows method of locking the Universal demountable rim, (C) Offers the Continental demountable rim in section

a considerable extent, are responsible for the Goodrich reputation, which, for uniformity, is well established.

Morgan & Wright—It is called the "Nobby," and looks as shown in C, Fig. 4. It is the new Morgan & Wright non-skid tire. In service this tire has just completed six months, and its trial under the most severe conditions involving what might well be called an abuse test, places it in the front rank of Morgan & Wright achievements. As the illustration clearly sets forth, the rubber projections on the tread are obliquely placed, they being closes the name embossed on the tread diagonally, and the further fact that an efficient non-skid construction resides in the plan. This idea is already well-known to a host of tire users, and the capabilities of Firestone tires are best brought out in severe service. The regular line of Firestones was shown this year, including tubes, regular and odd sizes of casings, and, in fine, everything in tires that prudence dictates. The exhibit held wide interest and the novelty included in having the word "Firestone" on the tread continues to attract.

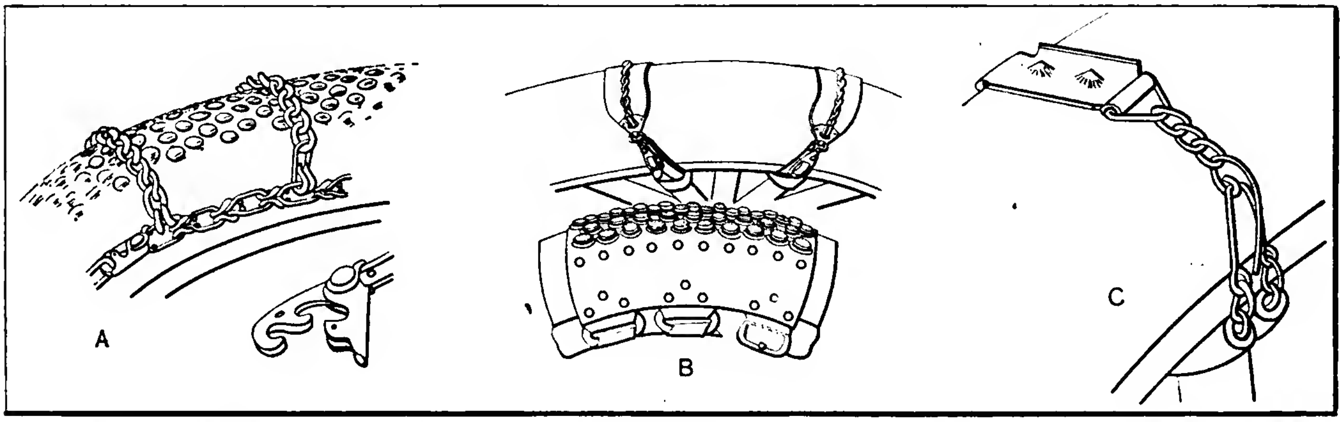


Fig. 9—(A) Portrays a section of the Weed tire chain, (B) Presents the Woodworth boot and chain, (C) Delineates the Travers single chain

of an oval form, and it was one of the main ideas of the company in running its protracted abuse test, to prove that this form and placing of the non-skid projections possesses especial merit. The company's exhibit was complete, including a wide variety of forms of casings, and its well-known line of inner tubes, so aptly displayed as to enable spectators to see at a glance the earmarks of quality.

Firestone Tire & Rubber Company—Referring to Fig. 1, which shows a portion of the tread of the Firestone, and dis-

American Stepney Spare Wheel Company—This line has been expanded to include all regular sizes of wheels as used on automobiles and as a quick-detachable proposition it is looked upon with much favor, especially among users who have tried it out. The Stepney "combination" wheel is the new idea, and by the use of this combination the necessity of carrying more than one wheel is avoided. There are many cars with different diameters of front and rear wheels; the Stepney combination wheel is the answer.

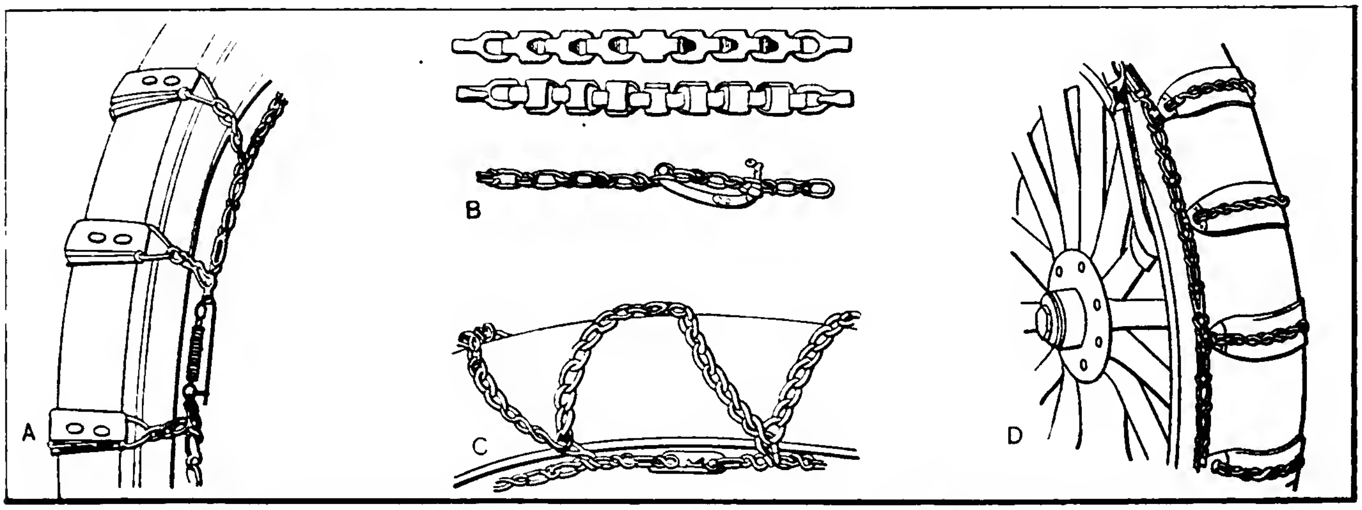


Fig. 10—(A) Depicts the Travers tire chain, (B) Shows Fox anti-skid chain, (C) Presents the Zigzag chain, (D) Pictures the Woodworth tire chain

INSTRUMENTS FOR INDICATING DISTANCE

DISTANCES which can be covered and the speeds that are possible of attainment are naturally the strong points of the automobile, and so it happens that the devices which record speed and distance have the first hold on the affections of the automobilist. Apart from the natural pride which the owner and driver take in their machines, the odometer and speedometer are of the utmost usefulness. In many cities magistrates will now take the word of the automobilist as to the reading of a $50 speedometer in preference to the word of a policeman as to the reading of his 50-cent stop watch. Further than this, instruments are now being made which supply automatically an indisputable written record covering every movement of the machine.

For those who adopt the automobile from motives of business economy the odometer is indispensable. All commercial vehicles must be compared on a basis of mileage. The figures, too, give an invaluable check on the outlay for gasoline, lubricating oil and tires. No concern with any pretensions to a decent business organization would attempt to maintain an automobile service, or even a horse service, without keeping an account of the expense per mile. Private owners with a head for figures and statistics are often no less exact.

Auto Improvement Company—No less than fourteen styles and combinations of odometers, speedometers and clocks form the "Ever-Ready" line of this company—not to mention clocks separately and tachometers, equally adapted for use on motor boats and airships. "Ever-Ready" speedometers are operated on the centrifugal principle. They are not affected by climatic conditions, nor are they oversensitive. The hand is claimed to be absolutely steady at any speed from one mile an hour up. In combination with the indicating instrument is used a monocoil steel driving shaft, protected by a brass, steel-lined casing. Each speedometer is given a test of 2,000 miles actual running before it leaves the factory. The speedometers are made with 2 5-8, 3 and 4-inch dials, registering to 50, 60, 70 or 80 miles. They are offered separately, istering to 50, 60, 70 or 80 miles.

Cleveland Speed Indicator Company—This instrument embodies a radical departure from the usual practice in speedometer design. This can perhaps be best explained by saying that it does not indicate the actual speed of the car at any moment, but only the average speed for each one-thirtieth part of a mile. A moment's figuring will reveal, however, that when the car is running 30 miles an hour the averages will be taken over periods of but four seconds each.

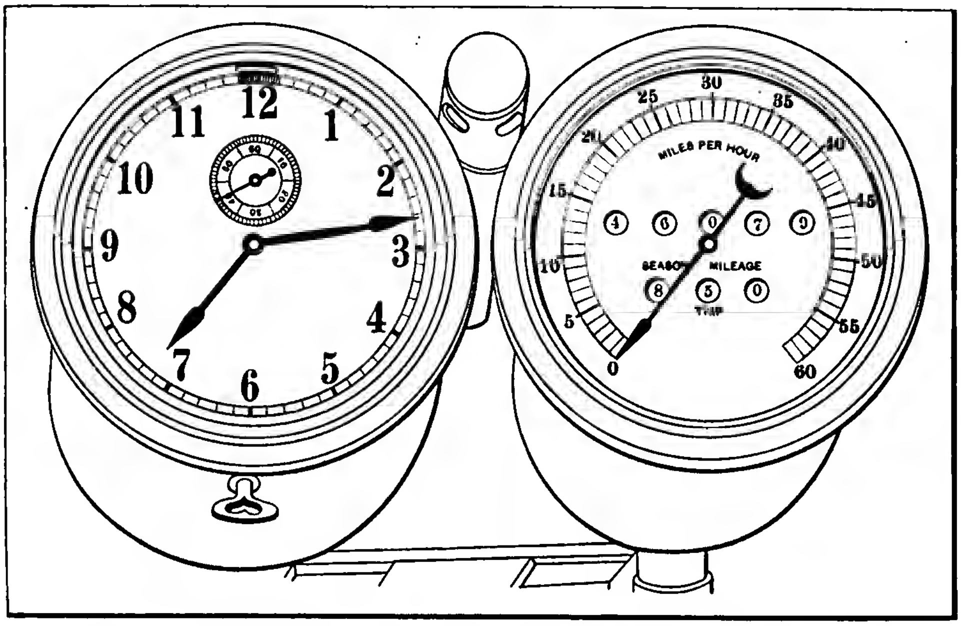


Fig. 1—Stewart multi-polar speedometer with clock giving distance, revolutions and time

Couch & Seely Company—The "Casgrain" speedometer manufactured by this company operates on the principle of liquid friction, and is claimed to have the longest scale of any device on the market. The horizontal cylindrical case of the speedometer contains a concentric cylinder bearing on its circumference the scale figures, and held against rotation by a coil spring. Within this cylinder is a shaft with paddles actuated from the front wheels. The case is filled with a liquid, which

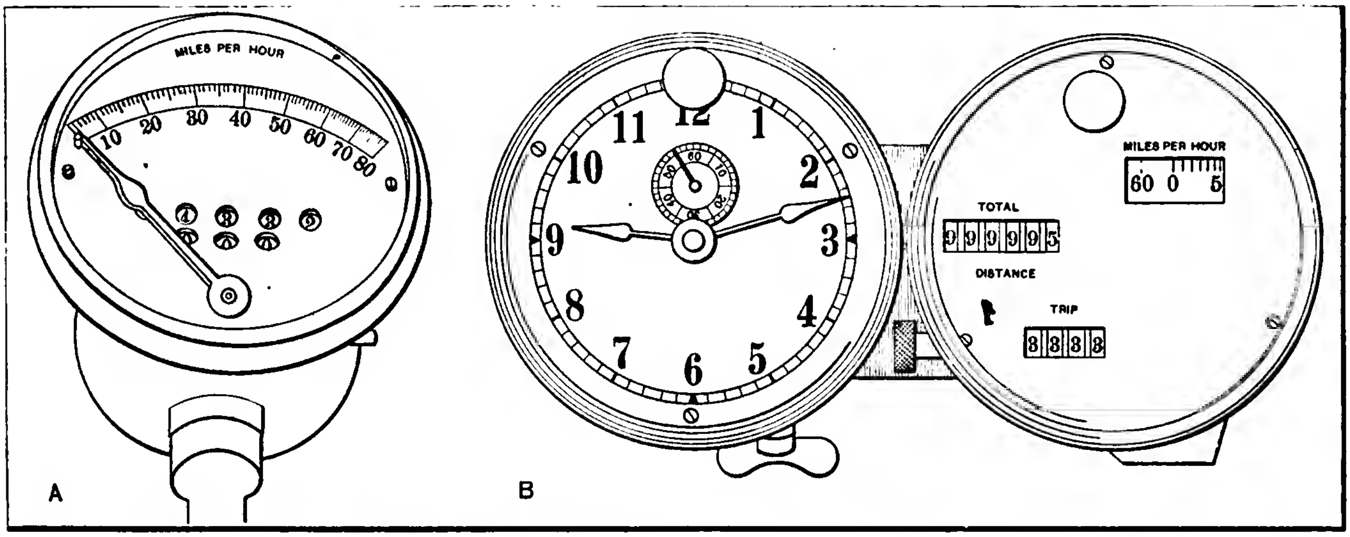


Fig. 2—(A) Presents new Jones speedometer, (B) Shows Warner's magnetic speedometer with clock

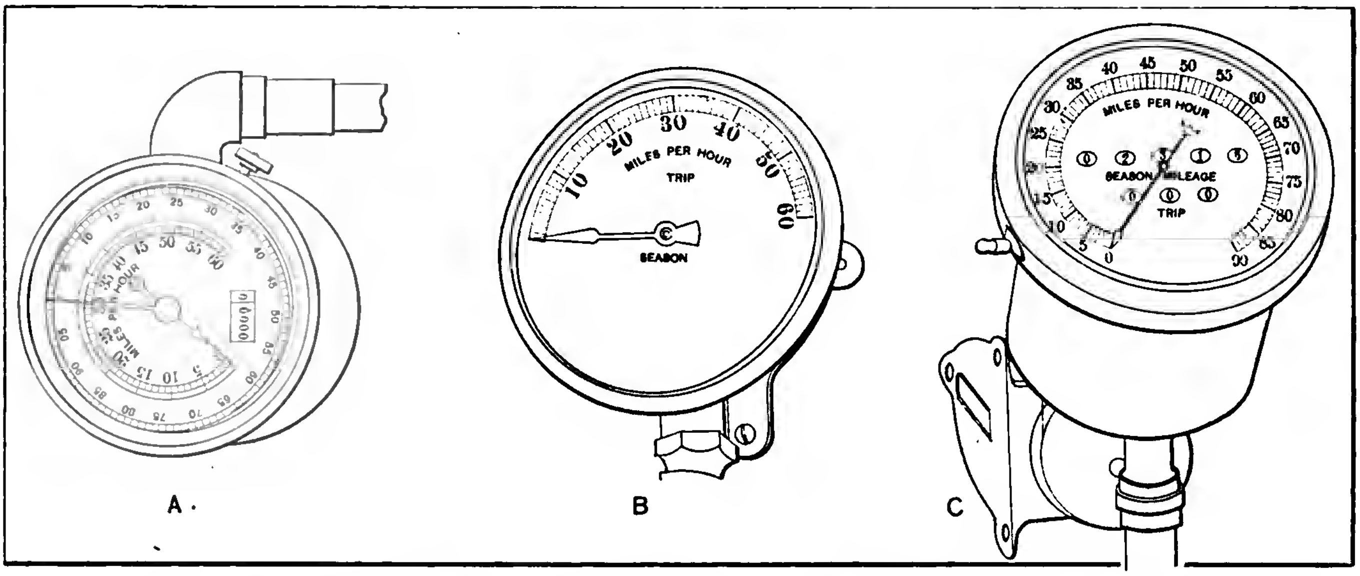


Fig. 3—(A) Offers Hoffecker centrifugal speedometer, (B) Depicts the Autocar speedometer, (C) Presents Stewart Model 19 speedometer

when set in motion by the revolving paddles has a tendency to drag the cylinder carrying the scale around with it. The strength of the drag is naturally in proportion to the speed of the paddle shaft, and the resulting movement of the cylinder causes the scale figures to appear in succession.

Great care has been taken in working out the design. The liquid of course is a non-freezing solution, presumably glycerine, and elaborate productions prevent the possibility of the escape of a single drop of it. The horizontal paddle-shaft is driven by bevel gears, but the drive shaft is made to enter the case considerably above the level of the liquid. Further, the drive shaft is cut with an exterior worm which forces back any liquid which tries to escape up the shaft. The scale is 28 inches long, giving a separate figure for each mile between 1 and 65.

Hoffecker Company—"The steady hand," as featured by this company, is demonstrated in a way which never fails to draw a crowd. One of the speedometers, running at a fairly constant speed, is mounted on a frame moved by a cam action which from time to time gives it a violent jolt. The indicating hand, nevertheless, remains as steady as if only painted on the scale, though moving freely when the speed is varied.

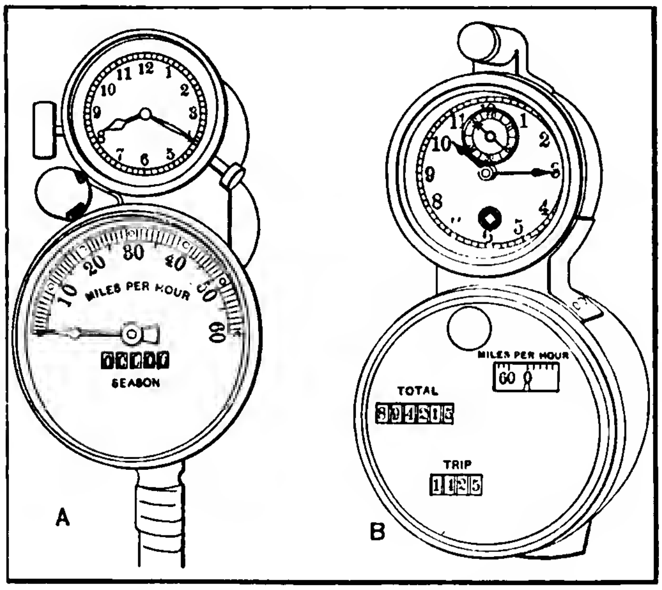


Fig. 5—(A) Illustrates the Ever-Ready reliable Speedometer, (B) Depicts the Warner combination speedometer

As to principle, the Hoffecker is another exponent of the centrifugal type, but incorporates with the usual mechanism a special damping device to check the small variations which arise from jolting of the instrument.

The Hoffecker is made in three sizes, with 3, 3 1-2 and 4-inch dials, scaled to 50, 60 and 90 miles. With the smallest size a separate season and trip odometer of the well-known type is used, but in the larger forms both are incorporated in the body of the instrument, and the trip mileage indicator is of a peculiar form. The mileage is indicated by a hand moving on a scale concentric with that of the speed indicator, either inside or outside of it. The season odometer is of the usual type, with figures showing through a window.

Jones Speedometer Company—The feature of the Jones exhibit which attracts the most attention is the new "Live Map," a sort of animated Blue Book. It consists of a cardboard disc perhaps ten inches in diameter, the rim of which is marked off into sections corresponding to miles on the route which it is desired to follow. Separate discs are used for each route, each disc being for a maximum distance of 100 miles. The route directions are marked off on the rim. The disc is revolved by a connection with the wheels so that points on its circumference pass in turn under a stationary pointer. The pointer always indicates the position of the automobile, and the appropriate directions may be read off the disc.

The device is extremely simple, consisting only of a frame carrying the gearing, with the usual flexible shaft connection, and the removable cardboard disc. The shaft is of sufficient length to permit of the instrument being passed around among the occupants of the car, or it may be hung up on the dash or the seat. About 600 different cards, each representing a maximum of 100 miles, have been prepared by the Touring Club of America, and are listed in the Jones Company's catalog.

Recometre Company—The object of the "Recometre" is to record automatically every movement of the automobile to which it is attached. It contains a tape on which is permanently printed a record of the car, both in motion and at rest, for every minute of the day. If in motion, the distance traveled and the rate of speed are also recorded.

The tape on which the record is made is marked into divisions of about a tenth of an inch, and is unrolled by clock-work at the rate of one division a minute. A line is traced in red ink on the tape by a pen which moves up and down regularly once for every mile the car travels. The result is that a saw-tooth line appears on the tape whenever the car is in motion, and a straight horizontal line as long as the car is at rest. The number of teeth in the saw-tooth lines indicate the number of miles the car has traveled, and the number of minute spaces included in the base of each tooth show the time taken to cover the mile.

The tape, with its record for the past half-hour, is always visible through a glass door in the instrument. It acts as a clock and calendar, for the month, day, hour and minute are pointed out on it by the pen. Each tape lasts one week. The instrument includes a speedometer and a season and trip odometer.

Stewart & Clark Mfg. Co.—The Stewart "Multipolar" speedometer is shown in a number of combinations, both for attachment to the dashboard and for mounting on the special standards introduced by this company. The principle and operation of the instrument differ in no way from the forms already found satisfactory. The principle, of course, is magnetism, the influence of revolving magnets upon a disc held by a spring. The drag upon this disc is in proportion to the speed of the magnets, and the indicating hand is mounted on the upper end of the disc spindle.

The rotor of the instrument driven from the front wheel consists of a ring in which are imbedded four permanent magnets. These are accurately machined from imported tungsten steel, made to special analysis. They are hardened, magnetized, edged and tested before being assembled in the rotor. The central stud on which the rotor revolves is recessed to receive a light spindle on a jewel bearing; the spindle carries a disc of alloy metal having a low resistance, and above this the indicating pointer which appears over the scale. The disc attempts to follow the magnets, but is restrained by a light spring. The indicating elements are extremely light and so have little inertia; the action of the instrument is at once sensitive and steady.

Veeder Mfg. Co.—This company prefers to call its speed indicator a tachometer, although this term is generally accepted as meaning an instrument that reads in revolutions per minute rather than in miles per hour. No matter what name it goes by, the instrument is one of the simplest on the market. The only moving part is a small paddle wheel like that of a centrifugal pump. The casing of the paddle carries a small vertical glass tube, and is filled with a red liquid. When the paddle revolves the liquid is driven more or less completely out of the casing, and is forced to rise in the glass tube. The level to which it rises at once indicates the speed.

Adjustment is possible at any time. As long as the level of the liquid is at zero when the car is at rest, the indications must be correct. If the level should not be at zero, it can be brought to that point by turning a small adjusting nut. Another feature is the use of a double scale, one for high speed and one for low speed. Either of these can be brought into use by means of a valve. One is graduated up to 30 miles an hour, and gives accurate readings at low speed; the other is graduated up to 60 miles an hour for high-speed work. Other combinations can be had as desired.

Warner Instrument Company—Warner "Auto-Meters" are continued in the forms familiar from last season, both in the well-known original shape and in the newer style with a circular face. The mechanism of the two styles are identical. working on the magnetic principle. The indication is by means of a moving cylindrical band, bearing the figures, and a stationary pointer. The band is moved by the magnetic drag from the rotating magnet mounted on the main shaft.

Fig. 6—Jones Live-Map route indicator

The latest development is the new odometer, of which the season and trip faces read to 100,000 and 1,000 miles, respectively, instead of to 10,000 and 100 miles, as is customary. The instrument "de luxe" is a clock and speedometer twin, each with 4 1-2 inch dials, and provided with an electric lighting device by which light is thrown on the interior of the transparent dials. Other forms include the old-style indicator. either separate or with a clock mounted on top, and the new style circular face instrument separate and with superimposed clock. Another feature of the exhibit is the anemometer for aeronautic use, an instrument for measuring the velocity of the wind. When mounted on a aeroplane it is used to indicate the speed at which the machine is passing through the air.

In conclusion, one cannot help remarking on the ingenuity and knowledge of mechanical and physical principles which are displayed, individually and collectively, in the design of the speedometers on exhibition at the various stands. Centrifugal force, magnetism and friction all have their representatives, and in theory all are equally interesting. The working out of the application of the principles, and the arranging of the more or less complicated mechanism within the compass permitted a speedometer, shows mechanical training of a high order. The instruments all appear to be of solid and substantial construction, well balanced and with ample bearing surface.

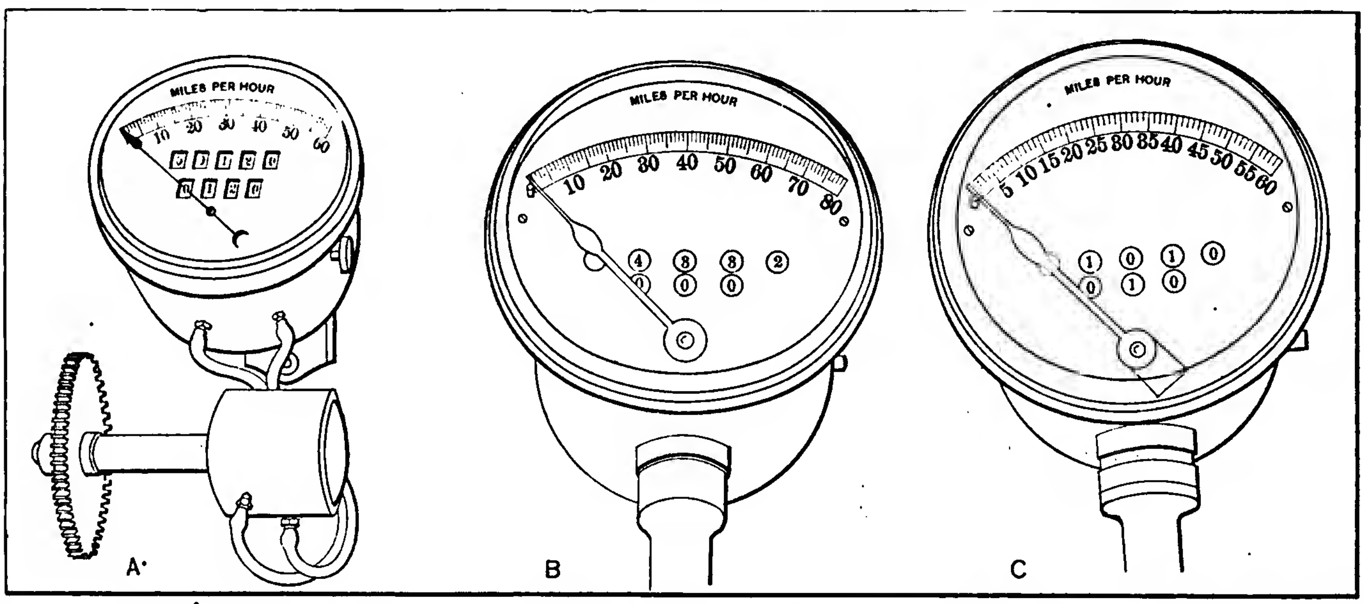
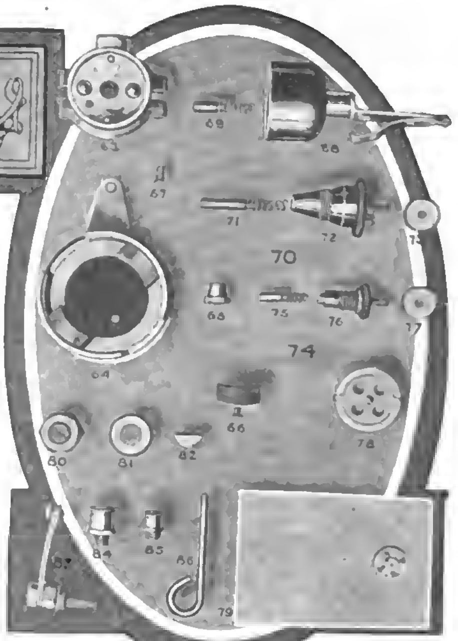


Fig. 4—(A) Offers the new Troy speedometer, (B) Depicts the new Jones speedometer, (C) Presents the Jones Model 19 speedometer

IGNITION METHODS ASSUME DEFINITE FORM



SPARKING equipment as it is to be obtained in the open market may be classified substantially as follows:

(A) High-tension magnetos.
(B) Low-tension magnetos.
(C) Low-tension magnetos with step-up transformers.
(D) High-tension magnetos in dual relation.
(E) Batteries with single coil.
(F) Multi-unit coils.

Battery and coil systems include both storage and dry batteries, and in certain cases (E) a single special coil, in conjunction with a high-tension distributor, is utilized to the exclusion of a multiunit coil. An example of this character of work by Splitdorf will be found in Simplex cars.

Multiunit coils (F) are widely used as supernumerary to magnetos, and these coils are subdivided in turn (a) with master vibrator unit, (b) with a vibrator for each unit; occasional examples of coils without vibrators are to be seen.

Among the ignition systems of competence which are used in automobiles of distinction the following are conspicuous examples:

U & H Master Magneto—Fig. 1 shows the type C B 4 magneto of this make, which is designed for three, four, six and eight-cylinder work, and, according to J. S. Bretz Company, New York, distributor of this magneto, its application is limited to motors with a bore which does not exceed 4 1-2 inches. Other types of U & H magnetos are provided for the several other applications. The illustration is sufficiently comprehensive to limit the need of further discussion, unless to point out that the wire *T*, shown at the interrupter end of the magneto, registers with the timing mechanism, and in the act of timing the whole operation is limited to the simple process of forcing the wire *T* through the registering holes, which may be easily accomplished by rotating the armature until the wire enters.

Pittsfield Spark Coil Company—The magneto as made by this company is depicted in Fig. 2, in which *A* is a section at right angles to the armature shaft and *B* is a section in the plane of the armature shaft cutting its axis. This magneto is of the strictly high-tension type, containing a primary and secondary winding; the windings are stationary.

Witherbee Igniter Company—Referring to Fig. 3 of the Witherbee magneto, *A* is a section at right angles to the armature shaft, and *B* is a section in the plane of the armature shaft cutting its axis. It is claimed for this magneto that it is a generator of current for ignition purposes of such competence that it will work successfully over the wide range represented by merely turning the armature by hand or rotating it at the highest possible speed consistent with motor practice. This product is made at Springfield, Mass.

Remy Electric Company—Referring to *C*, Fig. 3, which is a section of a new Remy magneto (the Remy plant being at Anderson, Ind.), it is shown that the coil is concentric with the armature shaft, flanked by polar extensions, and, taking the section as a whole, it presents an opportunity to study the design and note the character of the work. The Remy company has put out two models for 1910, one of which, type S, is for two, four and six-cylinder cars with high-powered motors.

Splitdorf Laboratory—The 1910 Splitdorf magneto is depicted in section in Fig. 4 A, representing the new low-tension type, with annular type ball bearings at all points, and a very efficient armature winding in a well-designed rotor. The magnetic field comprises six permanent magnets, made of a special grade of magnet steel, properly hardened, and the details throughout are up to the usual Splitdorf standard. The Splitdorf plant is in New York City.

Kokomo Electric Company—The Kingston Magneto as made by this company at Kokomo, Ind., is shown in B. Fig. 4, which is a section through the armature. Annular type ball bearings are used and the mechanical construction throughout is up to a fitting standard. The armature is of the bobbin type, with a high-tension winding, and the condenser is placed concentric with the armature shaft, at the front end.

Apple Electric Company—The Apple, as shown in A Fig. 5; is a direct-current dynamo and differs from a magneto in that the fields are wire-wound rather than with permanent magnets. This type of ignition is used in connection with a battery (storage) and coil. The battery floats on the system, is charged automatically as the demands indicate, and the coil works just in the same way as when a battery, unaided, is employed. This system has done good service for several years, and in many cases electric lights are run off of the dynamo; just now, when electric lighting is on the increase, it should be in brisk demand. A constant speed of the dynamo is brought about through the use of a conical pulley on the dynamo and means (a governor) for sliding the conical faces to regulate speed of the dynamo as the speed of the motor changes.

United Manufacturing Company—With a master vibrator unit, the Connecticut coil, as depicted in Fig. 6 A, represents a system which has taken a high rank among motorists. The box

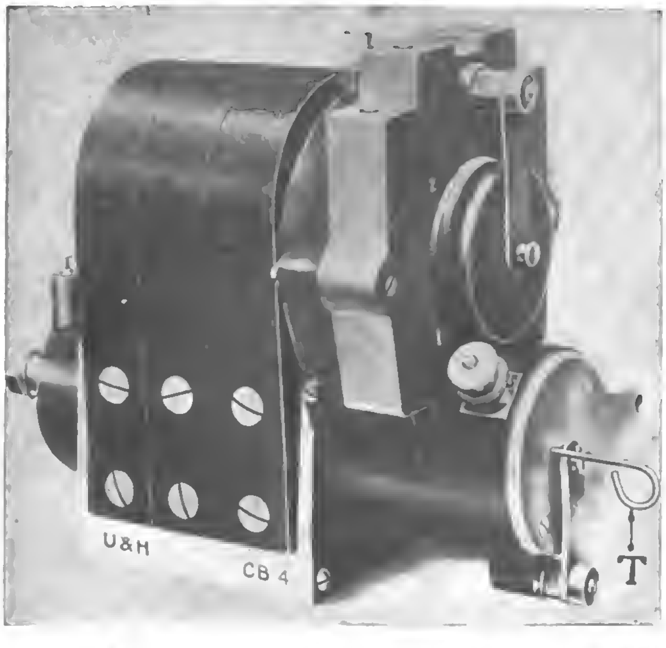


Fig. 1—U & H magneto, showing the timing wire T in the registering holes, this being the only adjustment required

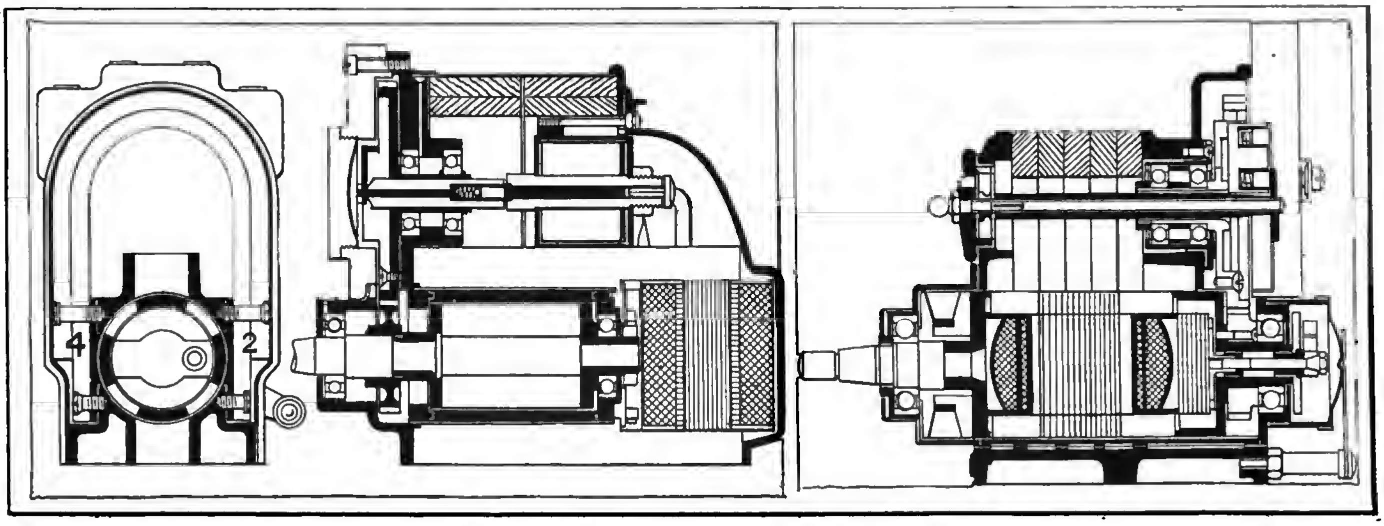


Fig. 2—(A) Section of Pittsfield magneto at right angles to armature shaft. (B) Section of magneto in the plane of the armature shaft. (C) Section of Herz magneto

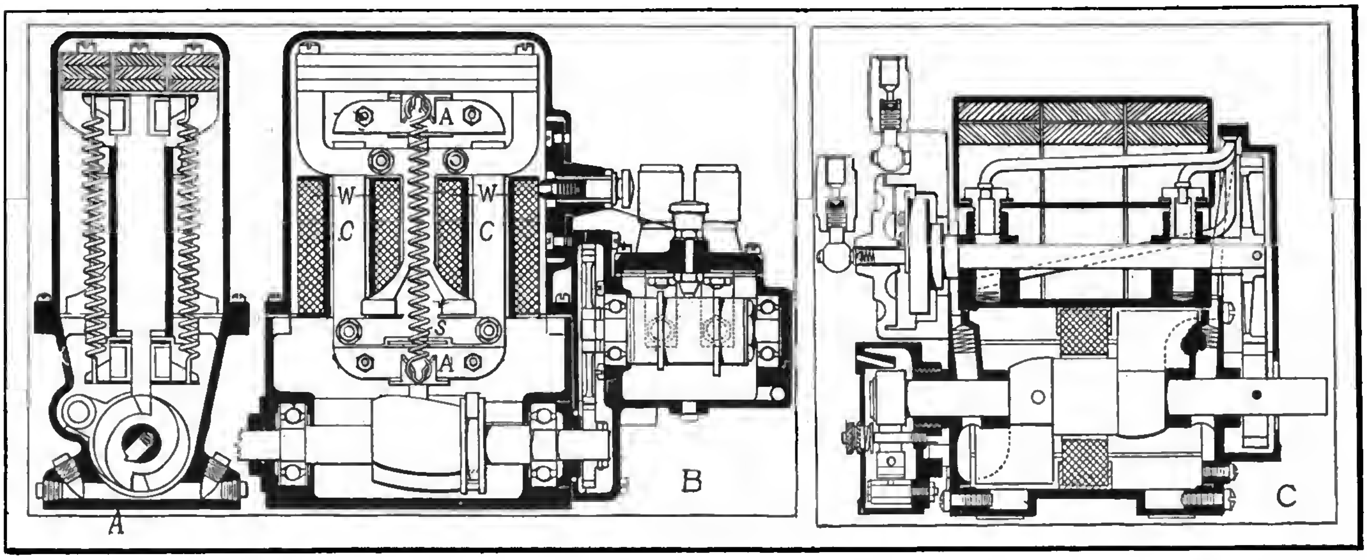


Fig. 3—(A) Section of Witherbee magneto at right angles to armature shaft. (B) Section of magneto in plane of armature shaft. (C) Section of new Remy magneto

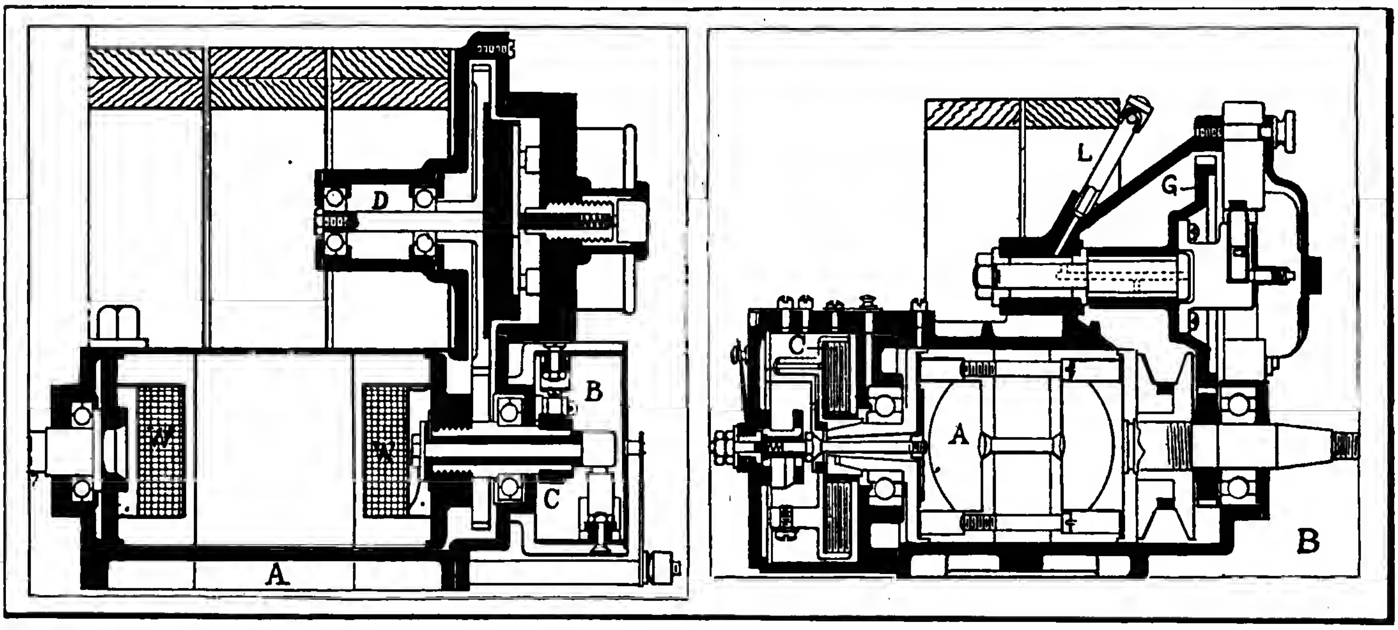


Fig. 4—(A) Section of Splitdorf magneto, showing annular ball bearings for mounting, (B) Section of new Kingston magneto

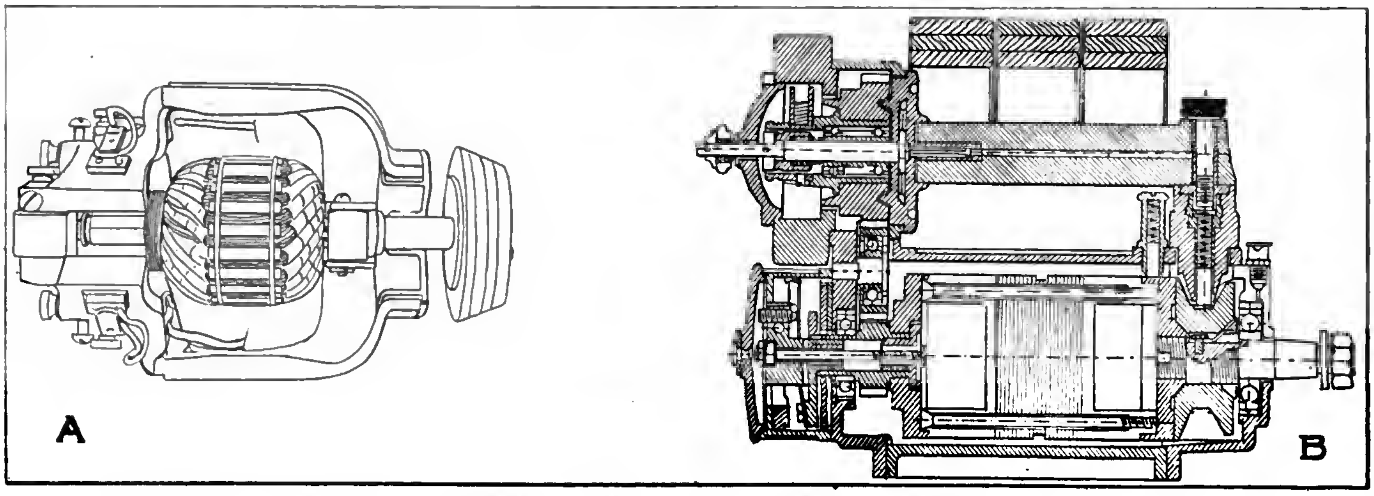


Fig. 5—(A) Apple dynamo in section, the same being used for ignition and lighting. (B) Neimellor magneto in section

holds five units, four of which are coils and the fifth is the master vibrator unit. All adjustments are made on the master vibrator, and, as will be readily appreciated, the spark will be the same in strength and potential difference in all cylinders. This system is used with or without a magneto.

Bosch Magneto Company—This well-known make of magneto is made in all high-tension types, and the illustration, Fig. 7, shows the connections of the "dual" system. In this system the magneto is electrically connected with a step-up transformer and it is optional with the user to run on the magneto or coil. The magneto is so designed that it serves as an interrupter for the battery circuit when the coil is in use, and the latter is equipped with an interrupter to "start on the spark."

Electric Storage Battery Company—Maker of the "Exide" battery; in ignition work it is delivered in two forms; one in the conventional way with the usual number of cells in series enclosed in a polished wooden case, charged complete, ready for service, and the other comprises the regular ignition battery with an emergency battery in the same case. The home of the "Exide" is Philadelphia, Pa.

National Carbon Company—This company makes the well-known dry battery known as the Columbia, and, having experimented along lines to develop the battery for use in ignition work, has brought it up to a high state of perfection; it is made in all regular sizes; headquarters are at Cleveland, Ohio.

Vesta Accumulator Company—This company presented a full line of electric lamps and headlights, as well as batteries for all purposes, as sparking, lighting, etc.

Motsinger Device Company—The direct-current magneto of this make was the novelty and a new machine for primary ignition service attracted more than the usual notice.

Atwater Kent Manufacturing Company—A simplified form of the sparker generator of this make was shown and attracted the usual notice. The Kent idea is one good spark at the right time, and it has been shown that the battery is conserved if the remaining useless sparks are dispensed with. The unisparker was also on hand, it being a simplified form of the spark generator, consisting of a contact maker, distributer, non-vibrating-coil, condenser and switch.

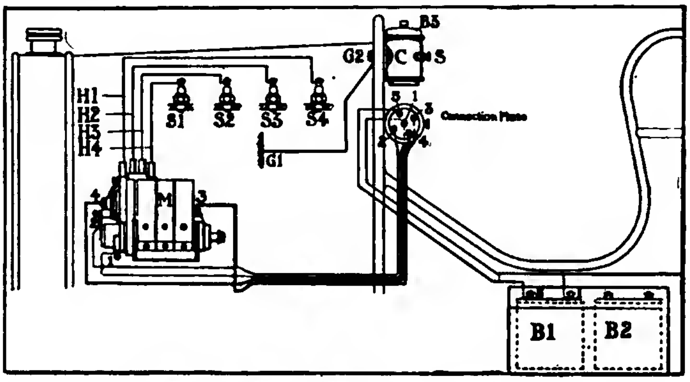


Fig. 7—Bosch dual ignition system in diagrammatic form

Emil Grossman—Of "Redhead" spark plug fame; this grade of spark plug has attracted a considerable amount of notice due to the use of porcelain which stands a high electrostatic strain and is impervious to moisture or lubricating oil. The plugs were shown both wth porcelain and mica, and the "redhead" is branded on every spark plug of this make; it is the Grossman sign of spark plug quality to which patrons subscribe.

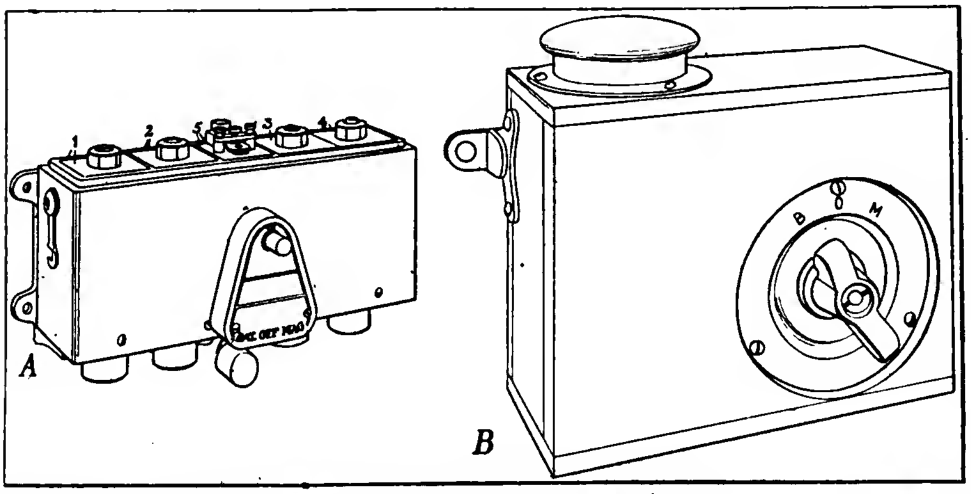
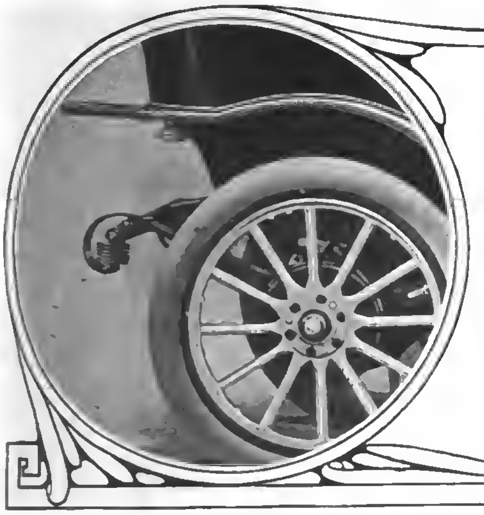


Fig. 6—(A) Connecticut coil system, with unit coils and master vibrator unit. (B) U. & H. coil as used with magnetos of the same make

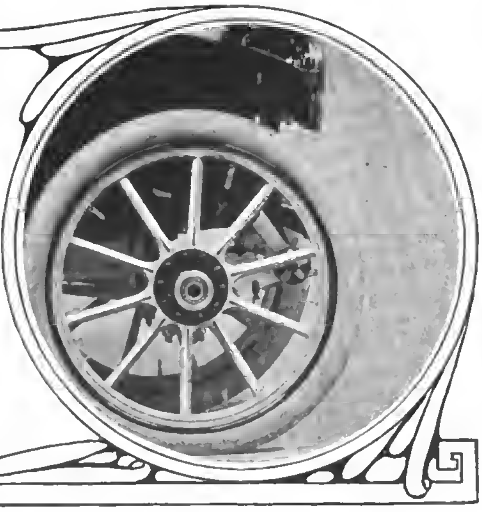
Union Battery Company—This company exhibited dry cells of all sizes, some of them especially designed for ignition work. In addition to cells, there was a line of flash lights. It is claimed for the Union make of dry cells that they are of high ampere output and deteriorate but slowly, if at all. The No. 6 cells have an output, each, of 34 amperes of current at 1.6 volts electromotive force. These batteries are made at Belleville, N. J.

Willard Storage Battery Company—This old and well-known maker of storage batteries offered a line of sparking batteries, some of which are large enough for electric lighting as well.

(*Continued next week.*)



WIDE DISPLAY OF SHOCK ABSORBERS



COMFORT to the occupants of the vehicle is the main idea of all shock absorbers, and similar devices, although it does not require any very complicated reasoning to show that the same arrangement which makes riding more comfortable, reduces the wear and tear on the chassis parts to a minimum. This latter, in a word, spells economy of maintenance, since repair parts and the cost of installing them are properly included in the maintenance cost.

However, their real reason for existence is the smoothing out of rough roads, the other reason being an afterthought. In this respect the value of the shock absorber depends entirely upon the extent to which it absorbs shocks—the greater extent to which this is done, the greater the value of the device. As a whole, they may be divided into three great main classes—the one depending upon non-compressibility of fluids; the second, frictional contact between two or more surfaces in contact; and, third, coil and other springs. Into one or the other of these three main classes, all forms of shock absorbers, or road-smoothers as they have been called, may be accurately divided.

Ernst Flentje—Coming in the first class, the Flentje absorber, made in Cambridge, Mass., uses glycerine, which is contained in a vertically placed cylinder, connected to the axle, while a piston moving inside the cylinder is fastened to the body or frame. This form has been on the market for several years, but for the season of 1910 has been changed somewhat. A spring has been added on top of the packing of the stuffing box, and a hollow piston rod with a regulating valve. Fig. 1 shows a section through the improved device as well as an exterior view, which gives a good idea of its appearance.

Kilgore Manufacturing Company—In the second figure is shown a section through the product of the Kilgore Manufacturing Company, of Boston, which is also a fluid device. In this there are no valves, a by-pass being provided in the side of the cylinder, within which the piston reciprocates. The resistance which this by-pass and the walls of the cylinder offer to the passage of the air forms the cushion upon which the passengers actually ride.

Hartford Suspension Company—At the automobile shows this device is shown in practical operation on a couple of miniature cars. The friction between several circular plates, some of which turn with an arm attached to the frame, while others are attached to the other arm, which is fixed to the axle. The tension between the faces of the plates is adjustable, a nut to bind the

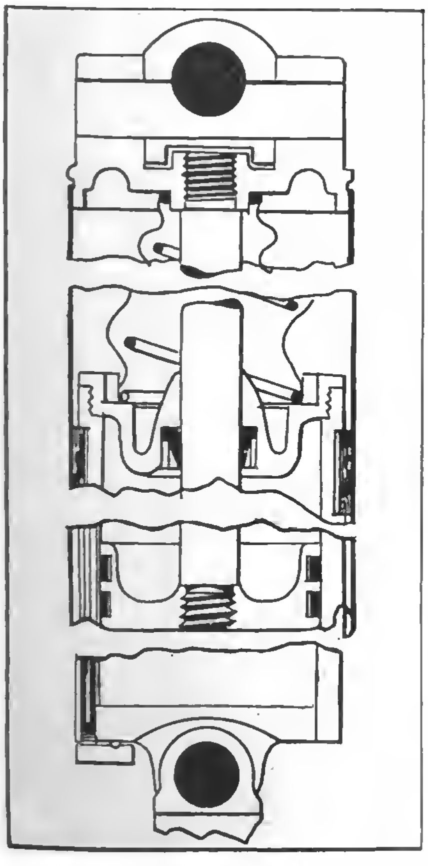


Fig. 2—Kilgore piston device

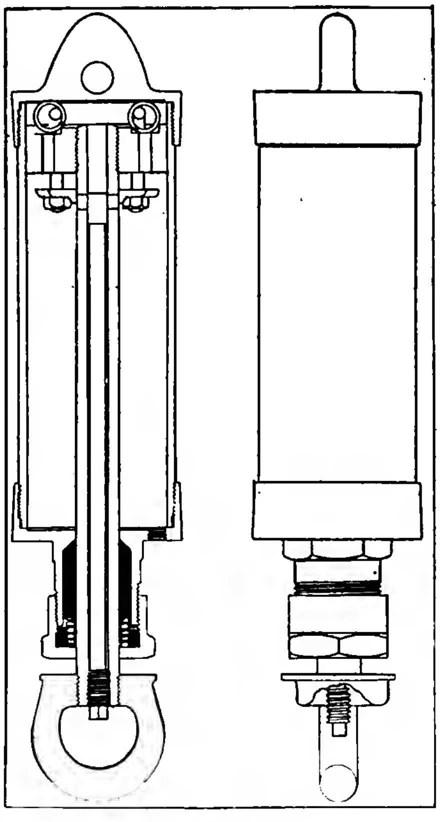


Fig. 1—Flentje glycerine cylinder

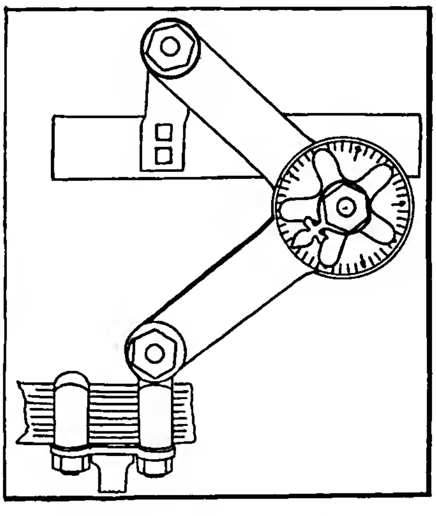


Fig. 3—Hartford Shock Absorber

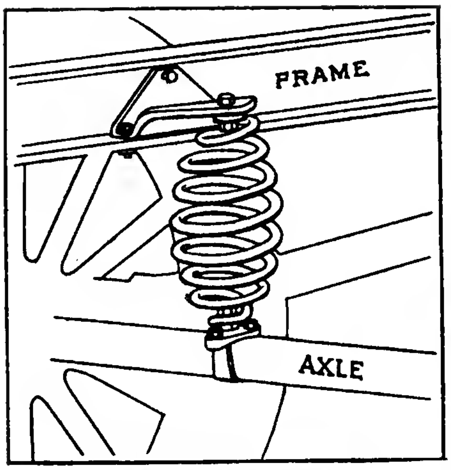


Fig. 7—Sager spiral spring absorber

surfaces against one another being provided for this purpose. It is made by the Hartford Suspension Company, Jersey City, N. J., and is shown in Fig. 3.

Westen Manufacturing Company—Like the Hartford, this is of the circular frictional plate type and is made in three sizes for three differing weights of cars by the Weston Manufacturing Company, Newark, N. J. Two friction planes are used, one being an integral part of the arm fixed to the frame, while the other is made up of an extension of the other or axle arm. The contact between the two is adjustable.

Gabriel Horn Manufacturing Company—Fig. 4 shows the Foster shock absorber, made by the Gabriel Horn Manufacturing Company, Cleveland. This is new and works upon a new principle. An elliptical cup is fastened to the side member of the frame, which is encircled by a friction band, lined with a specially prepared friction lining. The latter has two arms which attach to the axle, or rather to a lever which attaches to the axle.

Shippey Company—Like the preceding, the Shippey absorber, made by the George E. Shippey Company, Pittsfield, Mass., is of the frictional form. Sliding friction enters here, however, the free end of the device sliding up and down between the other two fixed ends, which are tightly held together.

Acme Spring Check Company—Practically all of the details of the Shoc-sorber, made by the Acme Spring Check Company, Broadway, New York City, are shown in Fig. 5. In this the working principle differs from the preceding, as a sectional filling of second growth hickory works against a ring, which is provided with steel rollers.

F. R. V. Sales Company—Springs form the basis of a goodly number of shock absorbers. Of these, the F. R. V., made by the company of that name, located on Broadway, New York City, uses a spring shock which is connected to the axle through the medium of a chain. The latter winds up or unwinds according as the load is decreased or increased. Fig. 6 show this form.

Bicalky Auxiliary Spring Company—This Buffalo firm makers a road-smoothing device which bears the firm's name. In this the spring assumes a spiral form, beirg wound up by the rise of the car body.

Sager Company—Fig. 7 shows the product of the J. H. Sager Company, Rochester, N. Y. This is a simple coil spring

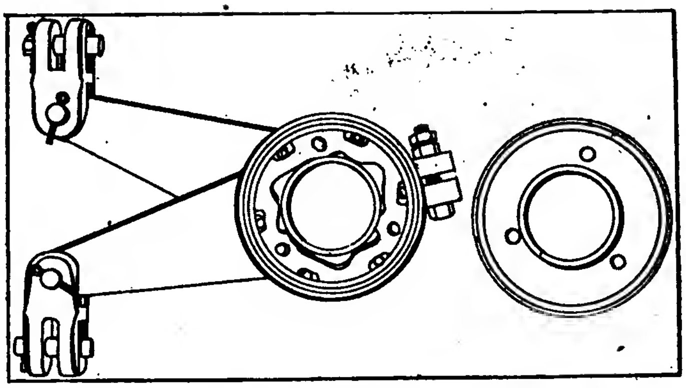


Fig. 5—Shocsorber utilizes hickory for a friction surface

interposed between the frame and axle in such a way as to be in tension during the rise of the body and in compression during the fall. This makes for long life, which quality is increased by the shape given to the springs themselves.

Baldwin Chain Company—This device is much like one of those previously described—that is to say, it consists of a coil spring attached to the two separating parts, the axle and frame, through the medium of a direct attachment in one case, and a chain which is paid out or taken in in the other.

Supplementary Spiral Spring Company—As the name would seem to indicate and as the Fig. 8 shows, this consists of a pair of small spiral springs interposed between the scroll end of the usual side spring and the frame or shackle, as the case may be. This is made by the Supplementary Spiral Spring Company, St. Louis, and has been very successful in its use.

Buffalo Specialty Company—The Thomas shock absorber is made by this Buffalo, N. Y., firm. These consist of a spiral spring, which is attached to the frame directly and above the axle. The connection to the latter is by means of a strap. The latter gives somewhat, while the spring yields considerably.

H. & F. Mesinger Company—Just like the Thomas, the Mesinger spring rebound check, made by H. & F. Mesinger Manufacturing Company, New York City, is composed of a combination of coil springs and leather straps. In this case, however, the construction is very simple, two coil springs being attached to each side of the frame in front of and behind the axle in the manner as shown.

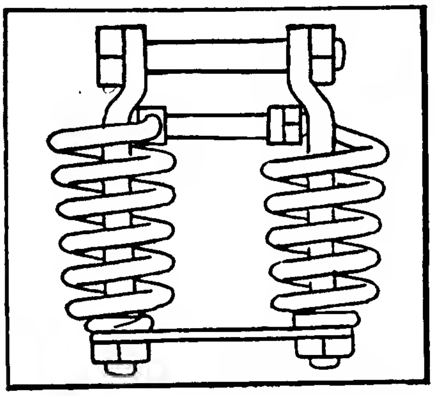


Fig. 8—Supplementary spiral spring

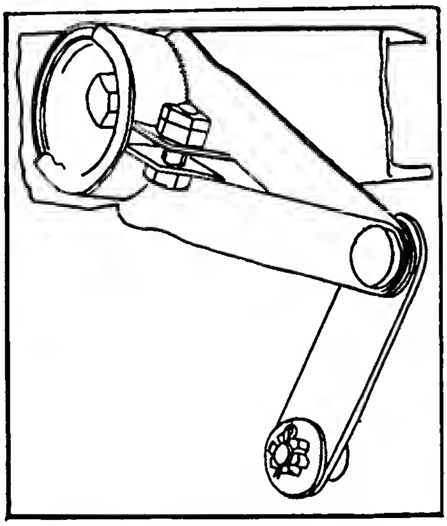


Fig. 4—Foster's shock absorber

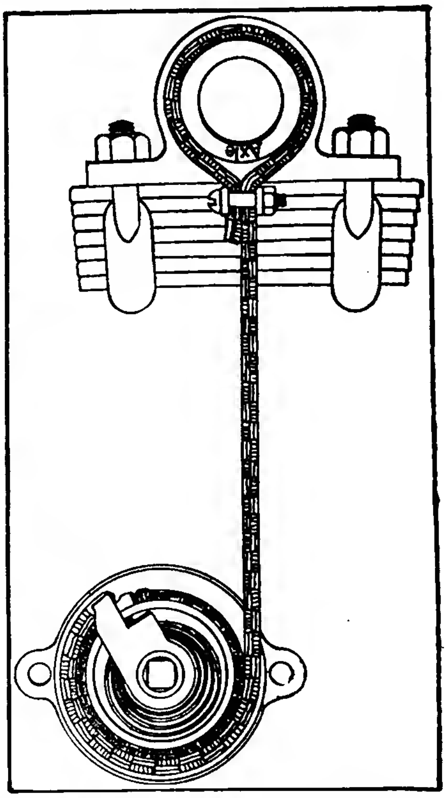


Fig. 6—F. R. V. uses spring and chain

SIGNALLING METHODS DEFINITELY CARED FOR

SAFETY is the keynote of all signalling devices, whether it be the selfish motive of personal safety or the more impersonal one of decreasing the dangers for the other fellow, the luckless one, who perforce must walk. Over and beyond the question of safety, although considered later on, is the matter of convenience.

This is made apparent by considering the case of a country road with a team occupying the center of the good going, and the driver of the same wholly unconscious of the automobile behind. Again, in city streets, when in a hurry one is often blocked off by a heavy, slow moving horse truck. In either of these cases, as well as in numberless others which might be mentioned, a polite request to move aside, as expressed by a proper signal on the horn, will usually give the much-desired result immediately.

More than this, the matter of passing another rig is attended with considerable danger to both parties, unless both are aware of and recognize the fact, making due allowance for the same. This sounds like a small item, but the danger is not only to the occupants of the two vehicles, but there is much danger of the vehicles being smashed up. The latter spells big expense for the motorist and comparatively large monetary outlay for the horse-drawn vehicle owner, as well as the inconvenience and delay in the latter case. Thus a farmer cannot borrow teams as he wishes during the busy season on the farm, and, in a case of this sort, the crops might rot or at least spoil, so as to be useless, while the farmer was endeavoring to secure another vehicle. So, the motorist should be thoughtful of others, and not only possess a good signaling device, but use it very freely as well.

In this connection, the automobilist would do well to bear in mind that when he has sounded a signal he in part frees himself from legal responsibilities, while in the absence of the same, the law will very likely be construed against him, to his financial detriment, and otherwise to his inconvenience.

There was a time when the hand-operated signal was universal, but with progress in other parts of the automobile has come also many improved methods of signalling, a number of them providing a signal which is not only produced easier and with less physical effort, but is of far superior value as a signal on account of its far-reaching qualities.

The public as a whole has taken kindly to the latter, and to such an extent that it might be said without disparaging the manually operated horn that the other types are increasing in numbers to such an extent as to become the majority instead of the minority, as before.

Generally speaking, the whole field of signalling devices may be divided into three large, principal classes, under one of which heads all may be classified. These are the electrically operated signal, the exhaust or air operated device.

Within one of these three classes, nearly every known automobile signaling system may be classed, for there are very few, if any, cases in which the device comes under a different head, while the devices which come under two of these heads are also like hen's teeth, few and far between. It is hardly possible to say how many horns are in use of any one of the three classes, although at one time the manually operated signal was in the lead, and probably had close to a monopoly. The other two forms, the exhaust, or air operated, and the electrical signal have both cut into the field of the hand horn to such an extent, however, that it is impossible to say with truth that the latter is now mostly used. Between the two newest forms, it is also difficult to say which is the more popular, despite the differing prices of the two. Thus, the lower priced of the two is the exhaust horn, while the other appeals to the class of buyers which has little consideration for the expense. Electricity in all of its branches is a mystery to many people and instead of investigating and learning the truth of its simplicity, they avoid it, the result being that the unwarranted prejudice against things electrical has held back and unjustly, too, the electrically operated horn.

Lovell-McConnell Manufacturing Company—Probably the derivation of the name of this horn, the Klaxon, will explain clearly the sound which it produces. The word Klaxon was made up from the Greek word "Klaxo," meaning to cause a roar or shriek, and that is exactly the result obtained. This is done by the very rapid vibration of a specially prepared steel disc. The extra rapid vibration is brought about by the impingement of a ten-toothed wheel against a button-shaped shoulder in the center of the disc, the wheel being rotated by a small and very compact electric motor. The latter is driven by either dry cells or a storage battery, and its speed is increased so that the three thousand revolutions per minute of the motor become thirty thousand per minute vibrations at the disc. Being operated by the simple act of pressing a conveniently located button, its use is a great convenience, as

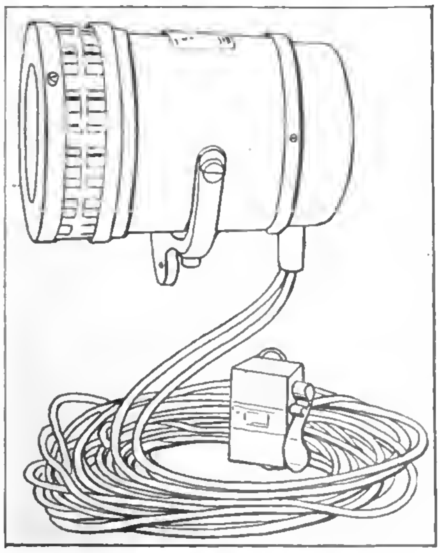


Fig. 2—Klaxon hand-operated siren

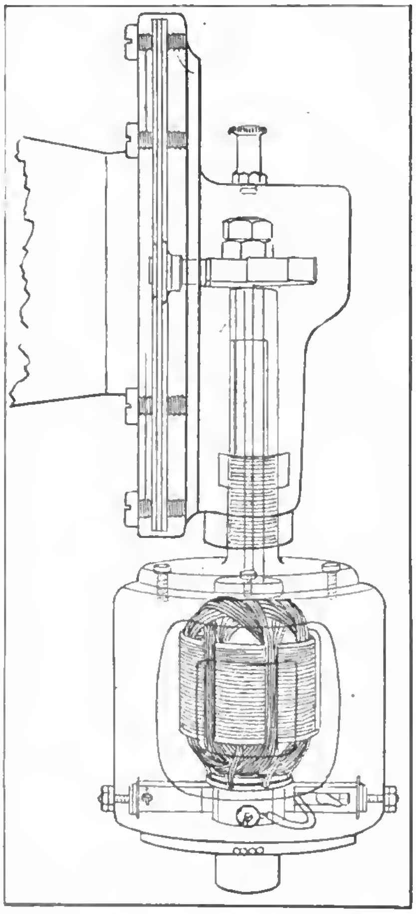


Fig. 1—Klaxon electrical horn complete

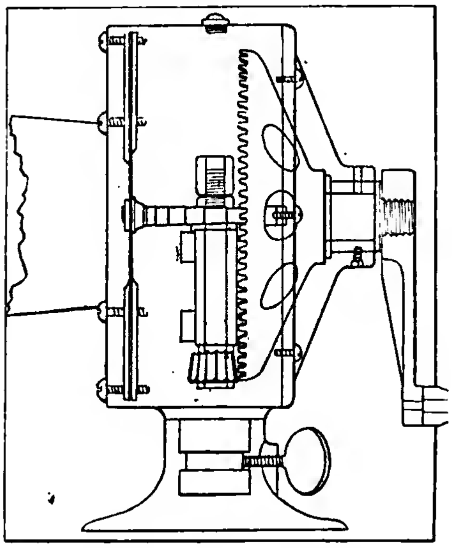


Fig. 3—Sireno turbine horn and switch

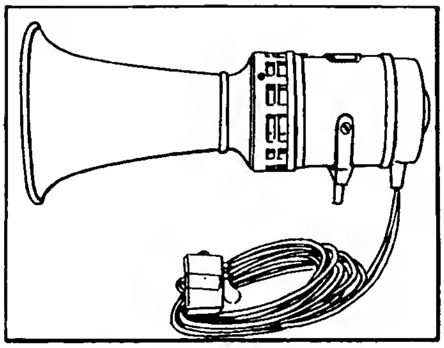


Fig. 4—Sireno Junior horn

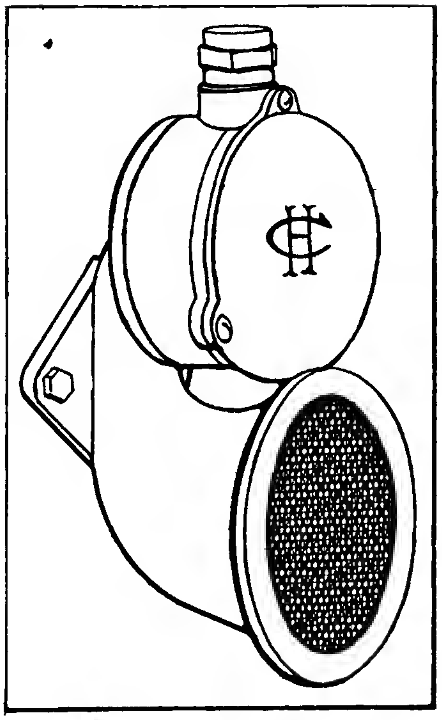


Fig. 5—Holtzer-Cabot electric horn

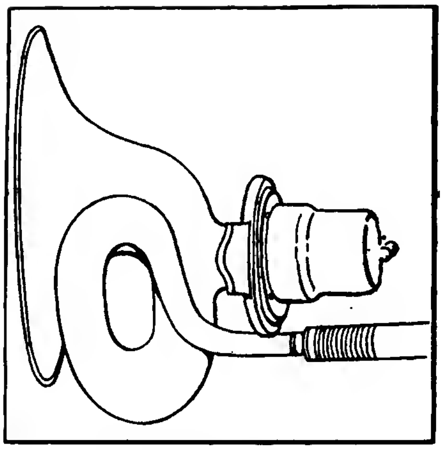


Fig. 6—Jones electric horn

this may be done without diverting attention from the road ahead. Safety is thus doubly assured and the idea good.

Sireno Company—This, too, comes in the first class, the electrically operated one, as it is a producer of sound through the medium of a cast-aluminum turbine, which is clamped to the shaft of a small electric motor. The turbine itself revolves, and this revolution causes the noise. To reduce wear and friction to a minimum, the armature is mounted upon a pair of ball bearings. A magnetic brake is added to stop the rotation, and with it the sound. These horns are made in several sizes, two of them being shown in Figs. 3 and 4. The former shows the large turbine horn, while the latter is a smaller size known as the Junior.

Holtzer-Cabot Electric Company—This Boston firm shows a direct-current electric horn differing from the others. As Fig. 5 indicates, it has a very neat, distinctive appearance, being compact, waterproof, and, what is more desirable than either, reliable. It may be wound specially for the work to be done on any pressure up to 123 volts, which may be sustained for five hours without injury. A superior interior construction has eliminated sparking at the contacts, even at high voltages. Its adoption by the United States Navy for emergency signalling speaks as highly of it as is possible to do.

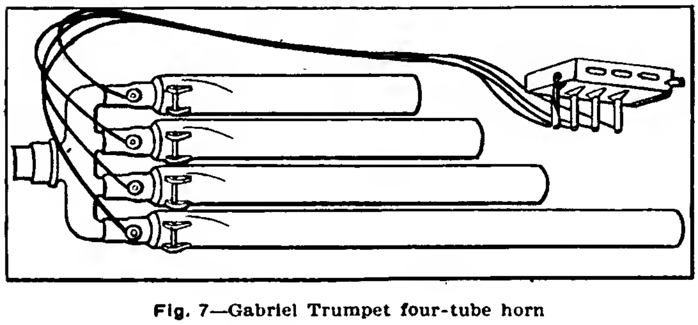


Fig. 7—Gabriel Trumpet four-tube horn

Electric Auto Horn Company—Since many owners adopted the hand-operated horn some time ago, and still possess good usable horns, which they would not care to throw away, this attachment will fill in very nicely, permitting as it does an electric attachment for old-style horns. This attachment operates by means of a push button, a set of dry cells or a storage battery being the source of current. The rotating member is wired up so as to set just back of the reed of the horn, so that the finished device has some of the advantages of both, the convenience and ease of application of the electric horn and the economy of using the old horn, as well as the softer sound produced by the reed. In addition, the whole outfit is not expensive.

United Manufacturers, Inc.—In the Jones electric horn shown at both shows by this firm, the sound is produced by the rapid vibrations of the diaphragm, which is set into motion by electro-magnetic means. As with each of the other electric horns, the current from dry cells or storage batteries is equally applicable. Many types are made, varying from the one shown in Fig. 6 in size, style and weight. The usual form has a 12-inch bell, a close-coupled body, and is operated by a push-button placed on the steering wheel.

Gabriel Horn Manufacturing Company—Better than ever describes the 1910 Gabriel horns. These are made in the same styles as before, with the addition of a number of new types. Among the latter may be specially mentioned as accorded first place at the show is the new Gabriel trumpet, illustrated in Fig. 7. This consists of four single tubes, with a small valve at the end of each tube, each valve controlling its own tube. The four keys shown operate the four tubes. This allows of the use of any single note, or by the combination of the four, any combination of trumpet and bugle calls is possible. In addition, the keyboard is fitted with a small lever which operates all four valves at once, thus producing a single note for signalling purposes. As is well known, these horns are operated by the exhaust pressure, or if the car be equipped with an air compressor this may be utilized, the action being the same, whatever the source of fluid pressure. This pressure is applied for signaling purposes through the medium of the keyboard.

Randall-Faichney Company—In the Jericho horn shown at both shows, and pictured in Fig. 8, this company, hailing from Boston, has an exhaust horn which is very effective. It is operated by foot pedal, depressing which closes the horn lid, forming a slot through which the exhaust gases are directed across the sound chamber opening. As the slot exists only when the lid is closed, it is impossible to choke or clog it. Immediately upon the release of the foot pedal, the exhaust has the usual full opening toward the ground, the sound chamber being so placed as to open downward. In position on the car it is placed behind the muffler, so has no effect upon the muffling or power of the motor

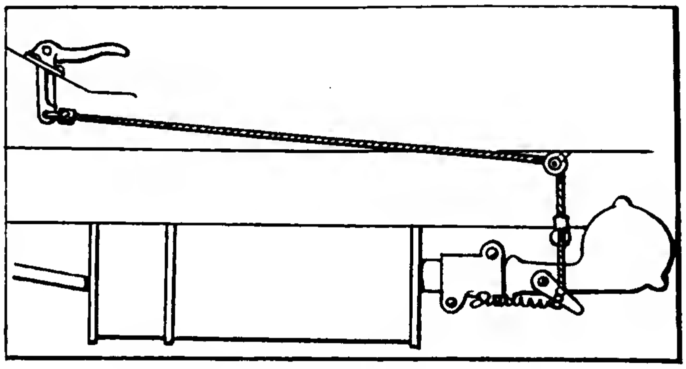


Fig. 8—Jericho horn and scheme of operation

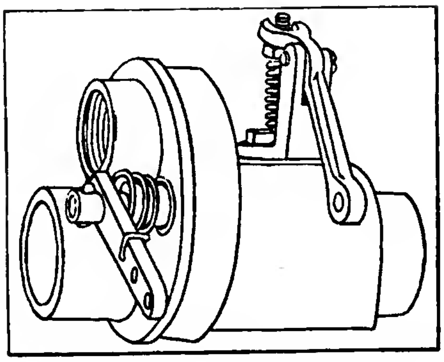


Fig. 9—Gray-Hawley Autochime Valve

with which it is used.

Nightingale Whistle Manufacturing Company—This, too, is an exhaust operated horn, being of French extraction, which the importers have, however, improved upon greatly without changing the fundamental principle. In the changing process the idea has been to make it and its attachment to a car as simple as possible, so that any mechanic, or even a private owner, could attach it without trouble. In this they have succeeded admirably. It is held on by means of clamps, which are designed to fit any exhaust pipe. In addition, the company is showing a new motorcycle signal along somewhat similar lines of construction.

Not the least attractive article the Nightingale Whistle Manufacturing Company is handling is the air compressor outfit for garage purposes. This consists of the very efficient little water-jacketed air pump, known as the Delpeuch air compressor, of metal throughout, with no leather packing or washers, which this company has been marketing for the past two years, the new feature being that they are furnishing a complete outfit for filling tires, including a guaranteed air-tight tank, safety valve, globe valves, and all necessary fittings, at the usually responsible prices consistent with the known policy of the company. The material and workmanship employed in the production of these outfits are of the highest grade obtainable, and no effort or expense has been saved to secure the greatest degree of efficiency; every part of the outfit is guaranteed. The compressor is already well and favorably known to garages throughout the Eastern states, and is being used not only for filling tires but cleaning engines, upholstery, etc.; it is the greatest labor-saving device garages can secure.

Gray-Hawley Mfg. Co.—Known to the trade as the Autochime, this exhaust horn has a number of individual features of sterling worth. This consists of a cylindrical body portion, containing the sound openings, and a valve for operating, which possesses a number of features of its own. Among these may be mentioned simplicity, durability, self-cleaning properties, accessibility, etc. It gives excellent control over the horn, which may be blown at any time, regardless of the speed of the engine. It is made in sizes to fit all exhaust pipes from 1 in. up to 2 in. The body of the Autochime proper is made of the best grade of selected brass, and is about 2 in. in diameter by 15 in. long.

Tsar Auto Horn—Another exhaust horn which possesses

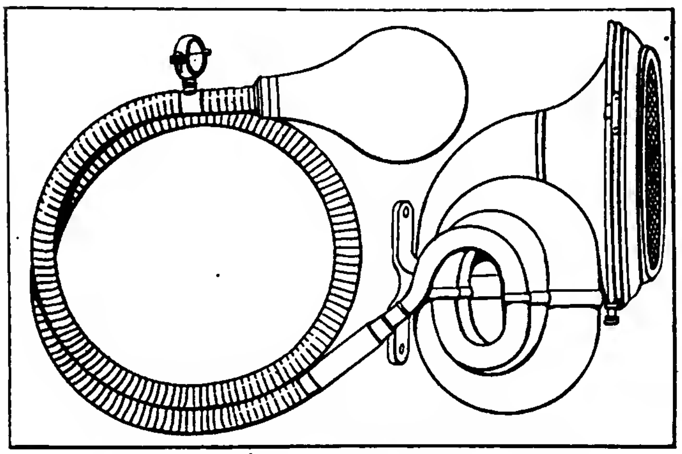


Fig. 12—Riley-Klotz Triple Twist horn complete

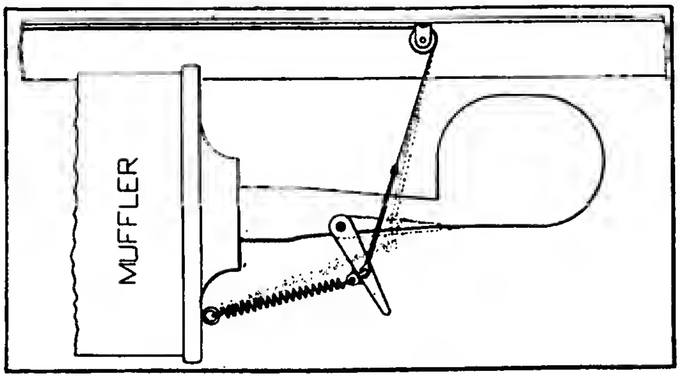


Fig. 10—Tsar exhaust-operated horn

the unusual feature of being quickly and easily attached to any car. This is attached to the exhaust end of the muffler, and requires no cut-out, although it may be used in connection with one, just as well as in cases where the cut-out is dispensed with. The makers state that it may be attached by any ordinary mechanic in less than two hours, with very few and simple tools. When in place it requires no attention, not even cleaning, as it does that little act itself. Being essentially simple, there is nothing to dislodge or get out of order. Fig. 10 gives an idea of the appearance, as well as showing the method of operation.

Charles E. Miller—This dealer is showing, among other things, the Testophone horn, Fig. 11. It has four tubes of varying lengths, which are worked by means of a single bulb. This result is something out of the ordinary, being produced through a special apparatus by successive compressions of the one bulb. The sound is a series of notes, which somewhat resembles a bugle call. Or, by the continued use of any one, a single prolonged trembbling note of gradually increasing force may be produced. On the other hand, a single note is obtained by turning the cylinder when the piston is at the end of its travel. The whole horn is prevented from working by means of this same cylinder, which is turned when the piston is at rest.

Automobile Supply Mfg. Co.—In the Nonpareil hand-operated brass horn this Brooklyn supply house has an excellent exhibit. The finish and workmanship follow along French lines, the foreigners having been the best horn makers for some time.

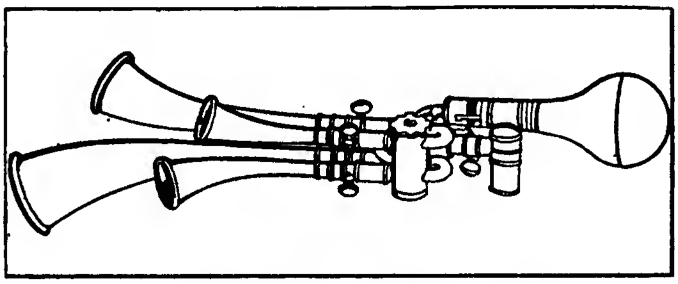
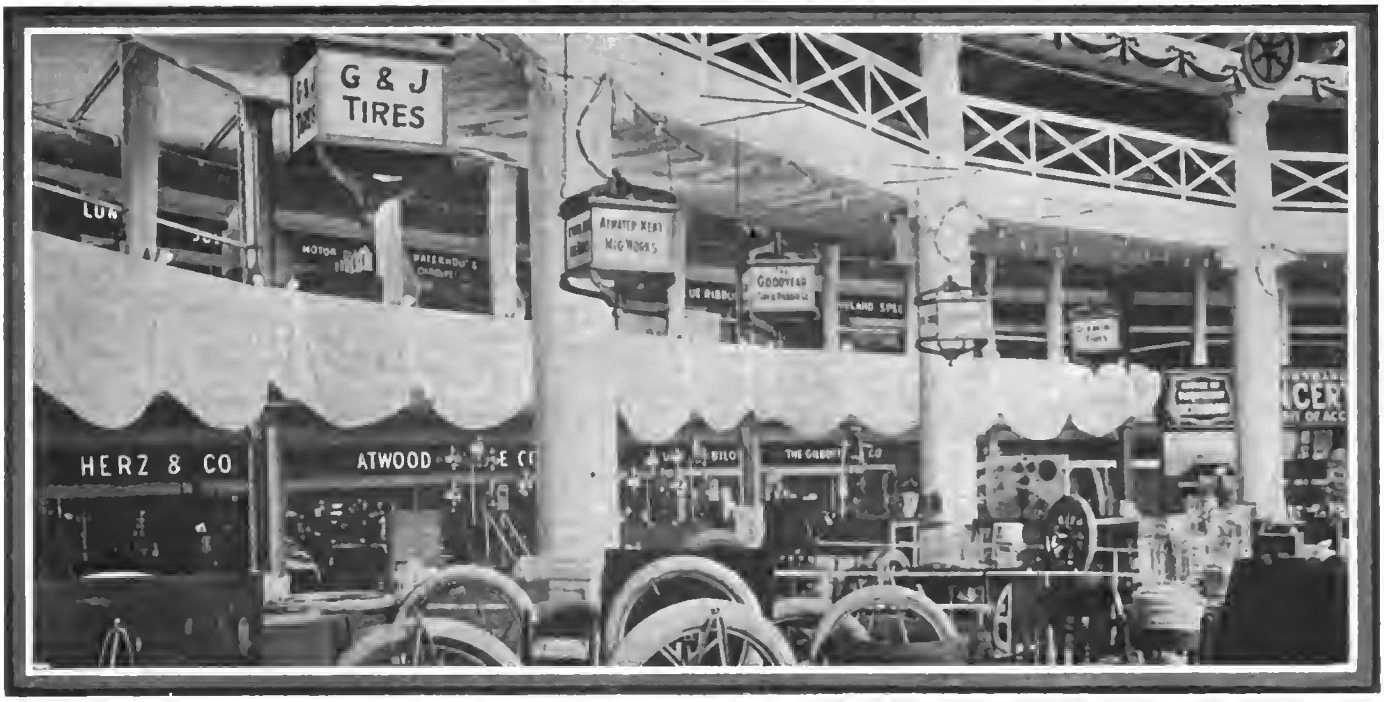


Fig. 11—Testophone horn has four tubes

A bulb of chemically cured rubber of large size secures instant and continuous operation, while the tone produced is best described as long-drawn-out, deep and penetrating.

Post & Lester Company—1910 models of the Volier horns are exhibited by this supply concern from Hartford, Conn. They are in two main styles, medium diameter oval and large diameter oval, both being of the hand-operated type. The bulb is of chemically cured rubber, the material of the horn heavy sheet brass, while the reed is of non-corrosive vibratory metal, which will give a maximum of service with a minimum of trouble.

Riley-Klotz Mfg. Co.—The triple twist horn, known by the prosaic name of No. 27, is shown in several styles. This is a manually operated horn with an oval bell, screen across the mouth of the bell, and fitted with a 50-inch tube, which is long enough for any purpose. The finish, material and workmanship are excellent throughout.



A Corner of the South Gallery Where the Display of Accessory Makers Was Imposing and Characteristic

NOTABLES GATHERED IN EXTRA FORCE

GLANCING over the list of names of the princes of the automobile fraternity who attended the gathering at the Garden proves to be of more than a little interest, partly due to the assembling in unusual force, then in view of the quality of the representation. In many cases, besides the heads of companies, there were numbered among the attendance the whole administrative force, which was augmented somewhat by a goodly scattering of executive "staff" men.

The accessory division added to the tide of official attendance, and this year the accessory field is not only strongly presented, but it has assumed such important proportions that none seems able to tell what will be the end. To be sure, the many additions to the "Selden flock" had to do with the attendance, and, perhaps, the gathering was forced by those who wanted to ascertain what the future portrays.

F. E. Powers, president and general manager of the Gilbert Mfg. Co., of New Haven, Conn., also E. B. Spaulding, treasurer, and W. A. Rutz, sales manager of the same company, are all stopping at the Woodstock Hotel.

The Astor Hotel is the home of Frank Coes, president and general manager of the Coes Wrench Co., of Worcester, Mass., also of Edward Searle and Harry Streme, salesmen.

The Randall-Faichney Company, of Boston, Mass., is represented by W. A. Randall, president; H. L. Hillman, sales manager; E. P. Wallan, the New York representative, and E. R. Brackett and S. A. Campbell, who are all stopping at the Waldorf-Astoria.

Among those registered at the Hotel Manhattan are Brice S. Evans, the Boston sales manager of the Kilgore Mfg. Co., also J. L. Allen, W. Nielson and H. C. Michelsen, the New York representative of the same company.

Hopewell Bros., of Newton, Mass., is represented by Frank B. Hopewell, C. A. Russell and Charles F. Hillers. These gentlemen are staying at the Waldorf-Astoria.

Among the representatives of L. C. Chase & Co., of Boston, Mass., are William Walden and R. L. Gilman, who are registered at the Prince George Hotel.

Irving H. Atwood, general manager of the Atwood-Castle Company, and Fred L. Castle, vice-president of the same concern, are staying at the Hotel Astor.

The New Departure Manufacturing Company, of Bristol, Conn., is represented by A. F. Rockwell, president and general manager; De Witt Page, secretary and sales manager; C. J. Tredwell, treasurer; M. J. Horton, D. W. Graham, W. R. MacGuyer, and J. N. Biddle, who are all staying at the Hotel Belmont.

Ernest Flentje, of the Flentje Shock Absorbers Company, of Cambridge, Mass., also E. Y. Stimpson, N. Y. representative; Charles E. Miller, draftsman; J. A. Sawyer, general manager; N. H. Wishart, Pittsburg representative; H. Hess and B. Parry, all of the same company, are stopping at the Hotel Empire.

The Hoffecker Company, of Boston, Mass., is represented by F. D. Bennett, general manager and E. M. Rollins, sales manager, both of whom are registered at the Belmont.

The Post & Lester Co., of Hartford, is represented by H. W. Lester, treasurer and general manager; C. B Lamb, secretary; G. R. Hall, Western representative; E. L. Thompson, manager of the Boston branch; T. A. Cotter, manager of the New Haven branch, and T. M. Tarbell, manager of the Springfield branch.

Among those representing the Heinze Electric Company, of Lowell, Mass., are J. O. Heinze, general manager; P. J. Legare, sales manager, and Lionel Loupret and J. A. Malone, advertising managers, who are al. stopping at the Hotel Belmont.

The Pittsfield Spark Coil Company, of Dalton, Mass., is represented by W. P. Wood, general manager; Thomas Wetzel, sales manager; K. Franklin Peterson, H. V. Greenwood, L. D. Bolton and W. J. Connell. These gentlemen are all stopping at the New Amsterdam Hotel.

Among those representing the Dover Stamping & Mfg. Co., of Cambridge, Mass., are H. E. Whitney, president, and H. M. W. Brigham. These gentlemen are stopping at the Hotel Woodstock.

During show week the Waldorf-Astoria is the home of William Gray, general manager of the firm of Gray & Davis, Amesbury, Mass.; also of Lambert Hollender, Alex Churchward, C. H. Munson, D. H. Elkins, Ed. Taylor and W. H. Gray, of the same company.

Witherbee Igniter Company, of Springfield, Mass., is represented by Phelps Brown, vice-president and treasurer; Theo. Getz, salesman; C. D. Galloway, salesman, and Mark W. Heath, Chicago branch manager.

The Allen Tire Case Company, of New York, is represented at the shows by William A. Allen.

Martin V. Kelley, of the MacManus-Kelley Company, of Toledo, is attending the show in the interests of his several clients. He is also making a trip to the Hartford Rubber Works, whose business he handles.

A. A. Atwood, Overland distributor in northwestern Ohio, registered in Monday.

Whitlock Coil Pipe Company, of Hartford, Conn., is represented by James L. Goodwin, general manager and treasurer; Richard Thompson and W. E. Kinney.

Couch & Seeley Company, of Boston, Mass., is represented by R. L. Whitman, treasurer; F. J. Bordeaux, sales manager, and L. A. Casgrain. These gentlemen are staying at the Belmont Hotel.

William Johnson, the well-known Denver dealer, is registered at the Cumberland.

Edgar Apperson, of the Apperson Bros. Automobile Company, and George Strout, sales manager of that company, are stopping at the Cadillac.

Among those registered at the Woodstock are N. H. Van Sicklen, president of the Automobile Blue Book Publishing Company; David Beecroft and N. H. Van Sicklen, Jr., of "Motor Age," Chicago.

J. McGill, of the Consolidated Supply Company, of Denver, is registered at the Cumberland. John E. Fry, of the same company, is also in town.

Fred C. Rohle, of the Excelsior Supply Company, of Chicago, and Chester C. Boynton, of the same concern, are at the Astor.

Carl Metzger, of the Woods Electric Vehicle Company, of Chicago, is registered at the Astor.

The Keystone Lubricating Company, of Philadelphia, is represented at the show by A. C. Buzby, president; H. A. Buzby, secretary and sales manager; C. A. Hopper, T. W. Armstrong, H. L. Carpenter, W F. Beitler and E. C. Huhn. These gentlemen are all stopping at the Hotel Breslin.

The Knickerbocker has among its guests this week F. A. B. Smith, vice-president of C. P. Kimball & Company, Chicago, and Stuart B. Andrews, of the same company.

Charles E. Firestone, secretary of the Columbus Buggy Company, of Columbus, Ohio, is at the Collingswood.

General Manager Otis R. Cook, Federal Rubber Company, Milwaukee, is registered at the Belmont.

G. S. Chapin, of the Motor Car Supply Company, Chicago, is at the Astor.

Bertram Smith, manager of the battery department of the United States Light & Heating Company, of Chicago, is at the Seville.

The Empire Hotel has among its guests C. E. Breisford, of Detroit.

The New Grand Hotel is the home during the shows of B. F. Meixell, president of the Indiana Motor Sales Company, of Indianapolis, and A. C. Downing, general manager of the Meixell-Downing Company, of Indianapolis.

C. J. Smith and A. R. Burr, of C. J. Smith & Co., of St. Paul, Minnesota, are registered at the Breslin.

Among the members of the trade who are stopping at the Astor are L. P. Zinke, J. W. Fulton, P. L. Hussey and Fred McManus, of the F. Z. H. Parts Co., of Chicago.

John J. McCutcheon, "the big fellow," Western manager for C. F. Splitdorf, is registered at the Astor, as is also Harry E. Fields, of the Hartford Rubber Works.

William Schebler, of Wheeler and Schebler, of Indianapolis, is registered at the Waldorf-Astoria.

J. B. Long, president of the Long Mfg. Co., of Chicago, is registered at the Waldorf-Astoria.

J. A. Boyle, general manager of the Briscoe Mfg. Co., of Detroit, is stopping at the Belmont.

S. F. Briggs and H. M. Stratton, of the Briggs & Stratton Company, Milwaukee, were among the visitors at the show on Monday.

Fred S. Duesenberg, the superintendent of the Maytog-Mason Motor Car Company, of Waterloo, Iowa, is in town for both shows.

W. L. Easterly, Indianapolis representative of the Firestone Tire & Rubber Company, is at the Murray Hill Hotel.

K. Franklin Peterson, of Chicago, and L. D. Bolton, of Detroit, are at the Belmont.

P. S. Steenstrup, general sales manager of the Hyatt Roller & Bearing Company, is stopping at the Belmont.

Among those registered at the Latham Hotel is H. W. Gray, manager of the Neustadt Auto & Supply Company, of St. Louis.

The Cumberland Hotel has among its guests C. E. Lipman, president of the Lipman Mfg. Co., of Beloit, Wis., and George Wahlgreen, of Denver, Col.

Among those registered at the Manhattan Hotel are F. E. Eckhart and J. I. Farley, of the Auburn Automobile Company, of Auburn, Ind.

President C. B. Hayes, of the Hayes Wheel Company, of Jackson, Mich., is registered at the Webster Hotel.

H. B. Krenning, president, and G. P. Dorris, vice-president Dorris Motor Car Company, St. Louis, who are here for both shows, are registered at the Knickerbocker.

Seamless Rubber Company, of New Haven, Conn., is represented at the show by W. Williams.

Whitney Manufacturing Company, of Hartford, Conn., is represented by Clarence Whitney, general manager.

Among those who are in attendance at the show in the interest of the White & Bagley Company, of Worcester, Mass., are H. P. Bagley, general manager; A. F. Kelley and A. G. Guy, who are stopping at the Imperial Hotel.

The A. W. Harris Oil Company, of Providence, R. I., is represented by A. W. Harris, president and general manager; B. S. Terry, W. T. Kincaid, George F. Haywood, Howard L. Gaunt, E. V. Harris and W. L. Larash.

C. T. McCue and L. D. Parker are representing the McCue Company, of Hartford, Conn.

The Novelty Mfg. Co., of Waterbury, Conn., is represented by Oscar Fitzsimmons, secretary; F. L. Cowles and E. W. Kingsley.

L. J. Mutty Company, of Boston, Mass., is represented by L. J. Mutty, W. J. Hoynes, Edward Patrick Murray, Henry B. Harris, Peter Welin and J. Eugene Rogers, who are staying at the Holland.

Fred A. Ballou, Buffalo representative for the Palmer & Singer and Selden cars, is registered at the Hotel Imperial.

C. Cowles & Co., New Haven, Conn., is represented at the show by L. C. Cowles, president; F. M. Ruwet, M. S. Bottume, Harry Bradley, stopping at Prince George Hotel.

The Springfield Metal Body Company, Springfield, Mass., is represented by Hinsdale Smith, president; A. P. Smith, treasurer; W. T. Helfer, sales manager; J. B. Richards, superintendent, and H. L. Rich, who are stopping at Hermitage Hotel.

Baldwin Chain & Mfg. Co., Worcester, Mass., is represented by W. H. Gstes, treasurer and general manager; M. V. Greenwood and M. A. Bryte, stopping at Belmont Hotel.

Another Section of the Accessories Exhibits

L. D. Parker is attending the shows in the interests of Parker Motor Company, Hartford, Conn.

A. L. Dixon, general manager Brunner Motor Car Company, Buffalo, is at the Breslin.

E. W. McGookin, Detroit, is at the Astor.

Roger B. McMullen, Chicago, is at the Latham.

Ezra E. Kirk, Western sales manager Rainier Motor Company, of New York, is at the Manhattan.

F. H. Wheeler, of Wheeler & Schebler, Indianapolis, visited the Palace and Garden shows and left for Bermuda, Wednesday, by the "Bermudian," for a few weeks' stay.

W. S. McDonald, manager Detroit branch The Buda Company, of Chicago, is at the Astor.

James A. Hollhan, sales manager Briscoe Mfg. Company, Detroit, is at the Belmont.

F. B. Sears joined his colleagues of the Auburn Automobile Company Tuesday, and is registered at the Manhattan.

Morris Eckhart, general manager, is ill at home and was unable to come East for the shows.

General Manager J. P. Elmer, sales manager Richard Bacon, Jr., Frank Nutt, engineer, and S. H. How, sales department Haynes Automobile Company, Kokomo, Ind., are registered at the Woodward. C. C. Craig, manager Chicago branch, is at the Woodstock.

E. H. Webb, Detroit representative of the Royal Equipment Company, is at the Manhattan.

D. B. Smith, of The Standard Company, Torrington, Conn., is at the Breslin.

Typical Aisle in the Basement of Madison Square Garden, Where Many Accessories Were Exhibited

THE AUTOMOBILE

Vol. XXII Thursday, January 13, 1910 No. 2

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231-241 West 39th Street, New York City

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GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

TORPEDO TYPES OF BODIES OPPORTUNE

Granting that body work has long ago departed from carriage makers' practices, even so, murmurings, from time to time, which seemed to be out of tune, rather lead to the conclusion that something was wrong, or, better yet, that body work fell short of the requirement; a condition, to be sure, which could not have been foreseen. Experience has ever been the great teacher, and as this same influence ripened the judgment of autoists, it bestowed upon them the right to think—to think for themselves. That autoists do think is proven by the extent to which they are considered by the most advanced designers, and it is due to a desire to anticipate the needs of users of automobiles that so many changes were made all along the mechanical line, and body work is now coming in for its share of attention.

The presence of several determined examples of torpedo bodies, with differences in detail only, as between them, is but a reflection of the wants of purchasers; they preferring a fair measure of comfort, and, as experiences seems to have pointed out, a body which suffices for a carriage involving a speed of less than 20 miles per hour may be open at the sides without serious handicap.

For several years it has been the practice to protect occupants of the tonneau in every possible way, and a side door was found to be the most practical way of doing so. Why the driver, who has the lives of the occupants and the public in his keeping, should be left out in the cold, is a detail which will require a little explaining, but owners, who drive, invariably complain of side-draughts when they come out from behind the breast-works. Contrast is an efficient illustrator.

Torpedo types of bodies alter the whole situation to a material extent; comfort is equally divided between the front and rear seats, and the power required to propel the automobiles so fitted is reduced materially below that which comes with unsymmetrical conformations. Torpedo bodies are probably destined to be with us long.

PRESSED STEEL AND FINALITY ON TERMS

Castings, like the man "Friday" in the story of Robinson Crusoe, befit a primitive situation. They were the most ready-to-hand, in the early days when shops devoted to the turning out pressed steel work were but few, and they, for the most part, were confined to car work as it applies to railroads or in the manufacture of guns.

When automobiles first came into vogue, they were built in small numbers, and the designs were on so unstable a footing that changes were in rapid succession. Under the circumstances it was as a simple process to whittle out patterns in wood, deliver them to a foundry, and have castings run off. The growth of the industry added stability in designs, and the expansion of plants devoted to pressed steel work are responsible for a change all along the line.

It is useless to go on saying that production in quantity leads to better quality unless reasons can be given, but, fortunately, the reasons are on the surface. They are exposed to the searching glare of a tropical noonday sun, and in this light, when the last word is said, it is the presence of pressed steel, in the absence of castings, which is at the bottom of the whole situation—a state of glowing health.

TIRES FALL HEIR TO SANE TREATMENT

Improved methods of tiremaking, while they are positive, and include better materials for fabrics as well as first selections of rubber, do not account for the better service which is undoubtedly being rendered by tires. It is in the manner of adapting tires that accounts for more than a little of the increased satisfaction; larger diameters are in evidence; greater sections prevail, and, what is equally important, tire pumps, with accurate gauges, are used in the inflating operation.

It is now a settled fact that inflating, unless it is most carefully done, will be at the bottom of rapid deterioration; moreover, it is necessary to have all four tires pumped up equally. Flexure is what ruins tires, and this phenomenon is decreased materially as the sizes of tires used are larger, and if they are inflated to a satisfactory point—which is possible when the tires are large enough for the car.

Again, demountable rims are in force, nearly every large firm showing a form of demountable. This furthers the modern tendency to cater to the ease and comfort of the non-professional driver, who usually is not as skillful with tools as his salaried brother. This form is the acme of simplicity, so that any one can make the change, practically without tools at that.

ANNUAL MEETING MOTOR AND ACCESSORY MFRS. (INC.)

NEW YORK CITY, Jan. 5—Waldorf-Astoria, as a hostelry, was filled to overflow by the members and guests of the Motor and Accessory Manufacturers (Inc.), who were there to attend the annual meeting and be banqueted. Over 200 members were seated at the festive board, which was after the business of the meeting was over. In addition to current matters the business meeting ended in the re-election of the old officers and the board, which now stands as follows:

President, H. E. Raymond (B. F. Goodrich Company), Akron, Ohio; first vice-president, H. T. Dunn (Fisk Rubber Company), Chicopee Falls, Mass.; second vice-president, F. E. Castle (Atwood-Castle Company), Detroit, Mich.; third vice-president, C. E. Whitney (Whitney Manufacturing Company), Hartford, Conn.; treasurer, W. S. Gortin (Standard Welding Company), Cleveland, Ohio; secretary, P. S. Steenstrup (Hyatt Roller Bearing Company), Newark, N. J.

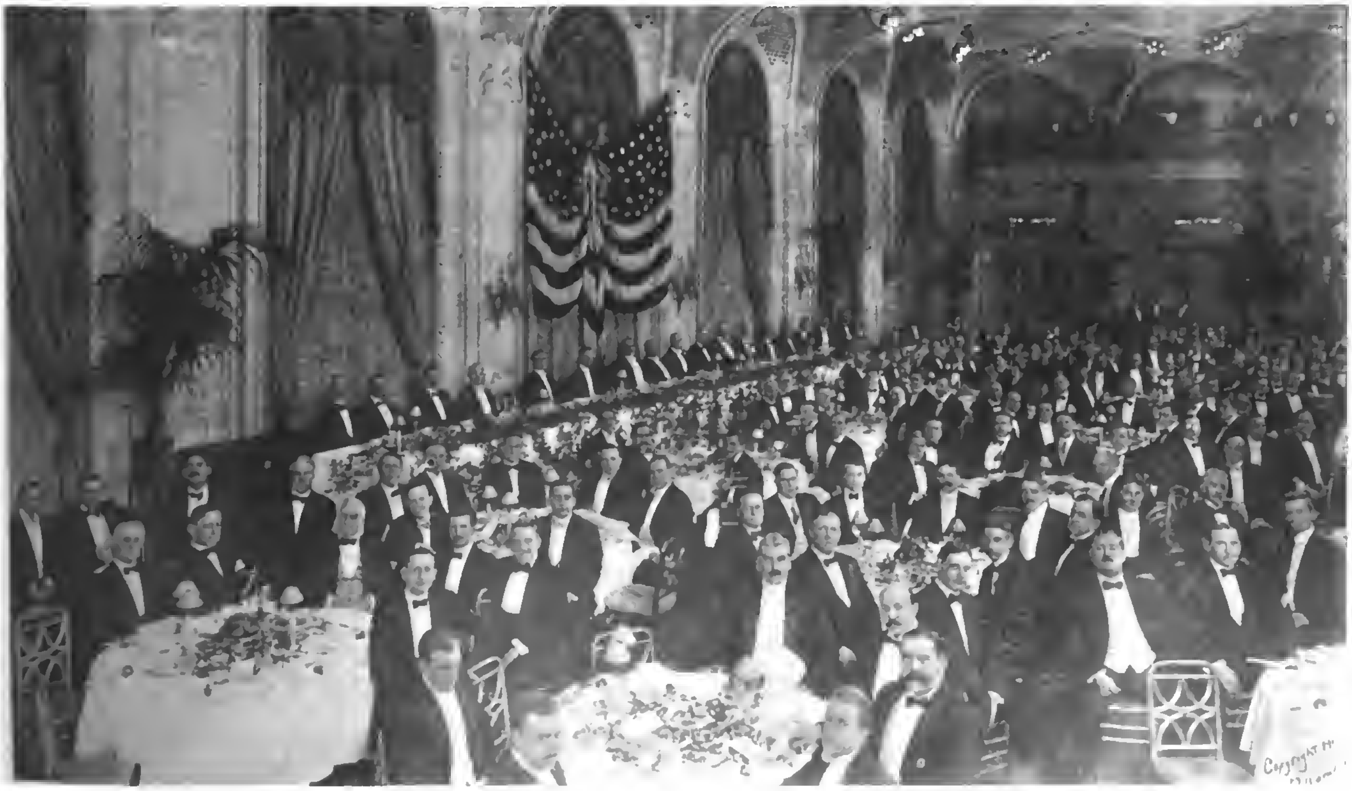
In addition to this regular list of officials a new office was created, namely that of manager of the association, which position was filled by the appointment of W. M. Sweet, who has been acting manager for the past year and has been associated with the organization since its inception several years ago. Mr. Sweet is a young man of hustling disposition and there is not the question of doubt but that the organization under his direct control will prove a most useful one for the industry during the coming season.

To-day the Motor and Accessory Manufacturers' Association is in a most promising condition, counting on its roster no less than 174 concerns, all of which are representative of the great accessory phase of the automobile industry. During the past year from thirty-five to forty new names have been added, one of which, the Auburn Auto Pump Company, Auburn, N. Y., was voted a member at the annual meeting. The present membership is, roughly speaking, 50 per cent. of the active accessory makers of the country, so that there yet remains big scope for the development of the organization. According to its present constitution the organization holds an annual meeting at this season of the year and a semi-annual one in the summer, in addition to which there are the quarterly meetings of the board of directors. The valuation of the industries at present in the association aggregates the big total of $307,000,000.

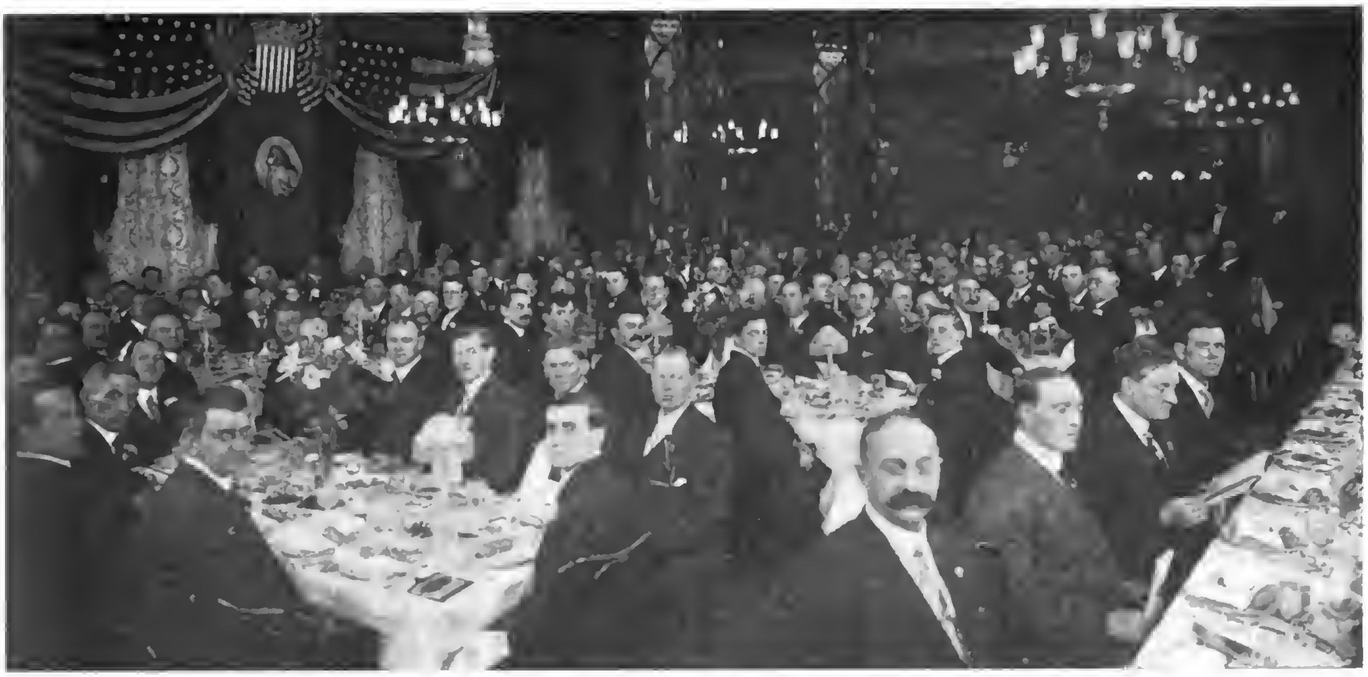
The annual banquet to a large extent took the place of the banquet which has been held every year up to the present by the American Motor Car Manufacturers Association, but which was dropped this season for the first time. The position of toastmaster developed upon Job E. Hedges, who has become familiar to the motoring fraternity by occupying similar positions during previous years, and throughout the evening his aphorisms were brimful of humor and common sense.

H. O. Smith, president of the A. M. C. M. A., the first speaker of the evening, dwelt on the present motor car situation and hoped that that same high order of business integrity would characterize every member of the accessory organization that has been conspicuous in the past. He looked for the time when gearsets or other important car parts would not be sold to concerns who would yoke them up in too powerful cars, and hoped the time was not far distant when a commission might be appointed whose duty it would be to pass upon such conditions.

Col. George Pope, chairman of the A. L. A. M. show committee, was reminiscent of old bicycle days and wished the present accessory organization every possible prosperity. Other addresses were made by John C. Wetmore, the dean of the trade press in motordom; Lewis Speare, president American Automobile Association, and Hon. Martin Saxe. The last speaker dwelt in particular on the engineering operations that are being carried on to-day in the vicinities of New York and which are working great good to the cause of the automobile. He referred in particular to the proposed bridge across the Hudson which will give New York motorists an outlet to the great State of New York on the west side of the Hudson. The participants left with a renewed feeling of good-fellowship and mutual interest.



Banquet of the Motor and Accessories Manufacturers, Inc., at the Waldorf-Astoria, New York City, January 5, 1910



Annual Banquet of Maxwell-Briscoe Motor Company, to Its Selling Forces, Hotel Manhattan, New York City, January 6, 1910

MAXWELL-BRISCOE ANNUAL BANQUET

Each year the annual banquet tendered by the Maxwell-Briscoe Motor Company to its agents and other representatives becomes a more enjoyable feature of that progressive corporation. These banquets given at the time of the Palace Shows when the attendance can be the largest, and that of the present year took place at the Hotel Manhattan, New York City, on Thursday evening, January 6, under the auspices of the sales organization of the company, and catered to 275 covers. The menu card was elaborate and was replete with caricatures of the leading lights of the Maxwell-Briscoe organization, the outside cover depicting a radiator upon which was embellished in color a large piece of beef roasting over a hot "rotisserie" fire.

E. R. Thomas Accepting New York-Paris Trophy

This year the usual quota of speechmaking was abolished, Mr. Briscoe making the speech of welcome, and introducing a program of vaudeville which was good and appealed strongly to the sentiment of the assembled guests. The head of the table was occupied by Messrs. Benjamin Briscoe and J. D. Maxwell, who were flanked on either side by the leading lights of the company's sales organization.

THOMAS GETS "ROUND THE WORLD" CUP

At a banquet at which nearly 300 guests partook of the hospitality of the E. R. Thomas Motor Company, the New York to Paris Trophy, offered by *Le Matin* of Paris and the *New York Times*, was formally presented by the representatives of the donors, at the Automobile Club of America on Saturday evening, January 7. There was a large table circling the banquet hall in the shape of a horseshoe, and at the oval's end was placed a table at which were seated the guests of honor and the officials of the Thomas company.

Robert Lee Morrell officiated as toastmaster and at his right and left were seated George Schuster and George Miller who were in the winning Thomas car almost constantly from the time it started on its 20,000-mile journey at Times Square, New York City, until it stopped in front of the office of *Le Matin* in Paris, 26 days ahead of its nearest competitor. Running all the way round the horseshoe-shaped table was a series of photographic views which depicted the progress of the journey.

At the toastmaster's signal Messrs. Schuster and Miller, accompanied by E. R. Thomas, advanced to the center of the horseshoe where the trophy stood draped with the American flag, and simultaneously pulling two wires they released the flag which fell disclosing to the assembled guests the symbol of their victory. The orchestra played "The Star-Spangled Banner" and the guests cheered. Mr. Thomas made a well chosen speech of acceptance on behalf of his company, and Messrs. Schuster and Miller told of some of their experiences in Siberia.

The trophy is said to be the largest of its kind ever made, and stands six feet six inches in height, weighing slightly over 1,600 pounds. The materials used in its construction are all native to the four nations represented in the race—the United States, France, Germany and Italy. The pedestal is of green Italian marble, and the sub-base is of French marble of beautiful pink shade. The medallions are of German bronze, depicting the coats of arms of the four competing nations, and the German bronze globe that surmounts the whole is covered in bas relief, showing the continents and the route of the great race in American silver. The whole is surmounted by a silver American eagle.

An elaborate menu was served and at its conclusion many addresses of congratulation were tendered the host. Among the speakers, in addition to those mentioned above, were Col. George Pope, chairman of the A. L. A. M. show committee; Alfred Reeves, general manager of the American Motor Car Manufacturers' Association; H. P. Burchall and W. J. Hanley, of the *New York Times*, John C. Wetmore, the dean of the New York automobile press men, and S. M. Butler, chairman of the Contest Board of the American Automobile Association.

NATIONAL GAS ASSOCIATION MEETING

Cincinnati, Jan. 10—It has just been decided by the executive committee of the National Gas and Gasoline Engine Trades Association to hold the next annual meeting at the Sinton Hotel, Cincinnati, from June 13 to 16.

ADJOURNED MEETING OF THE S.A.E.

Agreeably to the resolutions which were made at the first half of the annual meeting of the Society of Automobile Engineers, which was held on the fourth instant, at the Automobile Club of America, the adjourned meeting, which will complete the dual session, will begin to-day at 10 o'clock A. M. in the Engineering Societies Building, New York City, and a banquet will terminate the doings of the society, at which the members and guests will be seated at 7 P. M. at the Engineers' Club, 32 West Fortieth street, New York City.

CANADA GOOD ROADS CONVENTION

Toronto, Ont., Jan. 10—After a conference of a committee of the Ontario Motor League with a similar committee from the Ontario Good Roads Association held in Toronto last week, it was decided to hold a National Good Roads Convention in Toronto during the automobile show, which occurs February 24 to March 3. This show will be the largest ever held in Canada.

OVERLAND COMPANY GIVES LUNCHEON TO PRESS

VERY enjoyable describes the luncheon tendered the "Fourth Estate" by F. A. Barker, of the Overland Automobile Company, introducing John N. Willys, president of the company. The lunch was served at one o'clock on Tuesday, January 11, at the Café Martin, New York City, with the usual good things and all the accessories. It was attended by about fifty representatives of the leading news and trade papers.

At the cigars and coffee, Mr. Barker placed the assembly in charge of A. G. Batchelder, who, in his happy and facetious manner, selected from the gathering the orators of the occasion. In presenting Mr. Willys, in whose honor the gathering was assembled, reference was made to the phenomenal development of the Indianapolis and Toledo properties under his leadership, but the future plans of the company were set forth in substantial and pointed oratory by Mr. Laskar, treasurer of the Lord and Thomas Advertising Agency, in whose hands the Overland company has placed its problem of publicity. His announcement that the advertising for the sale of 20,000 automobiles during 1910 was not to be obtained by free reading notices, was received with applause by an unusually appreciative audience. The advertising campaign will be opened by an expenditure in a single day of $62,000, to be followed by approximately $50,000 a month. It, therefore, followed that aside from an extensive and well-organized manufacturing proposition, the Overland people have organized one of the largest, if not the most elaborate, advertising propaganda in the history of the industry.

Mr. Wagner was then appointed timer, and the speeches following were limited to three minutes each. Complimentary indulgences were then offered by Messrs. Schwartzkopf of *Automobile Topics*, Major Humphreys of the *Post*, Ryan of the Chicago *Record-Herald*, Sullivan and Swetland of The Automobile.

The guests were presented with a handsome souvenir, consisting of a thermos bottle in a leather case filled with good intentions and best wishes for the New Year.

President J. N. Willys, and Banquet Tendered Press Representatives, by Overland Automobile Company, Cafe Martin, January 11

WORK FOR THE A.A.A. LEGISLATIVE BOARD

Widespread demand for uniformity in automobile legislation and the necessity for more satisfactory statutes has been apparent in all sections of the country for several years. The American Automobile Association, through its legislative board, early recognized the necessity for national automobile legislation, and what will be the biggest object lesson ever shown in America toward this end will be seen in Washington next month when the National Legislative Convention will be held in that city. The dates as fixed by the Legislative Board, of which Charles Thaddeus Terry is chairman, will be February 15, 16 and 17.

The American Automobile Association has been working to secure uniformity in automobile laws whereby touring from one State to another could be made possible without the necessity of securing additional registration and paying extra fees, and to a certain extent considerable success has been accomplished along these lines, mainly through the efforts to induce the various State Legislatures to enact uniform State laws. It has remained, however, for this National Legislative Convention to crystallize the efforts made in various sections of the country into a grand national demonstration to secure not only what autoists regard as their rights, but which will be a practical illustration of the growing sentiment for uniformity. As an indication of this increasing demand for uniformity it is important to note that Mr. Terry has been requested to speak before the National Civic Federation at its coming conference on uniform legislation, to be held in Washington January 17, 18 and 19, and he will outline the necessity for federal action.

Mr. Terry has recently announced the members of his Legislative Board for the coming year. Every State in the Union is represented. Among some of the well-known members who have always taken an active part in automobile legislation are T. E. Bryan, Florida; H. O. Smith and Edgar Apperson, Indiana; S. D. Waldon, R. D. Chapin, Michigan; F. T. Staples and C. H. Gillette, Connecticut; Frank C. Battey, Georgia; David Beecroft and Sidney S. Gorman, Illinois; Francis A. Hurtubis, Jr., Robert C. Cooley, J. P. Coghlin, Massachusetts; Frank M. Joyce and C. H. Kohler, Minnesota; Dr. W. B. Richardson, Bert Van Tuyle, H. A. Meldrum, Oliver A. Quayle, and Frank G. Webb, New York; Paul C. Wolff, Robert P. Hooper and Powell Evans, Pennsylvania; W. C. Crosby and H. A. Bonnell, New Jersey; James T. Drought, Wisconsin; C. Gordon Neff and F. T. Sholes, Ohio.

CONTEST AND TECHNICAL COMMITTEES

President Lewis R. Speare, of the American Automobile Association, has appointed the following active and associate members of the Contest Board and of the Technical Committee for 1910:

Chairman—S. M. Butler (previously appointed).

Active Members—David Beecroft, Chicago, Ill.; S. B. Stevens, Rome, N. Y.; T. A. Wright, Wilkes Barre, Pa.; Joseph K. Woods, Newark, N. J.

Associate Members—Frank G. Webb, Brooklyn, N. Y.; Frank B. Joyce, Minneapolis, Minn.; F. C. Donald, Chicago, Ill.; L. P. Lowe, San Francisco, Cal.; C. M. Gillette, Hartford, Conn.; Harry W. Knights, Boston, Mass.; James T. Drought, Milwaukee, Wis.; R. P. Hillman, Los Angeles, Cal.; P. D. Folwell, Philadelphia, Pa.; Ralph W. Smith, Denver, Colo.; Wm. G. Humphreys, Atlanta, Ga.; Harvey Granger, Savannah, Ga.; E. H. R. Green, Dallas, Tex.; Charles B. Shanks, Portland, Ore.; G. P. Bullard, Phoenix, Ariz.; Mason B. McLoughlin, Cleveland, O.; T. C. Campbell, New Orleans, La.; Henry J. Spuhler, Pittsburg, Pa.; Chas. W. Sedwick, Indianapolis, Ind.; Geo. Lane, Detroit, Mich.

Technical Committee—Alden L. McMurtry, Chairman, New York. David Beecroft, Chicago, Ill.; F. E. Edwards, Chicago, Ill.; Henry Souther, Hartford, Conn.; Alex. Churchward, Schenectady, N. Y.

Additional appointments on the Technical Committee will be made covering the Middle West, the Pacific Coast and the Southern territories. The object of further appointments will be to make this committee as representative of the different sections of the country as is the contest board.

MANUFACTURERS' CONTEST ASS'N MEETING

The annual meeting of the Manufacturers' Contest Association, Incorporated, was held Saturday, January 8, at the Hotel Manhattan, New York City. Officers elected were as follows: President, Benjamin Briscoe; vice-president, H. O. Smith; secretary-treasurer, William E. Metzger; assistant secretary-treasurer, Russell A. Field; chairman rules committee, H. E. Coffin; directors, Benjamin Briscoe, H. O. Smith, William E. Metzger, H. E. Coffin and Windsor White.

Reports of officers and committees show the organization to have made splendid progress in the first year of its efforts to regulate contest matters in a manner satisfactory to all concerned. The proposed classifications for 1910 were considered in detail and finally ratified. As soon as adopted by the contest board of the American Automobile Association they will be made public in printed form. Besides members of the organization, several others interested in competitions attended.

Interest in the work of the Contest Association is now evidenced from every corner of the world where motor contests are held. There are already several new applications for membership, and, as stated by the president at Saturday's meeting, "it is plain that every maker interested in contest matters will become identified with the organization," the New York office of which is in the Goodrich building, 1780 and 1782 Broadway.

Among those in attendance at the meeting were:

Members—George H. Strout, Apperson Brothers; Alanson P. Brush, Buick Motor Company; E. R. Hollander, Fiat Automobile Company; H. E. Coffin and C. H. Taylor, Hudson Automobile Company; H. O. Farr, Knox Automobile Company; Benjamin Briscoe and C. W. Kelsey, Maxwell-Briscoe Motor Company; William E. Metzger, Metzger Motor Car Company; George M. Dickson, National Motor Vehicle Company; Howard Marmon, Nordyke & Marmon Company; J. B. Eccleston, Oakland Motor Car Company; J. W. Elmer Pratt, Pierce-Arrow Motor Car Company, and G. W. Weldely, Premier Motor Company.

Present by invitation—S. M. Butler, Chairman American Automobile Association Contest Board; A. R. Pardington, Motor Cups Holding Company; E. A. Moross, Indianapolis Motor Speedway, and Frank Nutt, Haynes Automobile Company.

A.A.A. EXECUTIVE COMMITTEE MEETING

State automobile organizations of Texas and Alabama were added to the roll of the American Automobile Association at the meeting of the executive committee held Tuesday at the New York headquarters. This makes a total of thirty-three State bodies now included in the National association. At the same meeting the Automobile Club of St. Louis, with about 400 members, joined as an unfederated club; it will subsequently be included in the formation of a Missouri State association. Lewis R. Speare presided at the meeting.

The usual reports were made by the chairmen of boards. Thaddeus Terry, who has charge of legislation, indicated that the convention at Washington February 15, 16 and 17 will see important developments in the struggle for National legislation.

Chairman S. M. Butler of the contest board reported that the 1910 competition rules were practically ready for the consideration of the executive committee. The number of applications for sanctions far exceeds any previous list filed this early in the season, though this was to be expected in view of the request of the board that clubs desiring dates should let their wishes be known as soon as possible. Likewise Chairman Powell Evans of the touring board presented instructive facts and figures.

George B. Ellis, president of the Automobile Club of Southern California, and John N. Brooks of the Connecticut State Automobile Association were elected members of the executive committee, and the nominations of the following directors by their respective clubs were also approved: Dr. E. W. Omensetter, North Wildwood, N. J., Automobile Club; Hon. Walter E. Edge, Atlantic City, N. J., Automobile Club; J. J. Hinners, Edgewater-Fort Lee, N. J., Automobile Club; Edward C. Smith, Automobile Club of Vermont; William E. Goucher, Jamestown, N. Y., Automobile Club; J. B. McMurrich, Oswego, N. Y., Automobile Club.

TWO WEEKS OF SHOW FOR PHILADELPHIA

PHILADELPHIA, Jan. 10—Saturday night the ninth annual automobile show of the Philadelphia Automobile Trade Association will open in the Third Regiment Armory, at Broad and Wharton streets. The building is so small that in order to accommodate all the applicants for space an extension of the show for an additional week became absolutely necessary. The first week will be devoted to gasoline and steam pleasure cars only. There are a sufficient number of these exhibits to not only fill every available inch of space, but to necessitate some of the late applicants going over to the second week, when electrics, commercial cars, motorcycles, and accessories will hold forth. A special aero exhibit will be a feature of both weeks.

A large corps of workmen has been engaged since early last week transforming the bare interior of the Armory into a bower of beauty, of which blue and white will be the color scheme. When completed the impression of an outdoor exhibition of automobiles is the effect which the decorators will have produced. Box hedges, lattice-work walls intertwined with flowers and green burlap floorcovering combine to carry out the idea. The aisles will be marked by Corinthian columns topped with vines and ornamental plants. The gallery will be devoted to the use of the local automobile clubs for reception purposes, separate spaces being set apart for the Quaker City Motor Club, the Automobile Club of Philadelphia, the Automobile Club of Germantown and the Automobile Club of Delaware County.

All the exhibiting concerns are members of the Philadelphia Automobile Trade Association. A score or more of non-members have been compelled to take second-week spaces. These, with the electrics, commercials, motorcycles, and accessories, will tax the capacity of the Armory for the last half of the show. The following exhibits will hold the stage during the first week:

Stoyle-Vogel Auto Company—American.
Bergdoll Motor Car Company—Bergdoll cars and taxicabs, Thomas and Mercer.
Chadwick Engineering Company—Chadwick.
Prescott Adamson—Columbia and Reo.
Gawthrop & Wister—Elmore.
Ford Motor Company—Ford.
Locomobile Company of America—Locomobile.
General Motor Car Company—Lozier.
Matheson Automobile Company—Matheson and Everitt "30."
Maxwell-Briscoe Company—Maxwell.
Standard Motor Car Company—Middleby and Velie.
Penn Motor Car Company—Mitchell.
Tioga Automobile Company—National and Hupmobile.
Olds-Oakland Company of Pennsylvania—Oldsmobile and Oakland.
Packard Motor Car Company of Philadelphia—Packard.
Auto Sales Corporation—Peerless and Cadillac.
W. J. Sprankle—Marion and Overland.
Foss-Hughes Motor Car Company—Pierce-Arrow.
West-Stillman Motor Car Company—Pope-Hartford.
The Motor Company—Premier.
Longstreth Motor Car Company—Pullman and Alco.
Thomas M. Twining Company—Regal-Detroit.
Hills Motor Car Company—Royal Tourist.
D. Walter Harper—Stanley steamers.
G. Hilton Gantert—Stearns.
A. G. Spalding & Brother—Stevens-Duryea.
Stoddard-Dayton Auto Company of Philadelphia — Stoddard-Dayton.
Studebaker Brothers Company—Studebaker and Studebaker-Garford.
White Company—White steamer and gasoline cars.
Winton Motor Carriage Company—Winton.

SOME FACTS ABOUT PALACE SHOW

Now that the Palace show has closed, it is possible to present a number of interesting figures and facts in connection with it. All records for attendance, either of the public or of agents, were broken, as were the records for profit as well.

For the six days and seven nights, the total attendance was 104,660, to which total, Friday, the closing day, contributed the greatest amount, 19,000. Owing to the close proximity of the A. L. A. M. show, the latter half of the show was the most profitable, the last three days being equal to the others totaled.

That the dealers were out in force was shown by the large number of dealer's buttons given out by the management, 1,284. In addition to the great number from all over the United States, there were many from Canada, and six from Europe. The attendance of carriage dealers was 243.

Associated with the American Motor Car Manufacturers' Association in the conduct of the show and interested in the profits are the Importers' Automobile Salon and the Motor and Accessory Manufacturers.

At the Grand Central Palace on Saturday, Marcus Nathan, the secretary, said that the palace was built 22 years ago and during all that time it never had such a handsome exhibition, nor one so important in the industrial world, while the attendance exceeded anything on his records. The Palace will not be torn down for at least two years.

SYRACUSE SHOW AN ASSURED SUCCESS

SYRACUSE, N. Y., Jan. 8—Immediately after the close of the New York exhibits, the committee of the Syracuse Automobile Dealers' Association will meet to perfect arrangements for the Syracuse show, to be held March 14-19 in the New York State Armory. Chairman H. D. Van Brunt of the committee says no effort will be spared to make the Syracuse show second to none outside of New York. Double the amount of money spent last year in decorations will be paid out this year.

40,000 SQUARE FEET FOR BUFFALO

BUFFALO, N. Y., Jan. 10—All of the space for the Buffalo Automobile Show, to be held in the Broadway Arsenal February 14-19 under the auspices of the Buffalo Automobile Trade Association, has already been taken. The hall is 267 feet long and 167.1 feet wide, offering a floor area of 35,119 square feet. This is two and one-half times the floor area of Convention Hall where the former shows have been held, so that the forthcoming exhibition will be just that amount larger than any of its predecessors.

Members have been in New York during the past two weeks to visit the shows in Madison Square Garden and the Grand Central Palace for the purpose of obtaining suggestions in the line of decorative effects. A feature already adopted will be the drapery of the vaulted ceiling with the largest American flag ever made. It will form a canopy far above the exhibits, and will be illuminated by electric lamps. The illumination calls for 10,000 lamps. The show will be departmentized, including gasoline pleasure cars, electric vehicles, trucks and motorcycles.

The management is making arrangements also for the exhibition of an aeroplane with an actual record of flight, in the interest of and with the co-operation of the Aero Club of Buffalo.

ROCHESTER LOOKING FOR BIG TIME

ROCHESTER, N. Y., Jan. 10—Under the direction of the Rochester Automobile Dealers' Association and the management of Captain C. A. Simmons, who is well known in Rochester, the third annual automobile show will be opened on February 14, and run to and including February 19. An indication of the spirit in which the show is being received is the fact that the Mayor has consented to postpone a musical concert which was planned to be held in Convention Hall the day previous to the opening. This concert has been done away with in order to permit exhibitors to have all the time necessary to get the hall in complete shape so that when the doors are open on Monday night, February 14, there will be absolutely no reason why the show should not be ready for the public. Monday night will probably witness a tremendously large audience.

Elaborate posters have been put out advertising the show and the preliminary application for spaces on the part of accessories dealers early gave evidence to the manager and the committee in charge that the show would far surpass last year's efforts. It is planned this year that the show in itself will be a big social event, or, rather a series of social events. A special effort will be made on featured nights. From the standpoint of the dealers, more store has been put in this year's show than ever before owing to the success which attended last year's exhibit. An electric display will be a feature.

For months the people of Rochester have been looking forward to this display. This feeling did more to make the manager and committee work hard in the early stages of the preparations to insure success of this year's affair than any other consideration. Features of the affair are to be two bands, one in each section of Convention Hall playing alternately, an elaborate floral display in addition to the musical programs, and electrical illumination.

MILWAUKEE SHOW WILL BE NOTABLE

Milwaukee, Wis., Jan. 10—The Milwaukee Automobile Club has begun to arrange the preliminary arrangements for the second annual show to be held in the Milwaukee Auditorium from February 22 to 27, inclusive, now that space has been sold out and the financial success of the event is assured. The demonstrating cars will be given the use of the Fifth street side of the Auditorium. All three entrances will be used to accommodate visitors. The Cedar street entrance will be used for those who attend in cars and carriages. The State street side is reserved for exhibitors. Electric arches will span Fifth street from Cedar street to Grand avenue.

On the evening of Washington's birthday the show will open and remain open until midnight of Sunday, February 27, in order to give the employes and experts of the various motor car manufacturers in Wisconsin an opportunity to see the exhibition.

The entire ground floor or arena of the main hall will be devoted to motor car exhibits; the basement to trucks, delivery and mail wagons, ambulances and other commercial vehicles; the smaller halls to motor boats, marine engines, sportsmen's goods, and accessories All this has been accomplished in the face of great opposition on the part of the local dealers, a large number of whom have not only refused to exhibit, but have opposed the show.

LOUISVILLE SHOW TO ASTONISH SOUTH

Louisville, Ky., Jan. 10—What will undoubtedly be one of the most pretentious and attractive automobile exhibitions held in this section of the country will be inaugurated in the Armory, said to be the largest building in the South, on March 17, 18 and 19. Applications for space to accommodate cars enough to make a creditable showing have been received and it is evident that the capacity of the Armory will be taxed. The show will be given under the auspices of the Louisville Automobile Dealers' Association and an elaborate plan of decoration will be carried out.

There will be several hundred different displays, which will include an extensive variety of the latest models. The value of machines on exhibition will range from the cheap vehicles to the most expensive cars. In one section of the big building a complete display of motorcycles will be exhibited, while the department of electric pleasure vehicles will be one of the featurs of the show. A considerable amount of space will also be given over to accessories.

At this show the Kentucky people will have the first opportunity to inspect the newest products of representative American makers. Committees have been appointed to take up the work of arranging for the various details of the show, which promises to be the most important event with the automobile manufacturing and trade interests in this part of the country.

DETROIT SHOW DECORATIONS READY

Detroit, Jan. 10—Practically all the decorative effects for the annual auto show under the auspices of the Detroit Auto Dealers' Association, which will open at the Wayne Hotel Gardens Jan. 24, continuing through Jan. 29, are in readiness to be installed, and every indication points to an even more artistic decorative scheme than ever before, making it the beauty show of the country, as well as the leader in point of actual number of models shown. Manager Gillespie and his staff of assistants are busy rounding out the details for the big event, and announce confidently that although the garden will not be available until four days before the show opens everything will be in readiness for the opening night.

ASKS DISSOLUTION OF VOTING POOL

Detroit, Jan. 10—Still another angle to the E-M-F-Studebaker controversy has developed, and may add to the complications already existing. When the selling contract between the two companies was signed last spring seven-tenths of the stock of the E-M-F Company was pooled and placed with the Union Trust Company, with the understanding that it was to be voted in accordance with the instructions of all of the stockholders interested. Having rescinded its selling agreement with the Studebaker concern, the E-M-F Company majority stockholders want the pool dissolved, formal notice having been served on the Union Trust Co. The latter has appealed to the circuit court.

SOUTHERN ENDURANCE RUN IN MARCH

Savannah, Ga., Jan. 10—It has been decided by the Savannah Automobile Club to have the next endurance run, which will be to Jacksonville, Fla., to be run on the 28 and 29 of March. The Savannah *News*, the Jacksonville Automobile Club and a local paper there will also take part. The scout car, a Maxwell to be driven by Robert Brockett, Jr., will leave next week to pick out the route on which the run will take place. It has been figured out that two days will be taken, as on the one to Atlanta. The distance is something like 175 miles. This is but one of the many runs that will be run by the Savannah Automobile Club this coming year.

AUTOCARS TO AUTO CHEMICAL'S RESCUE

Ardmore, Pa., Jan. 10—An automobile "train" as a fire-fighting adjunct was the novel sight witnessed here New Year's eve, when an alarm of fire was received from Wynnewood. The auto chemical responded at once, but its weight was such that progress through the heavy snow was slow, until some one suggested calling on the Autocar people for assistance. A hurry call brought two "testers," which took the heavy chemical in tow and in a trice the "train" was dashing down the Lancaster Pike through the partially broken snow-drifts, reaching the scene of the fire in time to prevent serious damage.

BIG TAXICAB SERVICE FOR BALTIMORE

Baltimore, Jan. 10—The Taxi-Service Company, of Baltimore was incorporated in Trenton, N. J., and under its charter the new concern is permitted to carry on a general taxicab and garage business; to transport merchandise as well as passengers and to manufacture and deal in vehicles for conducting its business. The new firm takes over Stewart & Company's livery business, including taxicabs, horses, carriages, etc. The Taxi-Service Company has an authorized capital stock of $500,000 divided into 5,000 shares of a par value of $100. Of this sum, $250,000 is preferred stock bearing 7 per cent. cumulative dividends, and the remainder is common stock. Prominent Baltimore financial interests are behind the new enterprise. The plans include the addition of a considerable number of cabs to those in service, with the object of giving Baltimore a service second to none.

Four Shaft-Driven Baker Electrics Out for a Winter Run

Pittsburg's New Traffic Regulations—Pittsburg has experimented one week with the new rule of the police department that all vehicle traffic should proceed in certain directions on leading downtown streets. Everything goes north on Smithfield street and south on Wood street, and the same order will probably be observed a little later on Liberty and Penn avenues, which are parallel with each other and nearly parallel with Wood and Smithfield. It is the intention also to do away with all vehicle traffic during the day on Fifth avenue, between Grant street and Liberty avenue. So far, the change has been received with comparatively little objection, and aside from a few collisions and altercations the first day the order went into effect, it has been welcomed as a sure means of doing away with the fearful downtown congestion.

Royal Equipment Company, Bridgeport, Conn.—This company, established by the late Arthur H. Raymond in 1902, has been reorganized. The new company will be known as the Royal Equipment Company, with a capital stock of $50,000 that has been fully paid. The officers of the company will be E. B. Knowles, president and treasurer; L. V. Raymond, vice-president, and W. G. Hoag, secretary. Mr. Knowles was formerly Mr. Raymond's confidential adviser and business manager, while Mr. Hoag was associated with the founder of the company in the first years of its establishment. The new concern begins business in a factory five times as large as that previously occupied.

Brampton Aeroplane Chains—Chas. E. Miller, 97-101 Reade street, New York, who is the sole United States agent for Brampton chains, has just received from the factory in England samples of a special chain which Brampton Bros. are now making for aeroplanes. This chain is made of nickel steel, and of a special size long pitch and a very narrow link, the size being 1¼-inches pitch, 5/6-inch wide. It is made specially loose, allowing a certain amount of lateral flexibility, which is desirable for the purpose for which it is used. This size chain was designed for and is used on the "Cody" biplane. Mr. Cody, an American, is in charge of the aeronautic division of the English Army.

Parts Exhibition.—At the headquarters of the Rambler Automobile Company of New York, during first show week, there was shown a stock of duplicates of every part of every Rambler car manufactured in the Rambler factory since the factory was started—ten years ago. The importance of being able to purchase an extra part with ease and dispatch has neevr been fully realized by new purchasers of automobiles, but always considered of great importance by people who have owned cars. The New York exhibit made by the Rambler representatives illustrates what has been accomplished by Thomas B. Jeffery & Company in this respect within the last ten years.

An Interesting Feature—To demonstrate the qualities of the Truffault-Hartford shock absorber, its manufacturers utilized a unique device at the Grand Central Palace Show. Two miniature automobiles, perfect in detail and complete equipment, including extra tires, electric headlights, tool boxes, etc., were shown in comparison, running on a rough road at a speed of about thirty miles an hour, one of the cars being fitted with shock absorbers, while the other is not. It was plainly seen that the passengers in the car with the shock absorbers found it always "easy going," while the occupants of the other car were having a rather rough time of it.

Ford Motor Company Gives Christmas Gifts—Following an established practice, the Ford Motor Company distributed about $80,000 among the workers in their big plant—this as a token of appreciation for faithful service rendered during the preceding twelve months. While the bulk of the money was distributed in Detroit, it still remains that all the branch offices and factories were remembered, so that Ford employees in twenty cities between New York and Seattle, as well as in Paris, France: Melbourne, Australia, and Winnipeg, Canada, were all remembered. The money was divided according to years of service.

Rambler Leads in Minnesota—Figures just compiled for the State of Minnesota show that there are in use in that State 6,282 automobiles. It is interesting to note that a very large number of these cars have been purchased by residents of small towns. The compilation shows that in towns of under 1,000 population there are in use 1,169 automobiles, while in towns between 10,000 and 21,000 population there are only 252 automobiles. Thomas B. Jeffery & Co. say that the New Rambler leads all those within $1,000 of its price in towns under 1,000 population, as well as in towns under 3,000 and 5,000 population.

Franklin Owners First and Third—The automobile owners of Ohio are required to take out a State license each year, and among the 23,000 motorists in that State there is rivalry for the low numbers. For months ahead application was made last year for certain numbers to be given when the tags were sold for the new year. The distinction of carrying No. 1 for the year has fallen to Thomas B. Paxton, Jr., a lawyer of Cincinnati, who owns a Franklin automobile. No. 3 has been secured for another Franklin by E. M. Schoenborn of Columbus, president of the Columbus Baseball Club.

Franklin with a Glass Hood—George E. Messer, Syracuse, N. Y., branch manager for the Franklin Automobile Company, is driving about the streets of that city with a Franklin motor car equipped with a hood made of glass instead of metal. The interior of the hood is illuminated by means of a series of electric lights. When standing in the city streets, especially in the evening, the car is always surrounded by a crowd of interested onlookers. The engine is, on occasions like this, allowed to run while car stops are made, so giving a visual demonstration of the operation of the motor.

To Share Company Earnings—The Warner Gear Works of Muncie, Ind., have joined the ranks of that class of manufacturers who believe that employees should share directly in the company's profits, and at a recent meeting an appropriation was made for distribution among employees who have completed three distinct periods of service. The plan was proposed by president A. L. Johnson, and the board of directors fell in line with the idea. It is expected that this move will encourage or increase the efficiency of the organization very materially.

Sebring "Six" Makes Record—In a recent test the Sebring "Six" was driven from Sebring, O., to East Liverpool, O., without a change of gears. The president of the Sebring company ordered that it be driven full speed over the intervening hills, and to be sure that the speed lever was not changed the car was wired into high speed. R. M. Allen drove, accompanied by B. H. Sebring. The gear was not changed during the trip and the "Six" took all of the bad hills without the least difficulty, evidently having plenty of power in reserve at all times.

Long Manufacturing Company, Chicago—This maker of radiators and accessories has just bought a tract of land in Detroit fronting on Cass avenue 320 feet and extending from Amsterdam to Burroughs avenue, and plans have been prepared for a two-story modern plant with 100,000 square feet and employing 1,000 men. The new plant at Detroit will be operated as a branch of the main plant in Chicago. The capital of the company has been increased to $300,000. J. B. Long is president and treasurer and Louis Shisler secretary.

Interesting Times Square Co. Exhibit.—This New York company, extensive dealers in second-hand machines, has a comprehensive collection of cars, ranging from the small runabout to the great sightseeing 'bus, of all cylinder equipments and all motive powers, whether gasoline, steam or electricity propelled vehicles. The showrooms, located at 213 West Forty-eighth street, are commodious—each car being readily accessible—while the lighting facilities are good, permitting minute inspection.

Special Cars for Automobiles—The Chicago, Burlington & Quincy Railroad has followed the lead of the Milwaukee road in furnishing special freight cars for shipments of motor cars, and it is reported that an order for 500 has been placed with the Burlington's shops for early spring delivery. The West Milwaukee shops of the Milwaukee road are still building these special cars, Wisconsin motor car manufacturers having become partial to them since first being granted their use.

Iroquois Garage Company, Columbus, Ohio—This concern recently incorporated in Columbus, Ohio, with a capital stock of $20,000, taking over the Columbus Garage & Machine Company of that city. The new company contains many of the men interested in the old one, and the management will not be changed. H. L. Thurma is general manager. The Iroquois Garage Company, in addition to the garage business, will be central Ohio agents for the Empire and Grabowsky trucks.

Owen-Thomas Company Moves—The Corliss Motor Company, of Corliss, Wis., is moving the machinery and equipment of the Owen-Thomas Motor Car Company, of Janesville, Wis., to Corliss, where it is being installed in the plant of the Wisconsin Engine Company. This plant will be used until the new works can be erected. The Wisconsin Engine Company is building the motors for the new car, which will be a six-cylinder, 60-horsepower, of all-steel construction.

Sheriff Gets a Franklin—A 1910 Model H Franklin car has been purchased for the sheriff of Milwaukee county, Wisconsin, by the board of supervisors. The car is of seven-passenger capacity, with a 6-cylinder, 42-horsepower motor, weighing 3,000 pounds. The price is $4,000, fully equipped. The sale was made by the Franklin Automobile Company. Fourth and Prairie streets, Milwaukee. The city now has 12 automobiles and the county three.

Demot Runabout Goes "Cross Country"—In order to demonstrate that the Demotcar is not only an asphalt performer, but a good "rough road" proposition as well, Albert K. Peters and W. C. Corey, of the Harper Aldrich Company, Detroit, drove from that city to Port Huron, over roads representing about every disreputable stage; time, 2 hours and 40 minutes; distance, 62 miles. The car finished in good shape.

Smith Automobile Company, Grand Rapids, Mich.—Plans are under way to remove this plant from Topeka, Kan., to Grand Rapids, Mich. Of the $180,000 in stock of the company, 17 Grand Rapids business men have acquired a controlling interest, and it is said that as soon as legal formalities are complied with, work will be commenced on the local factory. It is planned to have 500 cars for future delivery.

New Transfer Company—The Canfield Transfer Company, just organized, will conduct an auto passenger business and transfer business between Canfield, Ohio, and Youngstown, Ohio. It is possible that later a mail route may also be established over this line. The company was organized by H. W. and Bertha Corll, C. H. and Melvin Neff, and Lola E. Mock, of Canfield, Ohio. The capital stock is $50,000.

Another Carriage Company Comes In—The Collings Carriage Company of Philadelphia, old established and conservative, will take on a line of automobiles, selecting the Rainier. The Atlanta Gold Trophy Car, which made a new record of 200 miles in 173 minutes, will be placed on exhibition in the Collings showrooms, 1719 Chestnut street. This in addition to several other models.

Stewart Taxi Service Company, Baltimore—This organization has been incorporated under the laws of Maryland, with a capital stock of $10,000. The incorporators are: Harry L. Stewart and T. Foley Hisky, of Baltimore; Harlan W. Whipple and James J. O'Brien, of New York, and Claude S. Jarvis, of Philadelphia. Other New Yorkers are Lawrence W. Barnum and William S. Stafford.

Pittsburg Automobilists Up In Arms—The automobilists in Pittsburg are much enraged over the fact that a bill is now pending in Congress, imposing a tax of $10 upon all automobiles traveling from one State into another. They argue that such a bill, if passed, will limit the excursion business to local States—also that it will work a great injury to hotel interests all over the country.

Important Executive Change—Clare A. Pickard, president of the board of directors of the Salisbury Wheel & Manufacturing Company, is no longer connected with this concern. S. H. Penfield has been appointed his successor, while Edwin D. Cook has been made vice-president of the board of directors to fill the vacancy caused by the appointment of Mr. Penfield.

A Milwaukee Move—The Kissel Kar Company, of Milwaukee, distributors in a large Western territory for the Kissel Kar, of Hartford, Wis., has moved from Fourth and Poplar streets (Motor Row) to 228-232 Wisconsin street, Milwaukee, into the quarters formerly occupied by G. W. Browne Motor Company, recently merged with Bates-Odenbrett Auto Co.

Correction as to Quantity—In an item occurring on page 1194, of THE AUTOMOBILE issue of December 30, with reference to the output of the Warner tops, there was a notice in effect that this company expected the output to be "1,000 tops." By way of correction be it stated that this should have read "10,000 tops." We make this correction in justice to all.

Midland Rubber Company of Columbus—This concern incorporated in Columbus, Ohio, with a capital stock of $25,000 to manufacture and sell rubber appliances. A part of the output will be designed for the automobile industry. The incorporators were Fred W. Hoeschele, John L. Hoeschele, Fred A. Caskey and H. J. Powell.

New Reo Bucks the Snow—A new model, four-cylinder Reo went through the recent snow blockade from New York to Spring Valley, N. Y., a distance of 50 miles, over roads which had not yet been broken. H. D. Hewlett, driver and owner, states that he arrived home with the car in splendid condition, minus trouble and delay.

General Motors Company of Detroit—It is announced that this company has incorporated in Michigan. The incorporation is for $10,000, with W. C. Durant, Flint, W. J. Mead, Lansing, and C. R. Hathway, New York, each owning one share of stock. C. R. Hathway, Trustee, owns the other 97 shares.

Motor Parts Company, Chicago—The removal of this company is noted, from 309 Fisher Building, Chicago, to 1735 Michigan avenue, the same city. This company is selling agent for the Providence Engineering Works, and for the National Porcelain Company. R. E. Hardy is president.

Direct Drive Mfg. Co., Indianapolis, Ind.—This concern has been organized with paid up capital of $50,000, to manufacture the Parkinson direct-drive transmission. The officers are: W. H. Parkinson, president; B. F. Meixell, general manager; A. C. Downing, secretary and treasurer.

Racine to Keep Big Plant—It is said that the Racine, Wis., Manufacturing Co. will not move to another city, Racine manufacturers and merchants having offered to subscribe a fund of $100,000 to assist the company in rebuilding the plant destroyed by fire on Dec. 12.

Pennsylvania Rubber Company Elects Directors—At a recent meeting of the stockholders of this company, the following were elected directors for 1910: Herbert Du Puys, H. Wilfred Du Puys, Chas. M. Du Puys, F. A. Wilcox and Seneca G. Lewis.

Still Doing Business—The plant of the King Automobile Tire Company, at Racine, Wis., was damaged $3,000 by fire on January 1. The production will be carried on as usual, new equipment having been installed.

IN AND ABOUT THE AGENCIES

E.M.F. and Flanders "20" in Columbus—These cars will be represented in Columbus, Ohio, by a $20,000 corporation headed by Foster G. Burdell. The territory covered consists of Franklin, Madison, Pickaway and Delaware counties. The incorporators are: Foster G. Burdell, H. M. Myers, Randolph Walton, G. S. Frambes and P. D. Newall. The officers are: F. G. Burdell, president and general manager; H. M. Myers, secretary and attorney, and P. B. Newall, treasurer.

E-M-F and Flanders, Philadelphia—J. C. Schwartz is president, J. E. Gomery secretary-treasurer and Frank Yerger technical manager of the new company which will represent the E-M-F and Flanders cars in Philadelphia. Temporary offices have been opened at 1229 Chestnut street, but when the concrete building now in course of erection at Broad and Callowhill streets is completed, about February 1, the new concern will establish its quarters there.

Franklin, Cincinnati and St. Louis—The Franklin Automobile Company, which maintains branches for the sale of automobiles made by the H. H. Franklin Manufacturing Company, of Syracuse, has announced the opening of branches in Cincinnati and St. Louis. Mr. Braerly, formerly branch manager of the Olds Oakland Company in Toledo, has charge of the Franklin interests in St. Louis.

Winton, Marion, Overland in Milwaukee—The Bates-Odenbrett Auto Co., 503-507 Broadway, Milwaukee, Wis., representing the Winton, Marion and Overland, is making extensive improvements in its garage and salesrooms. New offices have been established, giving more stock room. The company recently absorbed the George W. Browne Co.

Isotta, Simplex and Pennsylvania, Philadelphia—Failing to secure adequate space at the coming Philadelphia Show, these cars will have a two weeks' show of their own in their quarters on the southwest corner of Twelfth and Walnut streets, Philadelphia. J. M. Quimby & Company, at the above address, are the local agents.

Studebaker, Portage, Wis.—The Cook-Jones Auto Company has been organized at Portage, Wis., to handle the Studebaker gasoline and electric cars. A livery and accessories department will also be established. James R. Jones was for several years associated with the Hokanson Automobile Company, of Madison, Wis.

Continental Tires, Cleveland and Denver—The Continental Caoutchouc Company has added two more distributing agencies to its list. These are the Pennsylvania Rubber and Automobile Company, 145 Euclid avenue, Cleveland, and the Boss Rubber Company, 1614 Broadway, Denver.

Lavalette & Company, New York—This concern, makers of the Eisemann Magneto, have removed from 112 West 42d street to more extensive quarters in the new Stoddard-Dayton Building at 57th street and Broadway, New York. This concern will occupy the entire sixth floor.

Another Foreign Agency—Flandrau & Company, well-known as carriage builders, have taken the exclusive selling agency in the United States for the Brasier car, built by the Société des Automobile Brasier, Paris. These cars will be equipped exclusively with Michelin tires.

E-M-F, Wilmington, Del.—This company will be represented in Wilmington, Del., by the T. C. Bradford Company. Wilmington is the center of the selling territory, comprising the State of Delaware and the eastern shore of Maryland, over which there has been a dispute.

R. E. Hardy Company, manufacturers of ignition plugs and other accessories, will move from their present location in New York City to Chicago, Ill. They will occupy a floor at 1735 Michigan avenue. Their location is in the center of Chicago's "Gasoline Row."

Early Motor Car Company of Columbus—A change is noted in that this company, organized by Dr. L. M. Early some time ago, has taken the Central Ohio agency for the Paterson car made at Flint, Mich., in addition to the Rambler and Babcock electric.

Ford Agency Change in Pittsburg—Paul Brown Patterson and Dr. J. M. Emery, of New Castle, Pa., have formed a partnership and have taken over the Ford agency in Pittsburg. They will be located at 135 Pittsburg street.

McIntyre, Winston-Salem, N. C.—The Motor Company of this city has secured the State agency for the automobiles and delivery wagons of the W. H. McIntyre Company of Auburn, Ind.

Mitchell Cars, Clarksburg, W. Va.—The Clarksburg Automobile Company, Clarksburg, W. Va., will handle these cars in the future. This company has been recently organized.

Hess-Bright Bearings, Chicago—The Hess-Bright Mfg. Co., of Philadelphia, will open a Chicago branch at 1800 Michigan avenue about January 20 to care for its Western trade.

Cole "30," Columbus—John T. Gill has secured the agency for this car in Columbus and surrounding territory. He will be associated with the Love Garage Company.

Pierce, Racine, Wis.—D. Elmer Roberts, of Racine, Wis., has established a local agency for the Pierce Motor Car Co., of Racine, at Wisconsin and Fifth streets.

Mitchell, Kewaunee, Wis.—W. Heck, of Kewaunee, Wis., has been appointed a district agent for the Mitchell in several counties of northern Wisconsin.

PERSONAL TRADE MENTION

W. McK. White, formerly associated with the Grand Central Palace Show, will leave for Indianapolis February 1, where he will enter the advertising and selling department of the Premier Motor Manufacturing Company. He will be associated with President H. O. Smith. Mr. White has been in the automobile trade for a number of years and has been prominently identified with the sales departments of several well-known manufacturers. He has also done editorial work for the *Press* and *Evening Times* in Philadelphia and was later connected with the staff of The Automobile.

A. L. Garford, of Cleveland, gave a luncheon last Thursday noon at the Engineers' Club to the old Federal Mfg. Company producers, including besides A. L. Garford, the host, M. B. Johnson, A. O. Smith, L. M. Wainwright, D. B. Warwick, W. W. Wardrop, W. L. Colt, J. M. Sinyard, L. D. Bolton, W. P. Culver, F. W. Lawrence, T. J. Heller, Herman Ely, F. M. Germane, E. K. Moore and G. J. Leonard.

John A. Poole, formerly associated with Col. Albert A. Pope, and European traveler for the American Bicycle Company, later sales manager of the Olds Motor Works and Buick Motor Company, has formed a connection with the Babcock Electric Carriage Company. Mr. Poole has been appointed general sales agent for the Babcock.

Elmer Apperson, president Apperson Brothers Automobile Company, Kokomo, Ind., according to latest reports, is convalescing at Lakeview Hotel, Leesburg, Fla. His absence from the Garden Show caused no little comment, as it is the first he has missed since the first show was held in the Garden in November, 1901.

H. E. Doty, fo merly sales manager of the Southern half of the Western sales department of the White Company, has been transferred to San Francisco, where he will assume the position of assistant manager of the Pacific Coast department. J. O. Sackman, of the Chicago office, has succeeded Mr. Doty.

J. J. Fuerth has opened a training school for chauffeurs and car owners in Syracuse, N. Y. A corps of competent instructors have been engaged for the purpose of teaching the manipulation, construction and repair work of cars. Mr. Fuerth was formerly from New York.

Louis C. Block, manager of the Philadelphia branch of the Ford Motor Company, who has been in Cincinnati for the past two months establishing a branch house, returned to the Quaker City last week.

Hans Renold, proprietor of the great chain works employing 1,000 men in Manchester, England, and bearing his name, is at the Manhattan, New York City. Herr Renold has done much in developing chain transmission.

James F. Fairman is now connected with the Automobile Tire Company, Inc., with headquarters at 1625 Broadway, New York.

F. L. Gallagher, secretary and treasurer of the Modern Tool Company, Erie, Pa., died on November 29.

THERMOID RUBBER COMPANY ENTERTAINS

On December 30 the Lozier Motor Company was entertained by President Stokes of the Thermoid Rubber Company, at a dinner given in the apartments of Mr. Stokes in the Hotel Royalton, New York. The dinner, while not large, is said to have been one of the finest ever served in the greater city. On this occasion the Thermoid Rubber Company presented the Lozier Motor Company with a beautiful and most remarkable tablet executed by Peter Korzilius, a sculptor of note. This tablet, which measures three feet in height and five feet in length, shows the two Lozier cars in action, winning the great 24-hour race at Brighton Beach on October 15. They were reproduced from actual photographs of the race. It will be remembered that in this race the Lozier car No. 3 finished in first place, establishing a new world's record of 1,196 miles. The dinner was evidently an expression of mutual good will, inasmuch as the Lozier Company were strong in their acknowledgment of the efficiency of Thermoid Brake Lining, and gives it due credit for the part it played in the winning of this important victory.

TREND OF THE TIMES IN OHIO

Columbus, O., Jan. 10—Automobile sales companies, garages and motor supply houses are being formed in every part of Ohio. The records of the Secretary of State show that many concerns were incorporated during the past week as follows:

The Automobile Trucking & Delivery Company, Cleveland, $15,000, by B. R. Graham and others.

The Mauser Auto Cab Company, Youngstown, $5,000; Louis K. Mauser and others.

The Zumstein Taxicab Company, Cincinnati, $300,000; Charles S. Dale and others.

The Automobile Country Club Company, Bevis, Hamilton County, $50,000; John Hamilton Davis, W. H. Hilland, John M. Thomas, Jr., Robert J. Buckwater and Theodore Jung.

The Atlas Motor Car Company, Cincinnati, $10,000; Hans Richards, Mrs. H. D. Braun, Mrs. F. B. Williams, Oscar Hood and Harold Becket Gibbs.

The Anchor Motor Car Company, Cincinnati, $50,000; W. J. Brunsman, F. M. Blair, Morris J. Dale and others.

INDEX TO ADVERTISERS

SPECIAL NOTICES

Advertisements inserted under this heading at 20 cents per line; about 7 words make a line. Remittance should accompany copy. Replies forwarded if postage is furnished.

Cars for Sale

A BARGAIN—New 1910 Model "G. A." White Gasoline Touring Car, fully equipped with top, etc. Shipped direct from factory to buyer at a bargain price. Good reasons for selling. Fred. T. Tremble, Saranac Lake, N. Y.

A CLEARANCE SALE of Standard make autos—all styles and prices. Taken in part payment for new cars and all thorougly overhauled by our factory experts with the company's name behind them. Thos B. Jeffery & Co., 302-304 Wabash Ave., Chicago.

A CHADWICK Great Six, factory overhauled touring car and tourabout for sale. Mechanically overhauled, subject to guarantee. Entirely refinished. An opportunity to obtain a high-powered, distinctive car at a reasonable investment. Chadwick Engineering Works, Pottstown, Pa.

ALLEN-KINGSTON, $1,400—Car 1908, seven-passenger, 45 H. P.; has new tires and two extra shoes. Brady & Myers, 66 Berkeley St., Boston, Mass.

ALL 1908 MODELS overhauled, repainted, fully equipped and guaranteed. Two K White Steamers, 7-passenger, $1,500 each. One L White steamer, 5-passenger, $800. Autocar XIV, 5-passenger, $1,500. Reo, 5-passenger, $500. Delivery car, $250. C. C. Stoltz, Marion, Ohio.

ALL KINDS of cars at all kinds of prices, $150 and up. Write us or call and we can satisfy you. Western Auto Sales Co., 309-310-311 Michigan Ave., Chicago, Ill.

AT A SACRIFICE our four-cylinder Ford runabout and our Olds runabout, both in first-class condition. 118 West Wayne street. Auto Hospital. 'Phone, 754, Ft. Wayne, Ind.

AT A BARGAIN—1909 Royal tourist, 48-H.P., run only 3,800 miles; owner has ordered 1910 Royal to be delivered in spring; also 1908 Matheson, 50-H.P.; owner sells because he has another Matheson; both cars are in perfect condition and are equipped with everything that can be put on a car. Address P. O. Box 1635, Boston, Mass.

ATTENTION!—Clearing house for motor cars. If you are looking for a slightly used car consult us. We bring buyer and seller together; expert auto appraisers. Automobile Brokers Association, 118 Market St., Newark, N. J.

AUTOMOBILES BOUGHT and sold, 20th Century Automobile Co., 1615-23 B'way, corner 49th St. 'Phone 4767 Col., New York.

AUTOMOBILE BARGAINS!! We are the largest dealers in the world in new and used cars. Now is the time to snap up the bargains. Hundreds of private owners, anxious to dispose of their 1908 and 1909 cars without delay, chiefly on account of getting 1910 models, have sacrificed them to us, and we, in turn, after being most careful to accept only good cars and then putting them in first-class condition, offer them at surprisingly low figures. We have them in all sizes and makes from the smallest to the largest. The makes creditably represented in the big stock on our sales floors are: Packards, Thomas, Peerless, Pope-Hartford, Stevens-Duryea, Haynes, Buicks, Hotchkiss, Pierce-Arrows, Oldsmobiles, Mitchells, Locomobiles, Chalmers-Detroit, Winton, Fords, Cadillacs and other well-known and reliable makes. Buy now and get more than your money's worth, and remember it costs you nothing to investigate. Send for our Bulletin containing prices and description of hundreds of cars. Times Square Auto Co., largest dealers in the world in new and second-hand cars. New York, 215-217 W. 48th St.; Philadelphia, 238-40 N. Broad St.; Chicago, 1332-14 Michigan Ave.; St. Louis, Pine and 18th Sts.; Kansas City, 1701-3 Main St.

BARGAIN—If you wish to purchase a 50-H. P. car at a very reasonable figure, communicate with Mr. Charles T. Brown, Winchendon, Mass. Any kind of a demonstration gladly given.

BARGAINS in second-hand cars. Winton touring car, newly painted and overhauled, $700; Peerless touring car, overhauled, all new tires, $650; Maxwell two-cylinder touring car, in good condition, $550; Ford Model T tourabout, run very little, $700; two Cadillac touring cars, single cylinder, $300. Address L. T. Ford, Sanford, Maine.

BUICK, Model 17, '09; run 1,742 miles; top, wind shield, slip covers, speedometer, three tubes and new extra casing; all good as new. Demonstration. Also two-cylinder Autocar delivery. White Steamers, '06, '07 and '08. For best offer. S. A. Teel, Bangor, Pa.

CORBIN touring cars and runabouts, $800 and up. Thoroughly overhauled by us and guaranteed. Corbin Motor Vehicle Co'p'n of N. Y., 1888 Broadway, near 62d St., New York City.

FOR SALE—Single-cylinder Cadillac; also small cylinder Northern runabout, in good order, or exchange for larger car. Box 431, Stratford, Conn.

GREATEST automobile sale in New York—Over 200 cars, all sold direct for owners; no dealers' profit to pay. Cars sold just as they come from owners. Unlike others, we do not put a few dollars in paint and repairs and add hundreds to the price. Our stock includes limousines, touring cars, roadsters, runabouts and delivery wagons. Prices, $125 to $3,500. A number of cars sold for unpaid advances and storage charges. The house of genuine bargains—one-third less than Broadway prices. Manhattan Storage Co., 334-340 West 44th St., near 8th Ave., New York City.

HOLSMAN, 1908 Model, high-wheel runabout, equipped with top and newly painted, $200. Lyman Kirkpatrick, Rochester, N. Y.

I WILL SACRIFICE my Thomas Flyer for $1,000 cash; is '07 5-passenger tourabout; has top, glass front, speedometer, seat covers, lamps, Prest-O-Lite tank, magneto, etc. Perfect mechanical condition. Address Box 83, care The Automobile.

INTER-STATE touring car; run 800 miles; cost $1,750, for $1,400; reason for selling, closing agency. J. T. Curtiss & Co., Simsbury, Conn.

LOCOMOBILE—15-20 H. P. 1908, touring body, excellent condition, $1,100.
Fifteen 24 H. P. De Dion-Bouton 3-ton truck chassis, or with double deck omnibus body; make offer; like new.
Brand new 30 H. P. Panhard; fast express chassis; capacity 3 tons; solid tires; $3,500.
One hundred other bargains.
Automobile Brokers Association, 118 Market St., Newark, N. J.

OLDSMOBILE runabout for sale at a bargain. Address Clinton V. Shoaf, Lexington, N. C.

ONE LOCOMOBILE in fine condition, just overhauled; newly painted; fully guaranteed. Jules S. Dreyfous, 308 Baronne St., New Orleans, La.

ONE SIX-CYLINDER PEERLESS, run but 8,000 miles, in first-class condition; will do 9 miles per gallon; also two 1909 four-cylinder Peerless in fine condition. Inquire Maine Motor Carriage Co., Portland, Me.

PACKARD 1908 touring car; Pantasote top, wind shield, gas tank, etc.; in prime condition; practically same as 1910 Packard at half the price. Used only by careful owner. No brokers. R. Foss, P. O. Box 2898, Boston, Mass.

RUNABOUTS and small touring cars our specialty, from $250 upwards. Cars guaranteed, demonstrated and delivered free. C. & G. Auto Co., 312 West 43d St., New York.

SIX-CYLINDER Franklin, Pope-Hartford, Thomas-Detroit Forty, Winton, single-cylinder Cadillac, Thomas Flyer, small Stoddard-Dayton runabout, Waverly electric with coupe body, etc. Lack of room compels us to sacrifice these cars at once. E. R. Thomas Motor Co., 1200 Niagara St., Buffalo, N. Y.

STANLEY EX for sale, or will trade for Stanley U. or F. Address "Stanley," care The Automobile.

STANLEY—Exceptional bargains due to many owners ordering the new models. Choice of many cars. Prices are lowest NOW. Macker-Tyler Co., 31 Central St., Worcester, Mass.

STEVENS-DURYEA MODEL U, six-cylinder Touring Car, with top, magneto, shock absorbers, tire irons, trunk rack, 2 extra tires and 4 extra tubes; made about 3,000 miles; almost like a new car in every respect; $2,000 net. Oliver B. Brown, Brookhaven, Miss.

1907 THOMAS Flyer, $1,000; 1907 Type XV Pope-Toledo, $1,200; 1907 and 1908 Pope-Hartford, $1,000 up; good condition. E. T. Reynolds, 14 Lakeview Ave., Lynn, Mass.

1908 SEVEN-PASSENGER touring car with Rothschild top and slip covers, speedometer, Truffault suspensions, electric light, etc.; overhauled and in fine condition; cost over $5,000; cash sale for $1,500. The Allen-Swan Co., 1382-1384 Bedford Ave., Brooklyn. 'Phones 5200 and 5201 Prospect.

1909 40-H.P. KNOX Touring Car, just overhauled at factory; cost with extras, $3,400. Owner buying 1910 model. E. A. Swain, Pomfret Centre, Conn.

1909 OAKLAND four-cylinder touring car; mohair top, glass front; speedometer; two new extra shoes, four tubes, $1,125. Lyman Kirkpatrick, Rochester, N. Y.

1909 WHITE STEAMER, Model "O," five passenger, kerosene burner, perfect running order, extra tires, top, wind shield, Jones speedometer. Will sell or exchange for two-passenger runabout. Gardner Hendrie, 810 Land Title Bldg., Philadelphia, Pa.

1909 PACKARD 18, Coupe, entirely refinished and in perfect condition in every respect; good as new. This is a luxurious outfit for any one wishing to drive his own car. Price reasonable. Chicago Motor Car Co., Packard Distributors, 2920 South Park Ave., Chicago.

$80.00 BUYS Cadillac; fine running condition. Lock Box 41, Dedham, Mass.

Cars Wanted

FOR EXCHANGE, 200 shares of Rice Electric Switch Co.'s stock for Buick, Model F, 1909, equipped fully. Address Box 94, care of The Automobile.

Parts and Accessories

(FOR SALE)

ALL SIZES and makes new and rebuilt tires for sale. Write for prices. Factory experts on repairing and retreading; work guaranteed. Charges paid on country work. Colonial Rubber Works, 2436-38 Michigan Ave., Chicago.

AUTO CASES and tubes that give good service at interesting prices. Send for my new price list. Wm. Vanderpool, Jamestown, O.

AUTOMOBILE Hardware Specialties; bronze, brass, aluminum bronze, German silver; foundry and finishing facilities unsurpassed; buckles, strap loops, handles, etc. Sargent Mfg. Co., Newark, N. J.

COLEMAN'S POLAR OILS, non-carbonizing, zero cold test; write for price list. 10,000 Wyco porcelain spark plugs, standard and metric, 32 cents. 10 new Remy magnetos, high tension, with coil, $36.50 net. Wm. R. Coleman, 1409 Broadway, New York City.

DARRACQ imported automobile parts for models; send for price list. Darracq Agency, 735 Seventh Ave., New York.

FOR SALE—New unit power plant, 4-cyl., 26-H.P. motor, multiple disc clutch, sliding gear transmission carbureter, coil and timer, muffler, gear-shifting levers, starting crank, $300. Address "Motor," care of The Automobile.

FORD OWNERS and dealers—Send for catalogue showing our outfits to convert any runabout into a handsome roadster; also Rumble and Surrey seats for "N. S. R. T.," enclosed fenders, dash hoods, folding hoods, glass fronts, oilers, magnetos and every part for these cars. Ask for Catalogue A. Write to-day. Auto Rebuilding Co., 1307 Wabash Ave., Chicago, Ill.

FOUR Fisk tires 36-in. x 4½-in. Four inner tubes 36-in. x 4½-in. Not used 125 miles. In fine shape. Rings, clamps and bolts for same. Will be shipped boxed C. O. D. privilege of examination to best offer. Send bids to H. B., 21 Hermon St., Worcester, Mass.

(Continued on page 62)

(Continued from page 61)

$20.00—New 4-cyl. Splitdorf Dash Coil.
22.50—New 22-25 H. P. Radiator and Hood.
35.00—60 H. P. Radiator and Hood.
7.00—4-Feed Kinsey Force Feed Oiler.
10.00—6-Feed Kinsey Force Feed Oiler.
2.50—15 and 20 Gal. Gasoline Tanks.
3.00—Mufflers.
1.00—Each Quick Detachable Rims.
.50—Each 34x4, 34x4½ and 30x3 Clincher Rims.
15.00—Set Hartford Shock Absorbers.
10.00—Set 4 Wheels with Clincher Rims 30x3½, New, Less Hubs.

These are all highest class accessories. Send for complete list. I. L. Breakstone, 1712 Michigan Ave., Chicago, Ill.

GENTLEMAN'S mink-lined coat, with elegant Persian lamb collar; outside English broadcloth; cost $175; will sell $35; never used; pair beautiful cinnamon bear robes, $30, cost $160; ladies' fur coat, $30. Call or write. J. Roberts, 104 West 114th St., New York.

ONE-CYLINDER Rambler Engine, new, complete, with transmission radiator, hood, etc., $75 cash. A. R. Co., 1307 Wabash Ave., Chicago.

RADIATORS, hoods, mud guards, metal dishes, gasoline and water tanks. If building or remodeling a car, it will pay you to write us, as we lead in this line. Auto Sheet Metal Works, 2230 Michigan Ave., Chicago, Ill.

RUMBLE SEATS $10 each. Surrey Seats $20 each; Fenders with mat and brass-bound running board, $12 set. Cash with order. A. R. Co., 1309 Wabash Ave., Chicago.

RUMBLE and Surrey Seats made for any car. Name car and send for Catalogue. A. R. Co., 1309 Wabash Ave., Chicago.

SECOND-HAND TIRES. Big stock. All sizes. Illinois Tire Co., 3111 Michigan Ave., Chicago, Ill.

STARTER successfully in use on motor car; automatic action, operated by foot lever; applicable to any gas engine for automobile, motor boat or stationary work; compact; demonstration given to interested manufacturers. Licenses issued on reasonable terms. J. W. Tudor, 35 Congress St., Boston, Mass.

NEW water cooled motors, 4½x4, opposed, $80; 5x4, $90; 5¼x4½, $105; 5¼x6, $120; 4½x5, 2-cyl. upright, $110; 5¼x6, upright, $130; 4½x5, 4-cyl., $200; 4¼x4¼ "T" head aluminum case oiler and circulating pump, $225; air-cooled opposed, 4x4, $60; with transmission, $80; 4½x4, $70; 4½x5, $90; 5x4, $90; 2-cyl. upright 10-H.P. carbureter, timer plugs, $80.

Second-hand Motors, 1-cyl. Jeffery, 5x6, $35; 5x6 Olds, $40; 4¾x5, opposed, $40; 5x6 Jeffery, opposed, $55; 5x6, with transmission, $65; two-cyl., 4x4½ upright Mitchell motor, timer carbureter, plug, $75; 4½x5, opposed, $70; opposed air-cooled, 4x4, $40; 4½x4, $60; 6x5, with transmission, $65; 1-H.P. stationary, $20; 2-H.P., $28; 4-cyl., 5x6, marine motor, complete, less reverse gear, $300; 25-H.P. trans., $15; 10-H.P. planetary, $12; 18-H.P., $28; selective type, with levers, $90; 28x3 clincher wheels, painted, $12 per set, 30x3, $14; also larger sizes.

Guaranteed Tires, 30x3, $13.50; 30x3½, $20; 32x3½, $22.25; tire chains, 28x3, $3.25; 30x3, $3.50; 30x3½, $3.60; 32x3½, $4.25; 32x4, $4.50; 34x4, $4.90; 34x4½, $5.00; 36x5, $5.75.

New Tires, not guaranteed, 28x3, $9.50; 30x3, $10; 30x3½, $13; 32x3½, $15; 32x4, $16; 34x4, $18; 28x2, Dunlap, 1905, $5; fenders with skirt, $8 per set; brass-bound wind shields, $10; chain-drive axles for runabouts, $35 per pair; Western Mott chain-drive axles, large size, $45; rack and pinion steering gear, complete with 14-in. wheel, $8; bevel-gear steering gear complete, $10; Warner steering gear, $10; air-cooled fronts, with hoods 23 in. high, 42 in. long, $7; gas lamps, $3.50 each; carbureters, $4; two-cyl. coils, $6; 2-feed mechanical oilers, $5; 4-feed Essex oilers, $5; 6-feed, $6.50; Universal joints, 1 in. square, 1⅛ round, $4; rear axle housing, $10; differentials, $7; double seat, upholstered, $20; single rumble seats, $6; 1x½x9/16 second-hand chain, 40c. per foot; Woods 10-H.P. electric motor, $10; Hendricks magneto with governor, $13; 36-in. new buggy wheels, for 1½-in. tires, with channels, $10 per set.

Adjustable lamp brackets in the rough, 50c.; five-gallon gas tanks, 75c.; body steps, 25c. each. Get our No. 60 bargain sheet. Auto Parts Co., 517 W. Jackson, Chicago, Ill.

SEND for list of auto parts and accessories; cheap. Lock Box 41, Dedham, Mass.

TIRE SALE EXTRAORDINARY—All brand new stock. Must sell; mail orders filled, subject to prior sale. Not the kind usually advertised.

Size	Shoe	Tube	Size	Shoe	Tube
32x4	$16.00	$3.75	28x3½....	$7.50	$2.00
34x4	18.00	4.00	28x3	9.00	2.25
34x4½....	19.00	4.00	30x3	10.00	2.50
34x5	18.00	4.00	30x3½....	13.00	3.00
36x3½....	12.00	3.00	32x3½....	15.00	....
36x4	16.00	4.00	34x2½....	12.00	....
36x4½....	16.00	4.00	30x4		3.50

36x5..............$16.00; $4.00.

A. H. Kasner, Oldest Tire Dealer in U. S., 152 Church St., New York City, near Chambers St.

TOPS—Until further notice, runabout tops, $20; touring car tops, $35. C. G. Meyer & Son, Tiffin, Ohio.

TRUSTEE'S SALE.
Stock of the Gearless Motor Car Co., consisting of five and seven-passenger bodies, frames, radiators, lamps, gas tanks, dashes, springs, wheels and sundry parts at sacrifice sale. Write for quotations. W. H. H. Rogers, Trustee, Rochester, N. Y.

WE HAVE on hand a full line of new and second-hand tubes at low prices. We sell and supply all makes of solid and pneumatics tires. Tire repairs our specialty. Chicago Tire Repair Co., Michigan Blvd., at 35th St., Chicago. 'Phone, Douglas 4592.

Parts and Accessories

(WANTED)

ENGINES—Responsible, experienced motor manufacturer will contract to build 4-cylinder vertical automobile motors in quantities. Address "Engines," care of The Automobile.

WANTED—Large touring body; buy two bodies with your car and sell one to me. Must be the best. Also want fine limousine body. State length. W. Loomis, P. O. Box 146, Portland, Me.

Situations Wanted

AMERICAN, 15 years abroad, speaking five languages, would act as manager and guide on European motor trip; references, itineraries and estimates on application. Grant Cramer, 31 West 55th St., New York.

AUTOMOBILE ENGINEER, university graduate, 10 years' experience, expert designer of every class of cars; commercial, up-to-date taxicabs, pleasure or racing; dead sure success; open for engagement. At present in leading position with one of largest concerns. Address "A. L. C.," care The Automobile.

CHAUFFEUR-MECHANIC, French, large experience, and best of references, would like position as demonstrator; would consider first-class driving job; go anywhere. Address "M. P.," care of The Automobile.

PURCHASING AGENT, thoroughly experienced, open for engagement. Address P. A., care The Automobile.

TO AUTOMOBILE FIRMS and manufacturers—Wanted position as salesman and demonstrator with automobile firm; best of English experience and references. Driven in all competitions. Apply G. N., care of The Automobile.

Help Wanted

TIRE SALES MANAGER wanted for New York and vicinity. In replying, give details of experience and former connections. Address "Tires," care of The Automobile.

WANTED—Salesmen and garage keepers to handle second-hand cars in every city of over 3,000 inhabitants. Address Box 87, care The Automobile.

WANTED—By a company manufacturing automobiles, a thoroughly competent and experienced man as head inspector of assembling and testing room. R. F. Ayers, 66 West Broadway, New York City.

WANTED—Draughtsmen for automobile lay-outs and details. Permanent position. State experience and salary. Apply to Mr. Borovitz, Asst. Eng., Thomas Motor Cab Co., 1738 Elmwood Ave., Buffalo, N. Y.

Repairing

RADIATORS repaired by experts. Ship to us and follow with letter. A. R. Co., 1307 Wabash Ave., Chicago.

SEND US BROKEN CYLINDERS, crank-cases, etc., to be repaired by autogenous welding. Quicker and much cheaper than ordering replacement parts. No charge unless weld is successful. Estimates and references given. Remember we repair any broken metal parts without solder, pressure or brazing. Try us. Waterbury Welding Company, Waterbury, Conn.

TIRES REPAIRED—Automobile owners, do you want your tires repaired or re-covered by the people who know how? Give us a trial and be convinced. Inner tubes vulcanized at short notice. Jungkind & Vogler, 158 Chambers St., New York City. Telephone 3386 Cortlandt.

For Sale or For Rent

CHOICE PLOT, 50x100, in West 47th St., with building, suitable for automobile garage; must positively be sold to partition estate. McDonald, 269 W. 45th St., New York.

FOR SALE—Garage located in the Shenandoah Valley, at Winchester, Va., on the New York-Atlanta Highway; good business location for hotel or printing company. N. A. Cooper, Winchester, Va.

WE HAVE a few choice offices left on the second and third floor of our downtown branch wholesale store, 1327 Race St., most desirable for branch offices of automobile accessory manufacturers. Address Keystone Lubricating Co., 20th and Allegheny Ave., Philadelphia, Pa.

Auto Schools

INDIVIDUAL road work. Small group classes. Day and evening in four or eight weeks' courses. Provision for out of town men. Booklet and pass to visit school on request. West Side Y. M. C. A. Automobile School, 310 West 57th St., New York City. Telephone 3800 Columbus.

THE STEWART Automobile Academy, 231 West 54th St., New York; best equipped motoring school in city; up-to-date motors, chassis and ignition systems; educated, practical instructors; for owners, prospective owners, women; separate courses for chauffeurs; modern cars for road work. Telephone 5409 Columbus.

Insurance

FIRE, THEFT, liability, collision, accident, property damage, and transportation fully covered, lowest rates. Colman Company, 165 Broadway, New York. 'Phone, Cortlandt 2409.

Miscellaneous

MITCHELL'S practical automobile handbook, postpaid, 30 cents. 1529 Starkweather Ave., Cleveland, O.

NONPAREIL is unequaled for cleaning and polishing automobile bodies, pianos, furniture, etc.; $1 per quart, $2.50 per gallon, net. W. T. Sevigny, 3 P. O. Square, Springfield, Mass.

REPAINT your car yourself. With our materials and full instruction you can repaint your car as well as a regular painter and save the big cost, labor. You will actually save from $15 to $50 by using the Arsenal system. Colors, French gray, red, maroon, green and blue. We furnish everything needed for best work. Write to-day. Motor Car Dept., Arsenal Varnish Co., Rock Island, Ill.

WANTED—Capital to build and market the most powerful and simplest motor for flying machine produced yet. For particulars address Box 86, care The Automobile.

WE WANT PATENTS or ideas of automobile accessories or novelties. Will buy outright, or pay royalty. What have you? Auto Parts Co., Providence, R. I.

THE AUTOMOBILE

QUAKER CITY'S SHOW OPENS AUSPICIOUSLY

Third Regiment Armory, Where the Philadelphia Show Is in Progress

PHILADELPHIA, Jan. 15—The ninth annual show of the Automobile Trade Association of Philadelphia, in the Third Regiment Armory, was declared open to the public at 8 o'clock this evening without any ceremonies. The first bar of the overture by the Third Regiment Band was the only signal. At the opening hour the aisles were crowded uncomfortably; an hour later progress at a rate faster than a snail-like crawl was impossible. It was the biggest opening night in the history of the Quaker City's automobile shows, and this despite the fact that the present show building is considerably smaller than some in which former shows have been held. "Evening clothes" were numerous, and Fashion seems to have set the stamp of approval on this annually recurring winter fixture.

Heavy snowstorms on Thursday and Friday delayed the arrival of several of the out-of-town exhibits; others are to come entire from the Madison Square Garden show in New York. Monday midday, however, will see the cars assigned to the first week of the show all in place; after that hour General Manager Beck says that no cars shall come in or go out—they are there to stay till Saturday night, when there will be a general revamping of the floor-space to make room for the second week's contingent of exhibits.

At 4 o'clock this afternoon it would have taken an optimist of the purest ray serene to predict anything better than 50 per cent of completeness in the preparations at the opening hour. But the committee, with Manager Beck at its head and assisted by members of the association, began a systematic clearing up of the floor, and by side-stepping supper they were enabled to get the building in fair shape for the opening. Save for a few bare spots here and there, where exhibits had failed to arrive, the general effect was that of a complete exhibition.

The crowd was so dense that no particular portions of the exhibition could be selected as centres of interest. Those exhibits, however, which included torpedo bodies among their models seemed to be especially interesting to the visitors, and the attendants at those booths were kept busy all the evening explaining the beauties of this latest novelty. Of the forty separate makers of cars exhibited at the thirty booths, twenty-eight are of the four-cylinder variety, the six-cylinder type claiming twelve representatives. The only two-cylinder motors to be exhibited are installed in the Autocar truck, which will be shown during the second week.

The Show Committee is composed of J. A. Wister, chairman; James L. Gibney, W. J. Foss and General Manager J. Henry Beck, with Richard H. Kain as publicity man. All former efforts of local promoters in striving after superior decorative effects have been outclassed by the splendid combination worked out by Decorator Charles M. Simpson. The main color scheme is blue and white. Overhead and along the front and side walls this combination prevails, the panels on the walls being punctuated at intervals by Corinthian columns of pure white extending to the roof, the ugly beams and braces of which are hidden from view by graceful festoons of blue and white bunting, the former representing heaven's blue vault, the white the fleecy clouds.

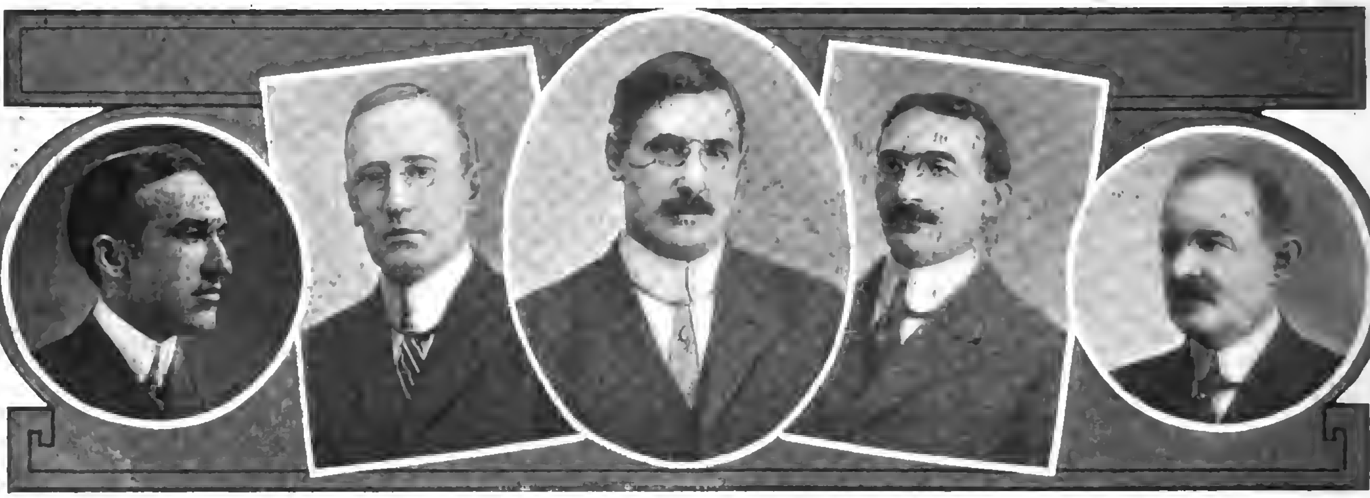
The entire back wall of the armory is taken up by a startlingly original and effective sunburst, the rays of which are made up of scarlet, orange, yellow and white bunting, the sun being represented by a huge gilt ball on which is spread the simple legend "1910."

The three aisles are marked on either side by rows of Carrara marble columns, each surmounted by a Swiss chalet in miniature and filled with growing plants. Each pair of columns is connected by a graceful trellised arch extending over the aisle, the intertwined flowers in which help along the outdoor-garden effect which the designer had in mind. Box hedges separate the various exhibitors' spaces, which are marked by dark green rustic signboards set at an angle on 12-foot uprights of the same color. The lettering on the boards is silver-white, and contrasts well with the dark background. The carpeting of dark green carries out the lawn idea, the outdoor effect being still further added to by the dark green rustic benches and chairs at each booth.

The lighting is especially well done. Thirty big arcs, the same number of Welsbach clusters, with countless long festoons of white electric bulbs, setting for the beautiful decorative effects to excellent advantage.

To-night's opening saw several of the exhibits incomplete, some of the cars to be displayed being at the Madison Square Garden show, and will not be installed until Sunday afternoon. When the doors are thrown open at noon on Monday there will have been crowded into the armory 123 complete cars and 21 chasses. On the opening night the crowded condition of the majority of the displays, with the crowd surging through the eight-foot aisles and encroaching onto the working ground of the conversation artists connected with each booth, again brought forth the wail, "When will Philadelphia have a convention hall of suitable size to house an affair of this kind?"

The decision to run the show for two weeks was actually forced on the committee by their inability to secure an exhibition building anywhere near the dimensions required for the annually increasing size of the show. The Second Regiment Armory, the largest building of the kind in the city, could not be engaged this year owing to the structure having been taken over by the State of Pennsylvania, a law of the commonwealth preventing the renting of any of its property for any purpose whatever. The First Regiment's quarters, although ideally located, was out of the question, being entirely too small. This process of elimination left the Third Regiment Armory as the only available building in the city. The main drill floor measures but 172 x 144 feet. With less than fifteen thousand square feet at their disposal, including aisle space, and with more would-be exhibitors of pleasure cars alone than could be accommodated, the show committee hurriedly decided to run the exhibition for two weeks, the first to be devoted to pleasure cars alone, the second to commercial vehicles, electrics, motorcycles and accessories. Even this arrangement did not provide sufficient space for the pleasure car exhibitors, and a dozen or more of them will be relegated to the second week. In assigning the space, of course, the preference was given to the members of the Philadelphia Automobile Trade Association, who are bearing the brunt and burdens of the management of the exhibition. Most of the exhibitors who failed to get in with the first week's elect have taken the situation philosophically, being well aware of the impossibility of satisfying everybody as to space and location.



W. J. Foss J. H. Beck J. A. Wister J. L. Gibney R. H. Kain

The Local Show Committee That Is Making the Exhibition a Success

Suspended from the armory roof is a new Herring-Curtiss aeroplane, natty in its bright varnish, looking fit for a dash through the bunting sky and clouds above it. So far this constitutes the only item in the "auxiliary aero exhibit," but it is understood that several additions will be made to this branch of the show before the end of the first week.

The management has made a hit by setting apart certain portions of the first balcony for the use of the various local clubs—the Quaker City, Philadelphia, Germantown, Century, and Delaware County. These were thronged throughout the opening night by the club members and their ladies—the balcony is a famous vantage-point from which to look down upon the crowds below and get a bird's-eye view of the whole scene. The "private boxes," as it were, will be devoted solely to the use of the members and friends of the clubs mentioned during the two weeks of the show.

Aside from the size, there is nothing to distinguish one booth from another except the wording on the signs. Uniformity is rigidly preserved, and no extraneous decorations have been allowed. Some of the displays are of a magnitude worthy of a national show. The Packard, Chadwick, Peerless and Cadillac, Locomobile, Olds and Oakland, Pullman, Elmore, White, Winton, Stoddard-Dayton, Columbia and Reo, Premier and Bergdoll dis-

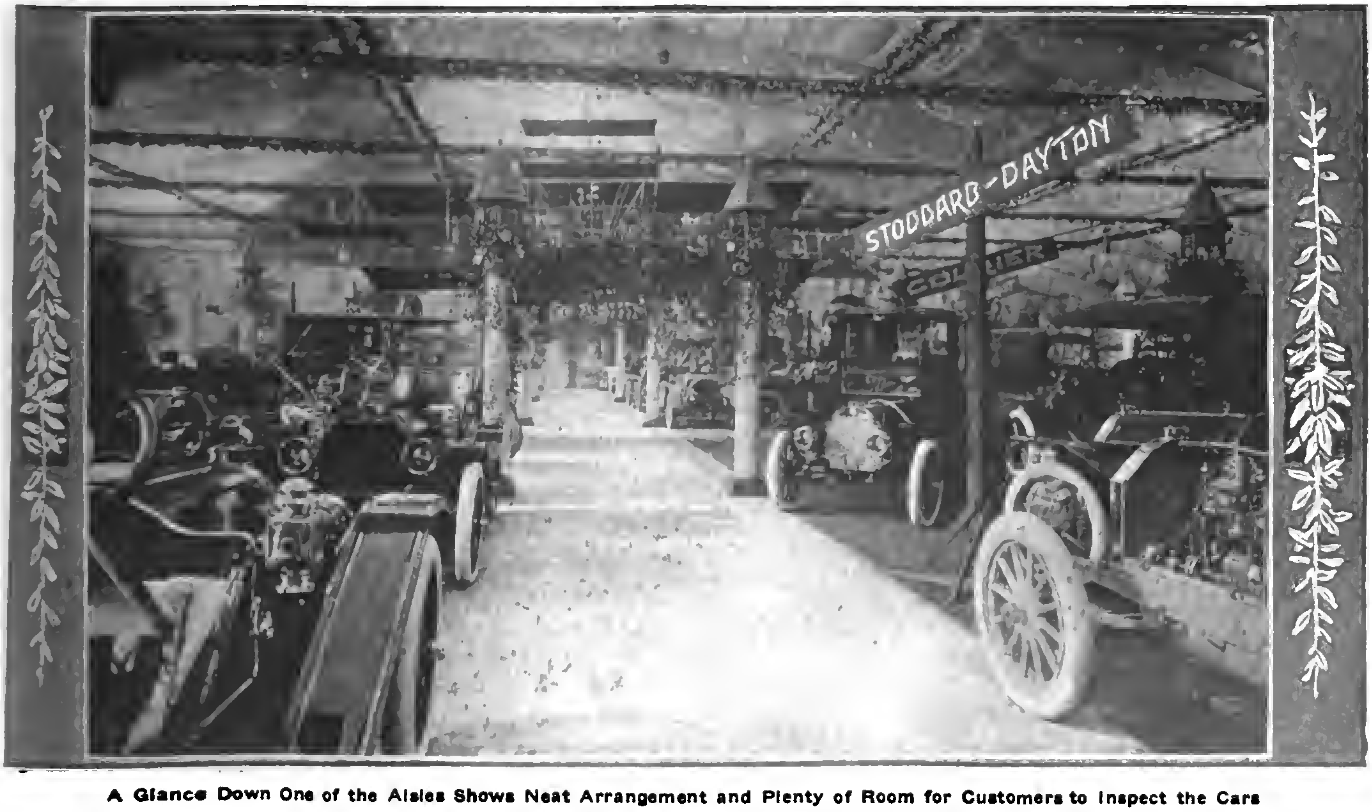
Auditorium Where the Exhibits Are Tastefully Arranged and the Decorations Are Harmonious in Effectiveness

plays occupy space to the limit allowed by the committee. In point of the number of cars exhibited the Ford display is especially prominent with two touring cars, a T-roadster, a town car, a landaulet and a coupé, all model T's. The Olds-Oakland display includes four each of the Oldsmobile and the Oakland—two touring cars, roadster and landaulet of the former and two touring and the same number of roadster models of the latter.

Another most comprehensive display is that of the Maxwell-Briscoe Company, no less than six cars being crowded into the rather limited space—Model E and Model G touring cars, three Model Q's (touring car, runabout and the famous "Sportsman"), and the Model AA, or "Baby Maxwell."

Torpedo bodies are much in evidence—the Winton and White and the Studebaker-Garford "Gunboat" coming especially under the observation of the crowds. The White gasolines form a particularly interesting portion of the company's exhibit, with "Billy" Taxis and his brother Ed among the "con" artists who hold forth at the sign of the famous steamer. The Winton exhibit—all sizes, of course—is one of the finest under the armory roof, and includes, besides the torpedo body, a touring car, a toy tonneau and a roadster.

The Thomas, Chadwick, Lozier, Peerless-Cadillac, Overland-Marion, Premier, Royal Tourist and Stevens-Duryea exhibits all have four models on exhibition, most of them in addition having



A Glance Down One of the Aisles Shows Neat Arrangement and Plenty of Room for Customers to Inspect the Cars

Some Representative Exhibits That Appealed to the Photographer's Art

a highly polished chassis also displayed. It is rather unfortunate that the exhibitors should have been compelled to do so much crowding in order to set forth even a moderately comprehensive exhibit of their goods. But "needs must when the devil drives," and all hands are doing the best they can under the circumstances.

That the show will result in business has been demonstrated even thus early. Several cars were sold outright to-night, and despite the crowds a vast amount of missionary work was done. Out-of-town agents and subagents are already coming into town, for Philadelphia has become quite a distributing point for a big territory during the past twelvemonth, and concerns like the Studebaker, Ford, Locomobile and Maxwell branches are making big preparations to handle the up-State, New Jersey and nearby Southern visitors when they begin to descend in force.

The Autocar Company, as one of the members of the local Trade Association and entitled to first-week representation, selected the second week to show its pleasure cars, which goes to verify the rumor that that concern proposes to especially push its commercial vehicles during the coming year.

Studebaker Bros. Company have so much to show that they have secured space for both weeks, and will be represented in the pleasure class during the entire show, in addition to a comprehensive display of commercial cars in the last half of the exhibition.

The Collings Carriage Company, a newcomer in the local field, will be prominent during the second week with a three-section exhibit—the Rainier in the pleasure class, the Waverley in the electric section and the Crane & Breed in the commercial car section. Other newcomers to the local field who will exhibit during the second week will be the Otto, by the Otto Gas Engine Works; the Springfield, by the Springfield Motor Car Co., and the Empire, by the Motor Supplies Co.

"Home shows" will be all the rage along Gasoline Row during the next two weeks. The "first-weekers" at the show will hold forth at their several Row establishments during the last half of the exhibition; the second-week contingent will have "open-house" throughout the first week. The "rank outsiders"—those who could not get in during the first week and wouldn't take space for the second—will put in a whole fortnight receiving guests at their branch houses and agencies. Among the latter are the Theobald Motor Car Company, Acme; Franklin Motor Car Company, Franklin; J. M. Quinby & Company, Pennsylvania, Simplex and Isotta; Chalmers-Hipple Company, Chalmers-Detroit; Buick Motor Car Company, Buick; Oxford Automobile Company, Gaeth and Brush; Philadelphia Automobile Company, Apperson; Selden Motor Car Company of Pennsylvania; Selden; Palmer & Singer Company, Palmer-Singer; Jackson Motor Car Company, Jackson; Hoopes Motor Company, Crawford and Rambler; Continental Motor Car Company, Speedwell and Parry, and Penn Automobile Company, Paterson "30." These, if combined, could have made a respectable show in themselves, and indicate what the promoters could have done had there been in Philadelphia a building more nearly adequate to the requirements of a first-class show.

KANSAS CITY OPENS FIRST OF TWO SHOWS

Kansas City, Mo., Jan. 18—The first of the two shows scheduled for Kansas City this season opened last night in Convention Hall. An abundance of flowers entered into the scheme of decoration. When the visitors passed through the south entrance the first thing that struck the eye was the double-decked tea garden on the far side of the auditorium, festooned with posies and electric lights. Around the sides the empty balcony seats were screened off with large panels depicting Western scenes, some of them reproductions of the work of the late Frederick Remington. In front of the first terrace of the tea garden is a rock embankment; the second level is a pergola with the trellis green with Southern smilax. A hedge fence of the same plant runs down the center of the hall to separate the exhibits. The show is conducted by the Motor Car Trade Association, with the following committee in charge: W. S. Hathaway, chairman; E. P. Moriarity, Fletcher Cowherd, Jr., C. C. Meade, W. M. McGee, R. H. Collins and J. F. Witwer.

Another View That Caught the Artistic Eye of the Man With the Camera

CHICAGO'S SHOW ATTRACTS NORTHWESTERN LUMBERMEN

CHICAGO, Jan. 17—In view of the extensive purchases of automobiles by backwoodsmen from Alaska, Great Bear Lake, Saskatchewan and contiguous parts, the management of the Chicago show has decided that special care should be taken to make the Coliseum and the Armory seem homelike to these wanderers from the tall timber. This is the real secret of the setting of forest trees which has been planned for the show. Additional details can now be made public of the arrangements for the entertainment of the Saskatchewanderers.

When the lumberman in search of an auto strides into the Coliseum entrance, his nostrils will be greeted by an aromatic odor which will recall to his mind the tall pines of his homeland. Under this magic influence each visitor from the Northwest is expected to buy at least three touring cars and a limousine. The perfumery used was tested in one of Robert Edeson's Hudson Bay dramas, and one man in the audience was so affected that he tried to chop down a balcony column with his penknife. He was not a Presidential candidate.

Realizing that visitors from the fashionable North Side, whose only knowledge of the timber lands has been gleaned from Stewart Edward White's novels, may not be sufficiently inured to this strenuous influence, Manager Samuel A. Miles has provided a counter attraction in the Annex. Here the decorations will recall an old-fashioned rose garden. Fountains scattered among the chassis and the landaulets will spray rosewater, burdening the air with a sensuous perfume. No taint of brass or lubricating oil will jar the perfect harmony.

Still another class of visitors will be made to feel especially at home at the Armory, which, Manager Miles says, will be provided with a "rustic atmosphere." So far not a whiff of this has leaked out, and the scribes on Automobile Row can but speculate as to what product of the barnyard will be used to give the effect. Something startling is expected.

However, atmosphere alone will not be depended upon to produce the impression of varied settings. A number of real trees are to be imported for use in the Coliseum forest; the specifications call for eight trees sixty feet high, fifty feet spread and two feet in trunk diameter, and four trees twenty feet high, ten feet spread and one foot trunk diameter. These are to be brought from Wilmette in due season and disposed artistically around the floor. The exhibitors' spaces will be marked off with brick walls and iron fences, and the aisles will be lined with bay trees. The trees will also be surrounded by fences, and it will be strictly prohibited to carve hearts and initials on them.

The Annex will be fitted up with trellis-work and wire netting interwoven with foliage, and bay trees will be scattered around in great numbers. In the center of the Armory will be four pagodas, and divisions will be made by rustic fences with ornamental corner posts surmounted by vases and foliage.

"This will all cost money, and will involve a larger expenditure than ever before for decorations and atmosphere," says Manager Miles. "However, it is my ambition to give Chicago an exhibition and a setting that will rival anything ever offered. My estimates call for an outlay of over $75,000 in decorations alone."

NATIONAL CAPITAL SHOW BEGINS SOON

WASHINGTON, D. C., Jan. 17—From present indications the automobile and aeronautical show to be given in Convention Hall during the week beginning January 24 will be the biggest trade display ever held in this city. Nearly every inch of space has been taken, and Manager B. R. Johnson is endeavoring to squeeze in a number of belated exhibitors.

A big feature of the show will be the display of aeroplanes and fittings, which will be under the direction of H. Chadwick Hunter. He has been very successful in securing exhibits for this department, and among them are several machines unfamiliar to the Washington public. The Warner Instrument Company will exhibit a Curtiss biplane equipped with a Warner anemometer. The Berliner monoplane, now nearing completion, will be given its initial tryout before the show opens. The Ormer, Smidley, Christmas and Smith aeroplanes, all local productions, will also be shown. The Government is to loan the committee a number of war balloons and kites, and there will also be a comprehensive display of engines and parts.

W. C. Long, chairman, has selected the following dealers as members of the show committee: John S. Larcombe, Jr., secretary; John R. Thomas, treasurer; C. W. Bender, William Jose, S. A. Luttrell, R. C. Wilson, A. G. Carter, C. E. Miller and L. D. Moore, Jr.

INDIANAPOLIS WANTS A NATIONAL SHOW

INDIANAPOLIS, Jan. 17—A plan for a national automobile show to be held in this city next fall has been launched by Carl G. Fisher, president of the Indianapolis Motor Speedway Company. He suggests that the New York and Chicago shows be reduced to the rank of local affairs, leaving the Indianapolis exhibition the only national one. He further suggests that the show be held on the Speedway, with the exhibits under tents, and the use of the course free to all participants. The Indianapolis manufacturers and the promoters of the Speedway naturally like the idea, but it is doubtful if it will find much favor elsewhere.

SPACE ALLOTMENTS FOR BALTIMORE SHOW

BALTIMORE, Jan. 17—The task of awarding the spaces for the second annual automobile show under the auspices of the Automobile Club of America at the Fifth Regiment Armory, February 22 to 26, has been completed. Thomas Young, chairman of the publicity committee, announces the following exhibitors:

Dixon C. Walker Auto Company, E-M-F, Flanders and Studebaker cars; Lambert Auto Company, Maxwell; E. L. Leinbach, Matheson; "Little Joe" Weisenfeld, Oakland and Reo; Motor Car Company, Stevens-Duryea; Boyd-Eastman Company, Apperson; F. W. Sandruck, Gaeth; Ford Auto Company, Ford; Palace Motor Car Company, Kline Kar; White Automobile Company, White, Neely and Ensor, Alco; Griffin Garage, Knox; Viola Oil Company, M. Denton, Bowser tanks; Mar-Del Mobile Company, Packard and Franklin; Shaffer Motor Car Company, Pullman; Standard Oil Company, Mount Vernon Motor Car Company, Autocar; Zell Motor Car Company, Hudson, Peerless, and Chalmers-Detroit; Auto Outing Company, Palmer-Singer, Haynes and Buick; Walter Scott, Crawford; Baltimore Buggy Top Company, J. G. B. Davy & Company, accessories; Auto Supply Company, accessories; Winton Motor Carriage Company, Winton; General Auto Company, Parry; Fose-Hughes Company, Pierce-Arrow; Standard Motor Car Company, Cadillac and Oldsmobile; Charles S. Houghton, Overland.

FURNITURE CITY WILL HAVE A SHOW

GRAND RAPIDS, Mich., Jan. 17—After trying in vain for several years to develop enough interest, this city has finally decided to have an automobile show, to be held February 17, 18 and 19. Twenty thousand feet of floor space will be provided in one of the big furniture exhibition buildings, and fifty-six exhibitors have already engaged space. Being held just after the Chicago and Detroit shows, it is believed the local exhibition will attract many of their features. Grand Rapids is the center of a large territory of automobile users. A. H. Vandenburg is chairman of the committee in charge of the show.

BUFFALO WILL HAVE MOTORBOAT SHOW

BUFFALO, N. Y., Jan. 17—The Third Annual Power Boat and Sportsmen's Show will be held here March 21 to 30 in Convention Hall. The decorations contemplate the conversion of the entire hall into a Japanese garden. D. H. Lewis is the manager.

Fig. 1—Everitt "thirty" touring car, presenting a long wheelbase, large diameter wheels, roomy tonneau, and a sense of comfort

ADVANCE is made in the art just as designers forge ahead in the work under their direction, and evolutionary methods govern. True, automobile designing has its many angles, but when the situation is fittingly canvassed there are but few schools of design, and deviations in point of detail within schools does not result in types. When a new school of design is instituted, and it has had time to prove its ability to breast the waves, it is fitting to discuss its details and note its advantages.

The Everitt automobile, made by the Metzger Motor Car Company, Detroit, Michigan, is readily separated out into a type, particularly if the motor is examined, nor does it take more than half an eye to note the reason for the distinction. The general appearance of the Everitt automobile will be apparent by noting the title illustration, which is reduced from a photograph of the car. The particular mechanical construction which greets the eye of the keen observer, and which differs very materially from other schools of design, lies in the motor.

CYLINDERS AND UPPER HALF AS A UNIT

The motor, which is given a 30-horsepower rating by the company, has four cylinders, 4 x 4 3-4 inches bore and stroke, respectively, and according to the rating the power delivered is 4.4 horsepower more than the A. L. A. M. rating, which is 25.6 horsepower. Referring to Fig. 2, the four cylinders C1 are en bloc and integral with the upper half of the case C2. It is this part of the design which gives to the Everitt its class distinction, but there are other features to be noted, which in a considerable measure must account for the fine performance of the power plant.

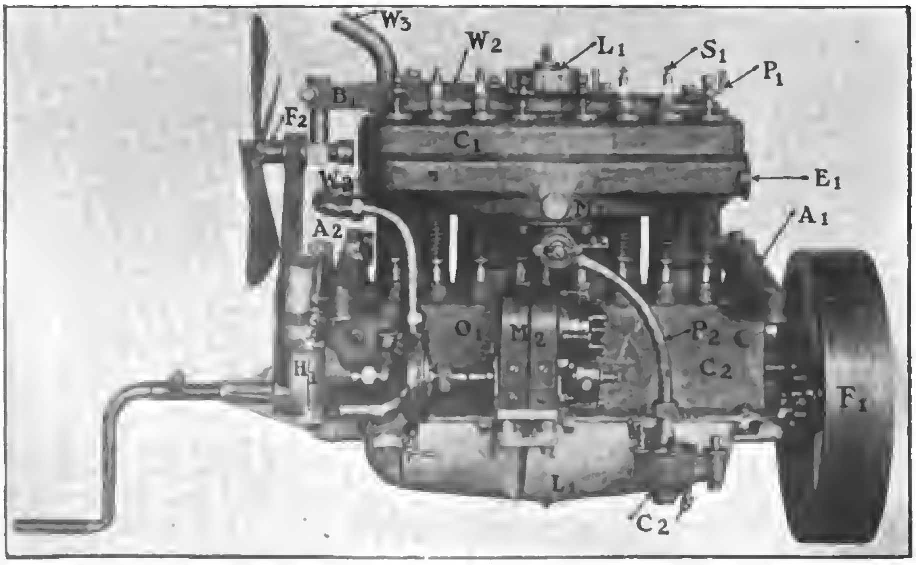


Fig. 2—Power plant, showing a distinct type of motor with cylinders and case integral, and accessories in convenient relation

There is a great difference between atomized liquid gasoline and a vapor of the same; vapor is formed during a change in the state of aggregation of the liquid (from liquid to vapor), and during this change heat units must be added to the liquid—it must be raised to its boiling point and enough energy must be taken up by it to equal the latent heat of evaporation. In this motor, rather than detract from the power by having the liquid (in the atomized state) changed to a vapor in the combustion chamber, the construction is such that exhaust products of combustion are utilized for the purpose, and the gain is a double one; exhaust heat is recovered and the energy cost of vaporization is not at the expense of the ability of the mixture as it enters the cylinders.

This considerable advantage, it is claimed, is brought about in the matter as follows: The intake M1 is cast integral with the cylinders, and the exhaust transfer ports, being also in integral relation with an opening, E1, have but a separating wall between the intake and the exhaust for a considerable distance, enables the heat units in the exhaust to transfer to the mixture in the intake, with the result that the atomized liquid gasoline is changed to a true vapor before it enters the cylinders at all.

There is still another gain, so it is said, in this performance; if liquid gasoline is allowed to enter the combustion chamber, the action will be that of a coke oven, and carbon will coke out, thus forming a carbon crust over the surfaces of the cylinders, and, as is now well appreciated, this crust will act as a shield, preventing the cooling water in the jacket from performing its function, and preignition will ultimately be the phenomenon that the unlucky autoist will have to cope with.

By vaporizing the gasoline before it is allowed to enter the combustion chamber, then, the following gains may be noted on the right side of the ledger:

(A) Heat will not have to be applied to the gasoline after it enters the cylinders to vaporize it.

(B) Coking out will be aborted.

(C) Homogeneousness of the mixture will be assured.

(D) Combustion will be more complete.

(E) The mean effective pressure will be higher.

(F) Heat will be recovered from the exhaust and turned to good account.

(G) The power delivered will be on a higher level.

There are other considerations to be given due weight; homogeneousness of the mixture is the dream of the pure theorist; it is extremely difficult to realize, and yet this quality is absolutely essential if a motor is to deliver power in proportion to speed. It is one thing to design a motor which will have a certain maximum power rating, but it is quite another point to so design a motor which it will deliver power in proportion to speed over a wide range of action.

If the power does not hold out as the speed changes, "stalling" will be easy, simply because the power will not be available in proportion under changing conditions of speed of the car on the road. It is the road performance of the automobile that is of the greatest importance, and Chief Engineer Kelley of the Metzger Motor Car Company holds to the idea that this is the point of moment. These features of motor design, then, rather than as differences to be used as mere talking points, or to lower the cost of construction, are for the express purpose of increasing the power, to begin with, but, what is more to the point, to make the motor characteristic conform to the chassis requirement on the road under a wide variety of conditions.

As an indication of the furtherance of this prime idea, the flywheel F1 of the motor is designed to afford the greatest possible flywheel effect, with the understanding that this facility enables the designer to work a more capable compression, which is especially advantageous at high speed, and the increased flywheel effect makes it practicable to run the motor at very low speeds under the better conditions of compression which are desired for efficient high-speed performance.

The carbureter C2 is placed low enough to allow of a gravity feed, which makes for simplicity and assured action, but there is still another point in this design which should not be overlooked. The pipe P2, which connects the carbureter with the transfer port in the cylinder casting, is relatively small, it being the purpose to prevent popping back. It is desired to thus prevent this popping back when the valves are timed for the best result, as when both the inlet and exhaust valves are open at one time (overlapped) for a part of the stroke. Popping back will not transpire under the conditions here imposed, for the simple reason that the pipe is so regulated as to its area that the speed of the mixture on its way to the cylinders is higher than the speed of flame propagation in the molecular structure of the mixture.

ACCESSORIES TO THE MOTOR WELL PLACED

The magneto M2 is flexibly mounted, an Oldham joint, O1, being placed between it and the pump shaft. This makes it possible to remove and inspect the magneto, even on the road, and to replace the same with no chance of trouble of any sort. The pump, W1, for circulating the cooling water is of the centrifugal type, is located just back of the housing for the half-time gears, and is driven by a pinion which is inclosed in the housing H1, which meshes with a gear in the half-time system. This pump is packed at both ends of the protruding shaft, and is fastened down to a bracket which extends out from the crankcase.

The timer, for use with the coil and battery system of auxiliary ignition, is so situated as to be readily accessible, and the spark-plugs, S1, are over the inlet valves of the motor, this from experience proving to be the best place. The fan F2 in front is adjustably placed, and the arm B1 is an extension of the water cover W2, which passes over the four cylinders, from which the water pipe W3 passes up and joins with the radiator in front.

The supporting arms, A1 and A2, are forged and separately mounted; they are held in place by security bolts of undoubted competence, and the plan is one that has been accepted by designers of recognized ability as advantageous in many ways. The starting crank is capable, and the end-bearing of the same is supported by a housing which extends out from the crankcase.

UNIT SYSTEM OF DESIGN IN EVIDENCE

Fig. 3 of the live rear axle shows the transmission system connected thereto, and, considering the power plant (Fig. 2) as making up the remaining portion of the mechanical equipment, it is self-evident that the car is composed of the least number of units possible to employ, and that they are so related to each other that there is entire accord between them, brought about by the proper utilization of universal joints.

The torsion tube T1 engages at its upper end with a yoke, Y1, which links to a cross-member of the chassis frame through a suitable mate, and the diagonal loading of the live rear axle is

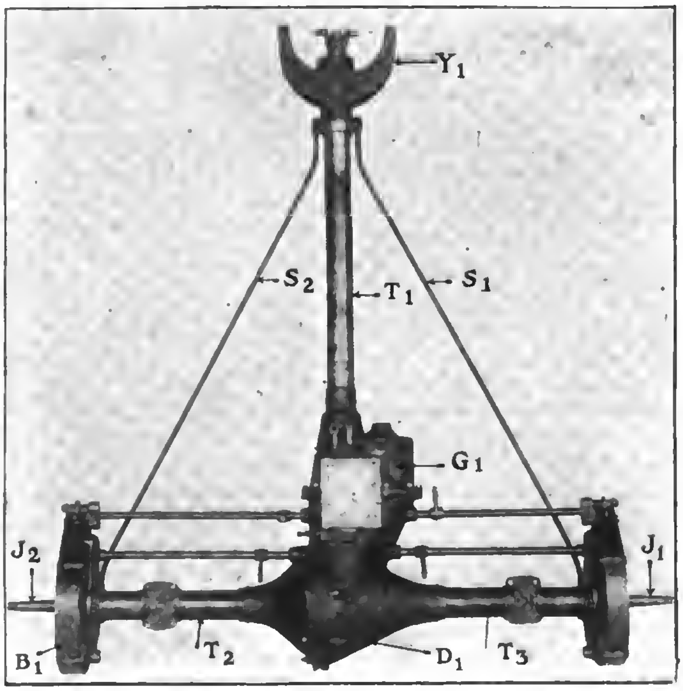


Fig. 3—Live rear axle, with integral transmission, diagonal stays, and torsion tube with universal attachment

cared for by the diagonal stays S1 and T2, so that the tubes of the live rear axle, T2 and T3, are not required to take more than the responsibility which is normal to an axle.

The transmission G1 is compact, does not pick up the ground when the going is bad, and the three speeds ahead and reverse are selective. The brake-control members, as shown, are straight and efficient, and the brakes B1, on steel drums, are efficient and adequate for every possible need, the emergency set being especially designed to take the work if the occasion demands.

The axle tubes, T2 and T3, are of good diameter, made of drawn steel tubing of selected grades, and the differential shafts, J1 and J2, are of specification steel, with a taper-fit for the wheels. This fit has the virtue of holding under all conditions of service, and if it is necessary to remove and replace the wheels, it is possible to do so without destroying the good relation which obtains from the start.

The price of this automobile is $1,350 ready for touring; wheelbase is 110 inches, and the tire equipment is 34 x 3 1-2 inches front and rear. The weight is 2,200 pounds, which, considering the tire equipment used, is a good sign of excellence of road performance at a low cost of tire upkeep. Lubrication is by splash, and grease cups are placed at all necessary points so that long life, as it is dictated by proper lubrication, is assured. Fits of the parts are carefully looked to and noise is aborted.

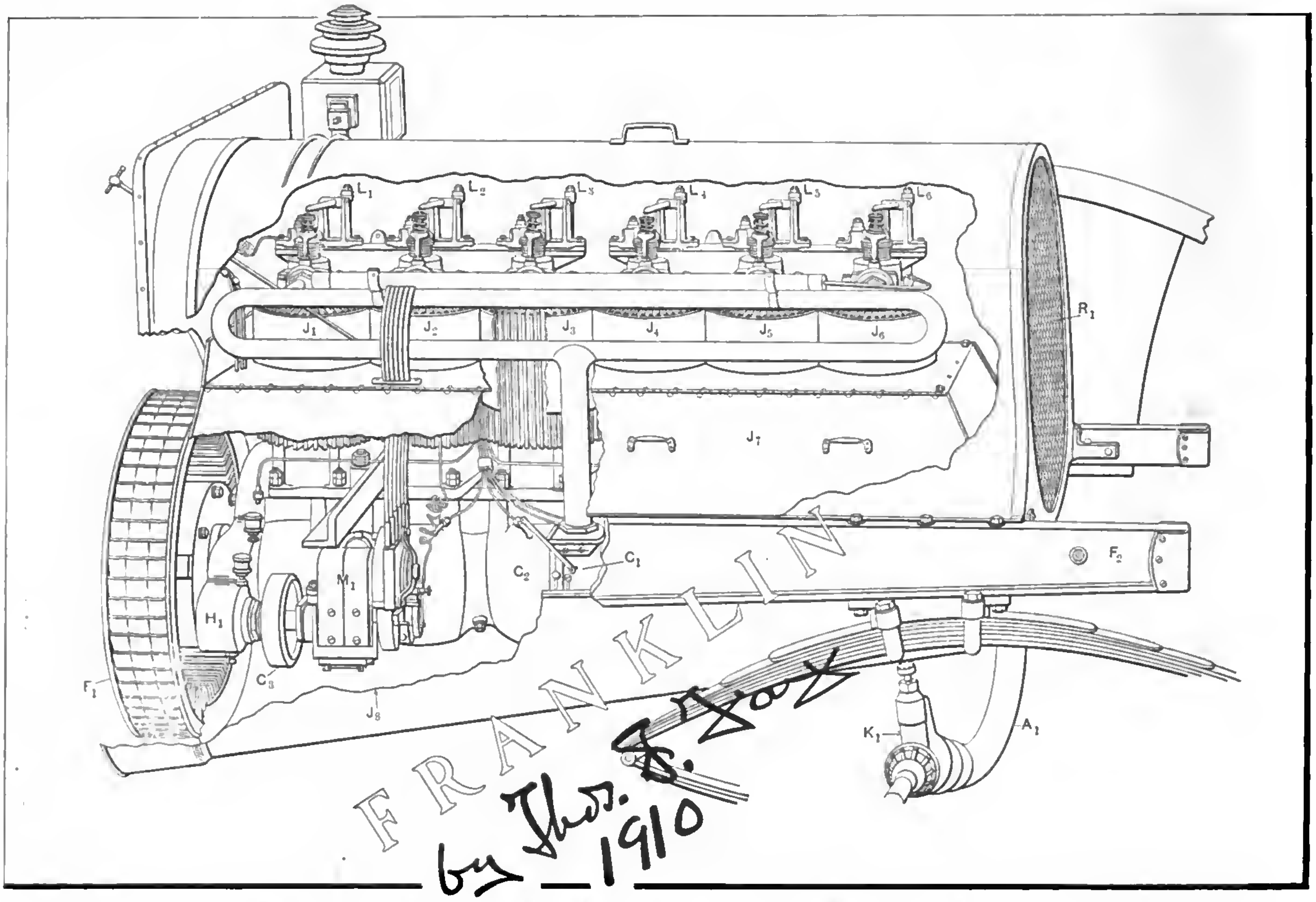


Fig. 1—Franklin power plant for a "six" presenting the latest in air cooling and methods involved in the execution

STRIDES are being made in all directions so far as automobiles are concerned, hence it will come as no surprise when it is stated that the new Franklin (which is the persistent exponent of air-cooling) is much different from the makes from the same company in former years. In the present Franklin power plant, while air is relied upon to accomplish the cooling, the difference shown is by way of a better means of accomplishing the purpose, according to the maker. Instead of relying upon the cooling effect of air drawn over the motor as a whole, with the chances of lack of equality of distribution, the air is transferred, positively, through ducts, and the ribbing on the cylinders of motor, instead of being horizontally around the girth, are in the vertical plane. In this way, since the air is forced to wipe over all the surfaces, each molecule of air is ladened with all the heat it can take away, and each cylinder is cooled exactly the same as the other.

ASSEMBLY OF FRANKLIN AIR-COOLED MOTOR

With a view to delineating the working of the new Franklin system of air-cooling, Fig. 1 is offered, in which the valve motion is the same as formerly obtained, it controlling the Franklin type of concentric valves, and in this assembly the lifts are indicated in their correct relation as L1, L2, L3, L4, L5 and L6. Cooling, in this model, is by means of a current of air which is drawn in through the circular radiator front, R1, by the fan F1, on the periphery of the flywheel, and in view of the proper disposition of air conduits, J7 and J8, the amount of air which passes down around the exterior surfaces of the respective cylinders is fixed by the jacket housings J1, J2, J3, J4, J5 and J6.

The motor case, C2, is of the same shape as formerly obtained on Franklin motors, and the magneto M1 is shown on the right side, driven by means of a shaft with a coupling, C3, lying between it and the housing, H1, for the half-time gears, and a gear for driving the magneto meshes with a gear in the half-time train.

The chassis frame, F2, is of wood, laminated, as in former times, and full elliptic springs are used to take the work, while the front axle A1, as shown, is tubular, and the knuckle K1 conforms to the usual Franklin practice.

AIR-COOLING BY THIS METHOD IS DIRECT

In order to more fully appreciate the directness of the method of cooling used in the Franklin, it will be to advantage to examine Fig. 2, in which (A) is the motor in section at right angles to the crankshaft, and (B) is an end view looking at the front of the motor. Referring to (A) the carbureter C1, is connected to the cylinder by the intake manifold I1, and the concentric valves, V1, are clearly shown in this section. The camshaft, C2, shows one of the cams, and the lift, L1, is of the design using a mushroom. In this section the lift shows the control of the auxiliary valve, V2, of the exhaust, which opens when the piston, P1, is nearing the bottom dwell point, and remains open until the piston ascends for a part of the up-stroke. It is claimed that this auxiliary valve serves as the outlet for over 70 per cent. of the spent products of combustion, and this, as a means of cooling, should not be lost sight of.

Considering (B) Fib. 2, the manner in which the air jacket, J1 (there being one for each cylinder), is fitted around the cylinder, is clearly depicted, and the air-box, the top plate P2, shows the upper line of the exhausting chamber, while the vertical ribs R show in the view, they being very thin, closely spaced around the cylinders and of sufficient area to accomplish the desired end.

GENERAL ASSEMBLY OF CHASSIS AND POWER PLANT

How the chassis, as a whole, appears, is best appreciated by referring to Fig. 3 with the hood off, this being the 4-cylinder model, which differs from the six only in point of the number of cylinders used and such other changes as this situation indicates. The motor, M1, has its cylinders projecting up above the air-box, B2, and, as the illustration depicts, the location of the motor is strictly in conformity with the most modern practice. The transmission, T1, is on the center line and connects with the live rear axle, A1, by the propeller shaft, P1, with a universal joint, U1, at its front end and a similar joint, U2, at the entrance of the housing, H1, of the live rear axle.

The brakes on the rear wheels are of great competence and the control is worked out in a manner to be commended, with the brake shaft, B1, far enough in front of the rear axle so that vertical motion of the frame does not interfere with the action of the brakes whether the tonneau is loaded or empty.

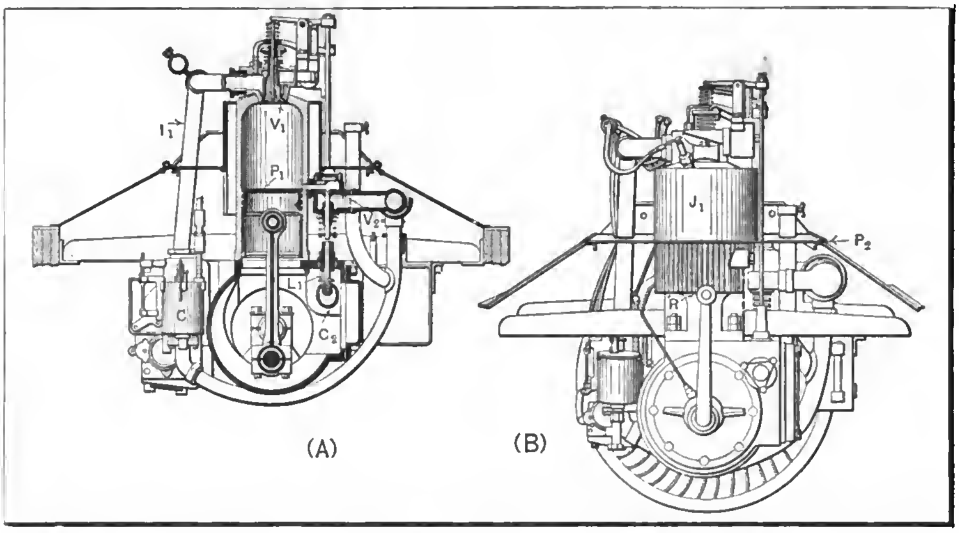


Fig. 2—Sections of the motor; (A) Through a cylinder, presenting details, and (B) Exterior of a cylinder showing method of cooling

Among the other features of the car are nice steering details, the crossrod, C1, being straight, and to the rear of the axle, thus guarding it from damage when the car is in heavy going, as on a soft road, or if an obstruction projects up far enough to strike the axle.

EXCELLENCE OF FRANKLIN FINISH AND BODY WORK

The general finish of the several models is on a high plane, and, in keeping with the trend, a torpedo type, with a Renault front, seems to take the place as the "leader," judging from the attitude of the spectators who hovered around the Franklin exhibit at the late Garden show. The company offers for this year the models as follows:

Model G, as a touring car or a runabout.

Model D, in touring car, runabout, landaulet, limousine, and in a close-couple design.

Model H, touring car, runabout, limousine, and close-couple.

Model K-4, town car.

Model K-3, taxicab.

ATTENTION TO DETAILS TAKES ON IMPORTANCE

Experienced autoists fully realize that, a car may be of excellent design, well made from suitable materials, and still be too troublesome to tolerate. If the wiring for the ignition system, for illustration, is not well installed, ignition troubles (even if the magneto is thoroughly good) will be continuous. In this and the many other ways, involving details, Franklin automobiles have been brought up to a high state of perfection, thus enabling the maker to concentrate upon the air-cooling work in order to bring it up to date as well—this task is finished.

FULL ELLIPTIC SPRINGS USED THROUGHOUT

Much of the fine performance is attributed to the excellence of the spring action; all types of Franklin cars having full elliptics, and, in order to get all there is in this phase of the designing problem, the springs are swung in such manner as to bring out the good working qualities of the materials used. In addition to the springs, there is the wood chassis frame, it being of laminated wood, of suitable design, assures strength even in excess of all reasonable demands, and, as is well appreciated, this type of material is extremely resilient, adds to "soft" riding, and is long of life.

The general appearance of the new models, from the point of view of the springs and frame, is as in former years, but the new front, designed to render the present method of cooling, adds something to the appearance which pleases beyond words. The style is smart, speed is written all over it, and critics seem to take kindly to the idea.

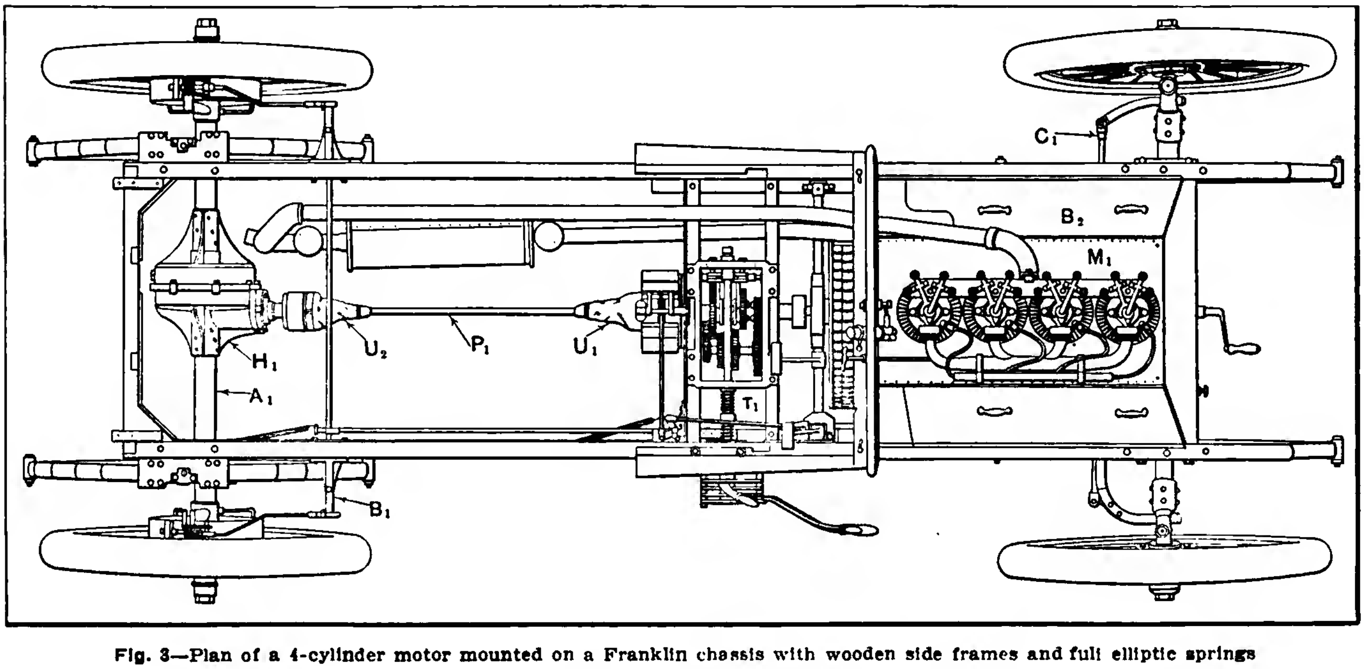


Fig. 3—Plan of a 4-cylinder motor mounted on a Franklin chassis with wooden side frames and full elliptic springs

Some Novelties Presented at the Shows

Fig. 1—Alco showing starting crank so contrived as to eliminate back-kicks under all conditions

THIS year, taking it as a whole, the displays at the shows in New York City partook of novelty along somewhat more mature lines than on former occasions. There was a distinct absence of the little "Yankee notions" of the catch-penny order, but, instead, the keen autoist, looking for something to help out, or influence for economy of operation, would not have to travel far in quest of the device.

The most striking example of budding novelty on a basis of high utility, was in the shape of the electrical generators designed for lighting, in which the speed of the generator is regulated even though the automobile motor used in driving may change speed over broad ranges. Gray & Davis, in the lamp division, presented one phase of this idea at both shows. The Apple Electric Company offered its system in refined form, and Ward Leonard Electric Company is out with still another version of this plan, using a dynamo.

Fig. 2—Example of Packard Landaulet, showing the top folded, wide side entrance and luxurious upholstery

ELECTRIC STORAGE BATTERIES

For lighting work the makers of storage batteries have in hand a class of equipment which is an advance on all former efforts in battery work. For lighting it is recognized that the service is difficult, and the present aim is to prolong the life of the battery rather than to skimp on the weight. The Electric Storage Battery Company, colaborating with Gray & Davis, in connection with its new lighting system, instead of trying to deliver a battery of high weight efficiency, employed the opposite method, and, with the added weight comes an assurance that, despite of the rather severe service, the battery will serve for at least three years under the conditions of operation stated. All along the line, considering the several makes of battery, this general plan of lengthened life is the paramount idea.

HESS-BRIGHT TESTING MACHINES SHOWN

In bearing work there is much to be learned, and, at the booth of the Hess-Bright Manufacturing Company, the question of testing was on the surface. One of the testing machines exhibited was on the principle of the Schlaroscope, in which a hammer falls for a measured distance and bounces off of the test proof. In the Hess-Bright machine it was a steel ball which was substituted for the little hammer, and it is surprising how much the machine tells about the quality of a ball. An inferior ball is at once discovered, and even balls of different materials will show the difference at once.

Still another testing machine by the same company was devised to determine the difference in friction loss as between plain and anti-friction bearings, in which the bearings are required to sustain under conditions of flywheel effect, friction and speed conditions.

MANGANESE BRONZE FINDS MANY IMPORTANT USES

At the booth of the Wm. Cramp Ship Building & Engine Company there was a wide display of Parsons manganese bronze castings, among which the motor frame for the Woods electric attracted almost as much notice as a front axle. This front axle, which was of the I-section, is most readily made in Parsons manganese bronze, due to the shape, which is looked upon by the patrons of this make of car as quite something out of the ordinary. There were many other Parsons manganese bronze parts there to be seen.

The great advances which are being made in the use of "silent chains" was adequately brought out at the shows, and, as an illustration of the many uses to which they are now put, mention will be made of the camshaft drive in the Jackson "thirty." This motor, it will be remembered, is of the "valves in the head" type, and the camshaft is superimposed. The drive, using a silent chain connection from the crankshaft, is noted for its silence, and, while motorists comment favorably, it is only the "wise" of them who look deep enough into the construction to note that the splendid performance is brought about through the use of a silent chain. This is a characteristic of the Jackson "thirty"; the remaining models are made in the conventional Jackson way, with camshaft superimposed, gear drive and a most careful method of lubricating the bearings.

LOW TENSION WIPE-SPARK SYSTEMS

In the ignition methods, as they were to be seen on the various cars, there were so many examples of high-tension work that the average spectator may have missed some of the sights. Take the Premier exhibit for illustration. It might have been observed that the ignition was by low-tension, wipe-spark methods, in which the mechanism has some novel points, among which, it takes but a moment to remove and replace the system of insulation, which is in the form of porcelain bushings, which are all ground to exact size, and an extra set is provided with each car as a part of the repair kit.

The Locomobile, it will be remembered, is also fitted out with low-tension ignition; this company has ever adhered to this method, believing that the energy in the spark is far greater, and that insulation trouble is eliminated, it being the case that the voltage is approximately 100 instead of 20,000. The Gaeth is also in this class from the ignition point of view.

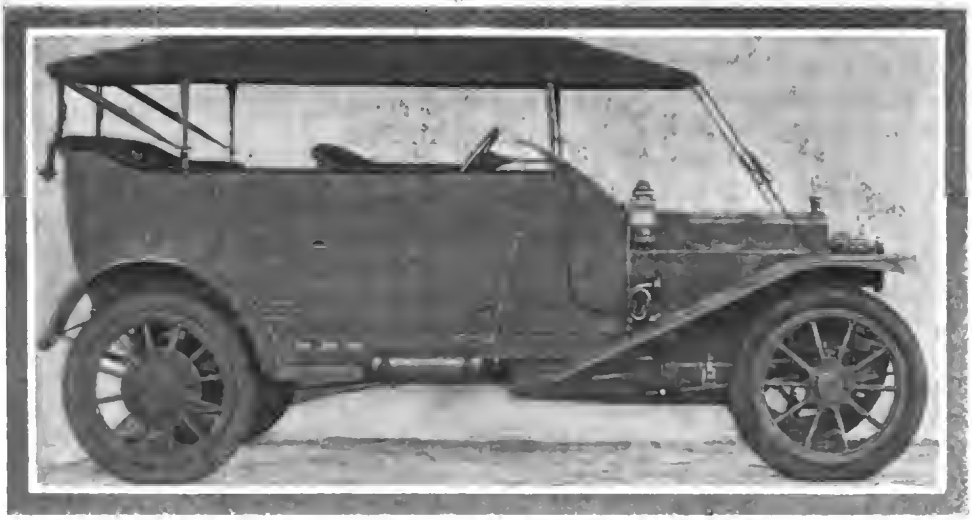


Fig. 3—Marmon torpedo type of body with unusual height of the superstructure.

ALCO COMES OUT WITH A NEW CRANKING SAFETY

The title illustration of this article shows the front of an "Alco," made by the American Locomotive Company, Providence, R. I., and S1 calls attention to the starting crank, which is different from any regular crank which was formerly used on Alco automobiles, although, last year, the company tried out this device, and, as it was at first reported, it was to be put on as a "special" this year.

Added experience with this device was so gratifying that the company decided finally that it should be regular, claiming that, in the furtherance of safety, the device might well be placed at the disposal of every user of Alco automobiles. As is well appreciated, when a powerful motor is being cranked, if the cranker is not careful, he is liable to experience a "back kick," and, according to insurance statistics, there are enough accidents which may be directly traced to this class of trouble to warrant the safeguarding of purchasers of this class of cars.

The crank, as shown, is so contrived that when the car is being cranked, if the operation is not properly performed, nothing of a disagreeable nature will transpire, because the finger which extends out beyond the starting crank will be engaged on a back motion of the crank, and the finger being connected to a reverse motion in the housing of the device, throws the crank out of engagement, positively, and what is equal to the point, within a very short angular travel of the starting crank. This device is very simple, there are but few parts, and they are sturdy.

PACKARD BODY WORK

Fig. 2, which is of a Packard body as it was exhibited at the Garden, is sufficiently distinctive to warrant utilizing it here on the score of a specialty, and, as the figure indicates, it has art written all over it. The foundation of this, like all Packard body work, is by way of well-designed framing of ash, from seasoned wood, which is held in the Packard yard for fully five years before it is brought in and placed in the drying kiln with a view to further and desirable treatment.

The Packard kilns are especially designed for this class of work; means is provided to regulate the heat, and as the vapor rises it is condensed and carried away. The result is that the wood is well kiln dried after it is yard seasoned, and, naturally, under such careful conditions, the wood, before being stored in the yard, is inspected by a "forester."

The ironing, while it is designed to limit weight, is given the same care as an axle or a crankshaft, and the strength of the frame is therefore maximum, although Packard body work, taking it as a whole, ranks as light. The aluminum sheets, as they are attached to the framing, are "butt-jointed," and to cover the points a half-round trim piece is lined up over the joints. In order that the trim will look artistic, the aluminum is so cut that the joints favor the undertaking, and, since all the trim pieces are screwed on after the holes are drilled, the work is securely held, while the finish is perfect, because the screws are all countersunk.

The aluminum, besides being securely placed, is of sufficient thickness to stay in place, and the chances of denting are eliminated, due to backing which is placed wherever the situation would seem to warrant. At one or two points castings are used, they being of aluminum, it being the idea to add to the strength of the framing, and make difficult curves. The finish on the body shown is up to the limit of the carriage-maker's art, and, with the work all done in the Packard plant, under the watchful eye of skilled and exacting inspectors, there is nothing

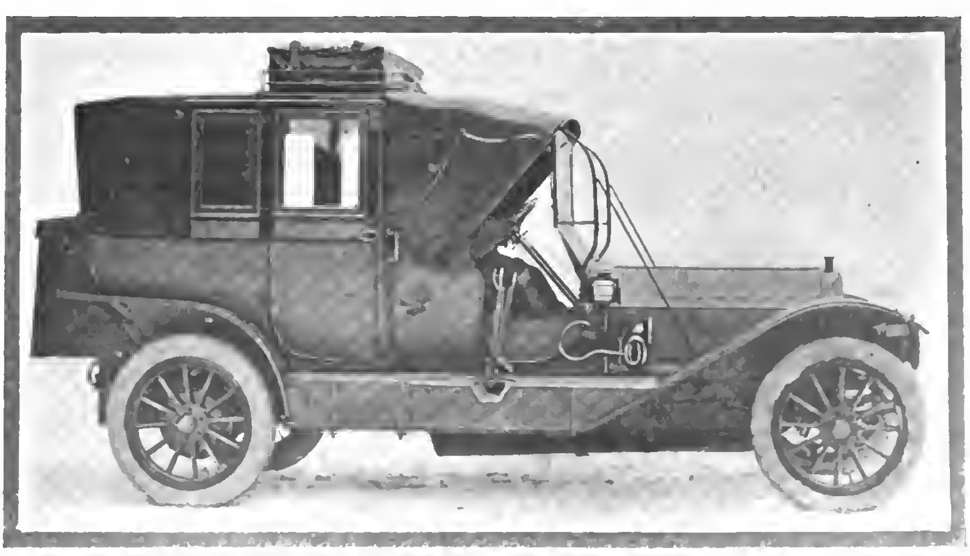


Fig. 4—Pierce-Arrow automobile fitted with a commodious touring body, including comfort.

Fig. 5—Palmer-Singer torpedo type of body, looking in to see the collapsible front seat which facilitates

to expect but the longest possible life from this point of view. First-rate work is the cheapest in the long run.

The entrance is wide, and the upholstery within is that which makes the lap of luxury. Purchasers are given a wide choice of materials for upholstery work, and, according to the usual Packard practice, it is the aim to give to each owner just the results desired, considering, within all seriousness, the artistic tastes of those who indicate capacity to judge.

MARMON COMES OUT WITH A TORPEDO TYPE OF BODY

Of the torpedo types of body work which were seen this year at the two New York shows, it is highly improbable that any of them attracted more attention than the Marmon. This body, besides being of the usual Marmon construction, which stands for stability as well as comfort, affords additional protection, due to the height of the sides, as the illustration, Fig. 3, adequately portrays. The entrances are commodious, interior work is on a basis of luxury without being in bad taste, and the whole situation portrays a considerable advance on the original idea of torpedo body work as it floated across the Atlantic a few months ago. This car has ample room, and seats five.

PIERCE-ARROW PRESENTED A TOURING CAR OF INTEREST

At the Garden there were many sights to whet the interest of the man who sees things, but, taking the situation as it would appeal to the "globe tourer," there was much to be said for the "big" touring car, Fig. 4, quite naturally, in view of its roominess, then, due to the accommodations offered.

Space for baggage, the utensils of a protracted tour, and the "home comforts" which even a hotel limits, may all be found in the Pierce-Arrow. In many places, especially abroad, a day's run is full of little disappointments, and a space for eatables and refreshments is easily possible in this car. The upholstery, while it is artistic, is more so because it is substantial.

LOOKING INTO THE PALMER-SINGER TORPEDO

The new body of this make was most interesting, and is representative of the original torpedo idea, limiting the facilities of ingress and egress to a single door (on each side of the body), so that to take a front seat it is necessary to "collapse" the one beside the driver's, pass to the front and thereafter erect the seat. It is a fine piece of work, and the ingenuity displayed in the construction of the collapsible seat is well worth examining personally. The general appearance of this body is up to the original foreign idea, but, if anything, the character of the workmanship is one better.

DORAIN DEMOUNTABLE RIM FEATURES

Glancing over the rims that came to the surface at the Garden during the show disclosed several new ideas, among which the "Dorain," as here illustrated, Fig. 6 (A) presenting the wheel with the tire inflated on the rim ready to use, and (B) depicts the wheel with its Dorain demountable features.

Referring to (A) of the figure the security bolts B1 and B2 are held in relation to each other by means of the bar or

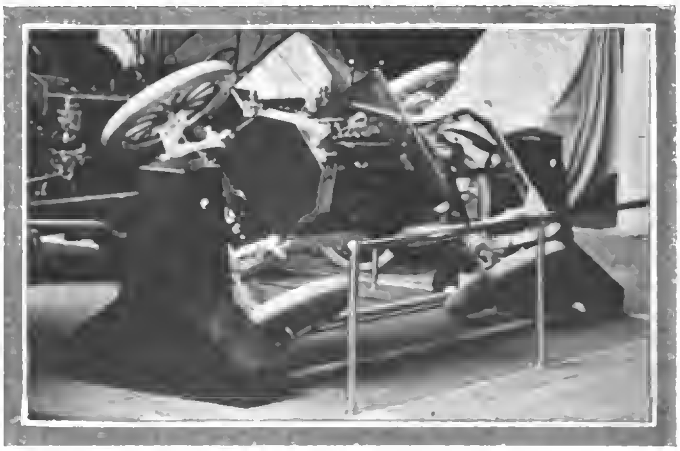


Fig. 7—Novel tilting frame used in the Thomas booth at the Garden to bring out good points of the Thomas chassis

keeper, K1, and since the nuts are designed with an integral flange, which fits under the caps, the whole unit may be removed, layed down, and when it is picked up again the nuts will be in place, being held by the flanges. The felloe of the wheel proper is in no way reduced in section, it being true that the auxiliary rim is plain, just as it would be in a standard clincher, were it necessary to employ one under the rim which holds the tire, as it is in demountable work. B, Fig. 6, shows the same wheel with the tire removed, and the parts which compose the locking device are also exposed to view, in which S1 is a socket wrench, the only tool required to remove and replace a tire, and K is the connecting portion of the keeper, of which four are used on a rim.

The terminations of the keepers are flanged, and the flanges, as shown, are with a wedge shape, W1 and W2, which wedges are forced up between the clincher and the supplementary rim, which is shrunk over the felloe of the wheel to hold the woodwork in secure relation.

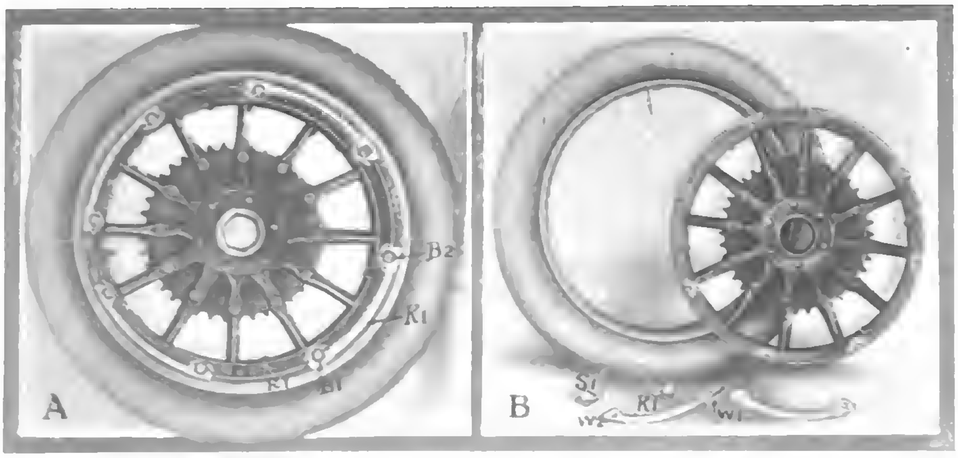


Fig. 6—Dorain type of demountable rim: (A) presents the rim and tire in place; (B) is the rim separated from the tire

STABILITY INDUCED BY EFFICIENT COOLING

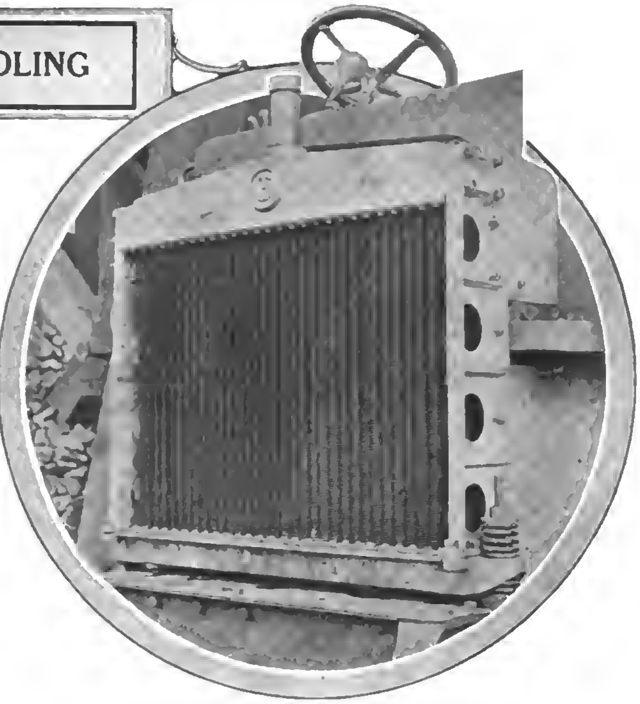


Fig. 1—Alden Sampson truck presenting method of cradling a strong type of radiator to sustain in trucking service

EFFICIENCY has many phases; thermal economy represents one of them, and, as a rule, when the thermal efficiency is at its best, it is nearly sure that the weight efficiency will show up favorably. The service efficiency, on the whole, is scarcely to be measured along the same lines, for, while the thermal efficiency and the power for weight may both be quite high, it is possible to have a condition which may be far from a high service efficiency.

In cooling, if the system is not one to assure stability under the most severe conditions, service efficiency will be at a low ebb. If a radiator heats up when a car is standing at a curb, it will take quite a little coaxing to realize a sufficiency of power for some time thereafter, or if in hill climbing the same heating is induced, it is a sign that service efficiency is too low, no matter what the "block" performance of the motor may be.

By "block" performance is meant the results which may be obtained from a motor on a testing block under the conditions which are likely to obtain if, in the testing room, the man in charge is lacking in "road" experience, or is trying to clear up the "floor." In abuse testing, which involves a run of, say, 100 miles, if the tester is alive to his opportunity, he will be able to tell if the radiator is competent, but if he fails to bring out the strong points, the purchaser will have the pleasant duty of finding how strong they are in fact.

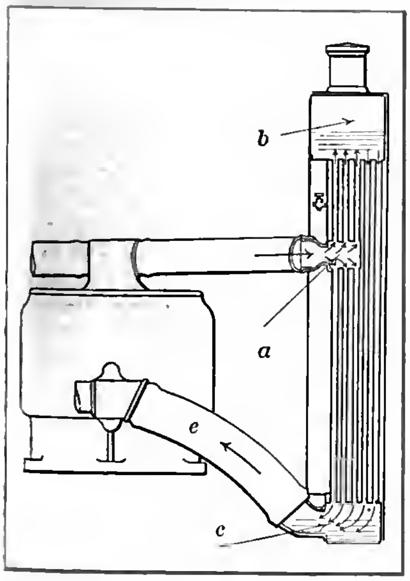


Fig. 2—McCord type of thermo-siphon radiator, as used on Regal automobiles, showing a pocket for the steam to distribute in

RADIATOR DESIGNS

In general practice the problems involved are now quite well understood, and, as a rule, the ratio of flame-swept surface to radiator surface is quite well regulated, whereas, it was not so long ago that builders of motors thought that all essentials were cared for when the maker of the radiator was informed as to the horsepower ration of the motor, nor was there any assurance that even that rating was in full accord with the exact requirement.

In truck work, where the motor is required to operate under rather severe cooling conditions, it is the practice to allow a liberal rating of the radiator, and to introduce rather more of mechanical stability that will be found necessary in pleasure types of automobiles. Fig. 1 portrays something of this condition. The radiator is suspended on a flexible cradle, as it were, it being the idea to eliminate shock to the greatest possible extent, which is accomplished by a flexible mounting.

McCord Manufacturing Company—The radiator as shown in Fig. 2 is of the thermo-siphon type of special construction as used on Regal automobiles, in which a pocket is formed at a point part way down from the top of the radiator and the water with entrained steam enters this pocket where it is separated out, and the water passes up or down depending upon the conditions, but all the water, properly cooled, ultimately passes to the bottom of the radiator and thence back to the waterjackets of the motor cylinders. Fig. 2 (A) is another type of McCord radiator showing a form of rigid fastening, (B) depicts the lap of the McCord vertical tube, which is made on a special machine, and (C) is a "trunnion" type of cradling as used on this make of radiators, which is now quite frequently employed.

Brisco Manufacturing Company—This company manufactures a full line of metal stampings as used in automobile work, and the Brisco types of radiators, of which there are several, are now so common in use as not to require a great amount of explaining. Among the very efficient types used is the vertical tube form, in which plates, placed horizontally and quite closely spaced, serve as the radiating members, and being mechanically

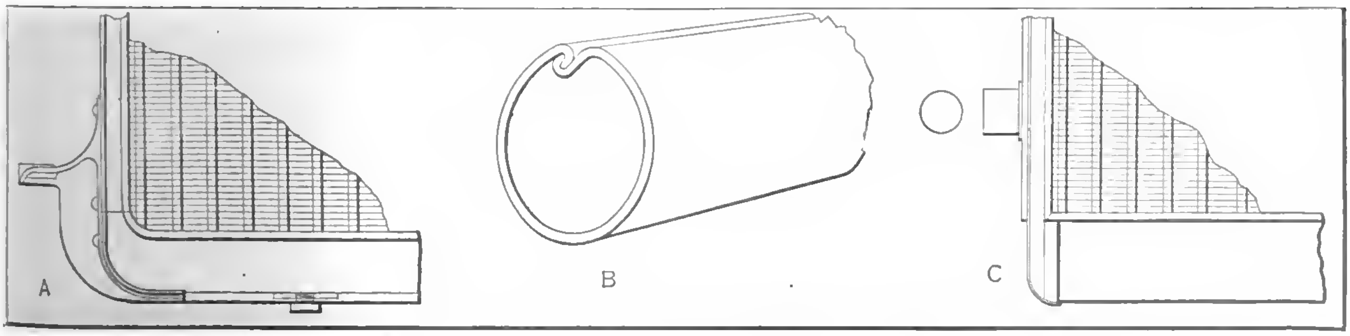


Fig. 3—(A) Fixed radiator support, (B) Tubes of McCord radiator, (C) McCord trunnion support

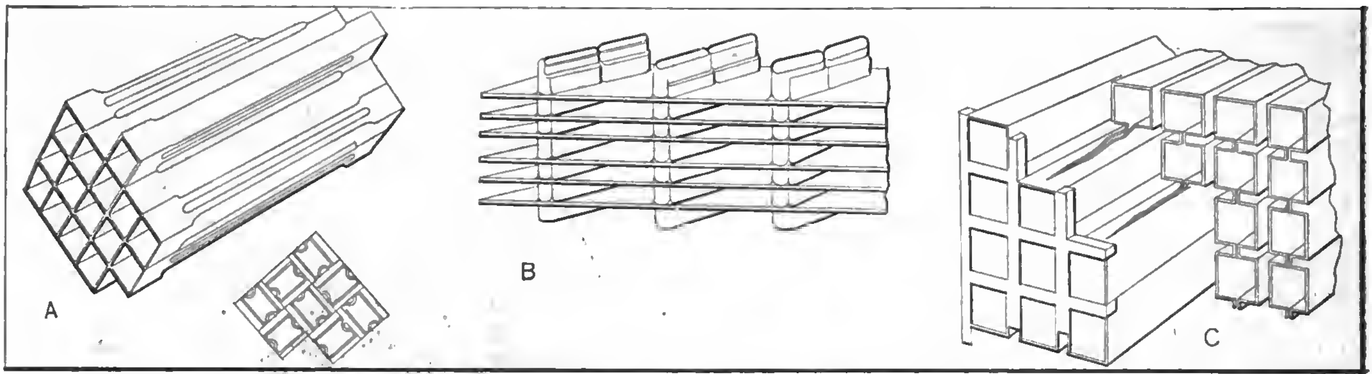


Fig. 4—(A) presents a section of the Brisco honeycomb type, (B) Brisco flattened tube construction, (C) Brisco tubular plan

well spaced with well-finished edges, the appearance is all that can be desired. The honeycomb type, as made in this plant, is much used and special forms are given consideration when it seems desirable to do so.

DATA ON FEDDERS RADIATOR TUBES							
Size of Tubes			No. of Tubes per Ft.	No. of Tubes per Sq. Ft.	Cooling Surface per Tube	Cooling Surface per Sq. Ft. of Tubes	Remarks
A	B	C					
5/16"	1/4"	3⅝"	39	1521	3⅝" Sq. In.	5513 Sq. Inches	15.7% More cooling surface than 3/8" tubes
3/8"	5/16"	3½"	33	1089	4⅜" " "	4764 " "	Cooling surface 86% of 5/16" tubes

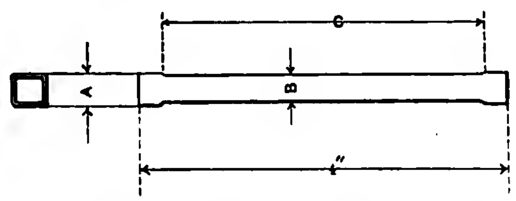


Fig. 5—Dimensions of a Fedders radiator tube as used in the honeycomb type of radiator

Fedders Manufacturing Company—This make of radiator is of the true square tube type, frequently designated as "honeycomb," and in Fig. 5 the dimensions of the tubes are given for one of the sizes made. This class of radiators is used in the most exacting service, especially in high powered motors.

Mayo Radiator Company—Made at New Haven, Conn., the Mayo radiator is now so well known as not to require any introduction at all. It is used on automobiles of excellence and under racing conditions where high duty is one of the important points. This radiator is built up of sheet copper, with every provision to realize the greatest efficiency of radiating surface, and water circulation is looked after with much care.

A-Z Company—In addition to a line of sheet metal work this concern turns out honeycomb and other types of radiators of a class which are used in high-powered automobiles.

W. J. Kells Manufacturing Company—Maker of the well-known Kells circular tube radiators and the true honeycomb type, this company placed before makers this year a line of radiators in keeping with its reputation for efficiency and stability.

Long Manufacturing Company—The Long tubular type of radiator has been so much used that it is too well known to demand more than mention. It may not be generally known in the East at any rate that this is one of the really well-equipped plants in America for turning out radiators of all types and forms. This make of radiator is much used in severe classes of service.

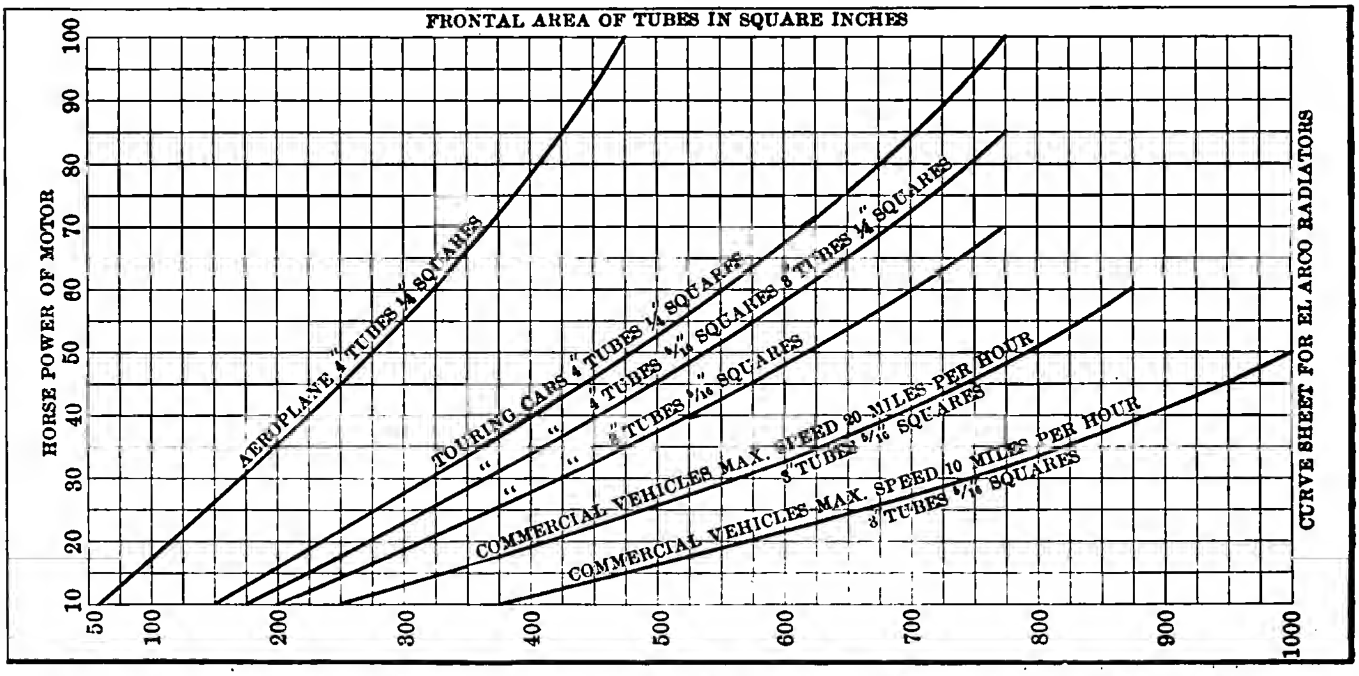
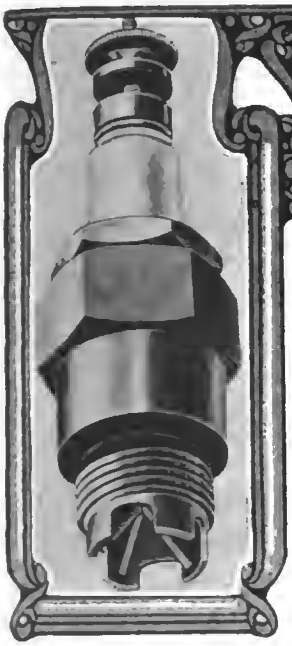


Fig. 6—Curve of horse-power ratings of the Arco (formerly Livingston) types of radiators as used in several classes of service

Serviceable Ignition Accessories



U. & H. Magneto Plug

HIGH-TENSION magneto systems deliver, without the aid of a step-up transformer, a sufficient electromotive force to break down the gas gap between the nodes of the spark plugs. Spark plugs disrupt at a voltage slightly above 15,000, hence the electromotive force delivered by the high-tension magnetos must be somewhat less, it being limited by the ability of the spark plugs.

Low-tension magnetos are constructed with but a single armature winding and deliver an electromotive force of about 100 volts, and in conjunction with a wide spark mechanism involving a hammer and anvil in proper relation, the art is drawn at the proper time, thus producing a spark with high energy.

Still another type of magnetos really belongs to the low-tension class in that the armature is wound to deliver a relatively low electromotive force, and a step-up transformer is employed by means of which the voltage is stepped to the higher level sufficient to disrupt the "gas" gap between the nodes of the plugs.

High-tension magnetos are sometimes used in connection with coils, they being sometimes so designed that by throwing a switch the magneto energy is substituted by a battery, and in the design of the magneto a supplementary interrupter is provided, thus accounting for the appellation, dual ignition systems.

Connecticut Telegraph & Electric Company—After two years of experimentation this concern now announces the completion and marketing (after March 1) of a new form of magneto. It will be made in four and six-cylinder types, which will be called 4-A and 6A. In its design, one point particularly aimed at was efficient sparking at very slow speeds, so as to permit ready starting without spinning the armature shaft, and also to allow of running the motor very slowly, which has hitherto been considered an exclusive feature of battery-coil ignition systems.

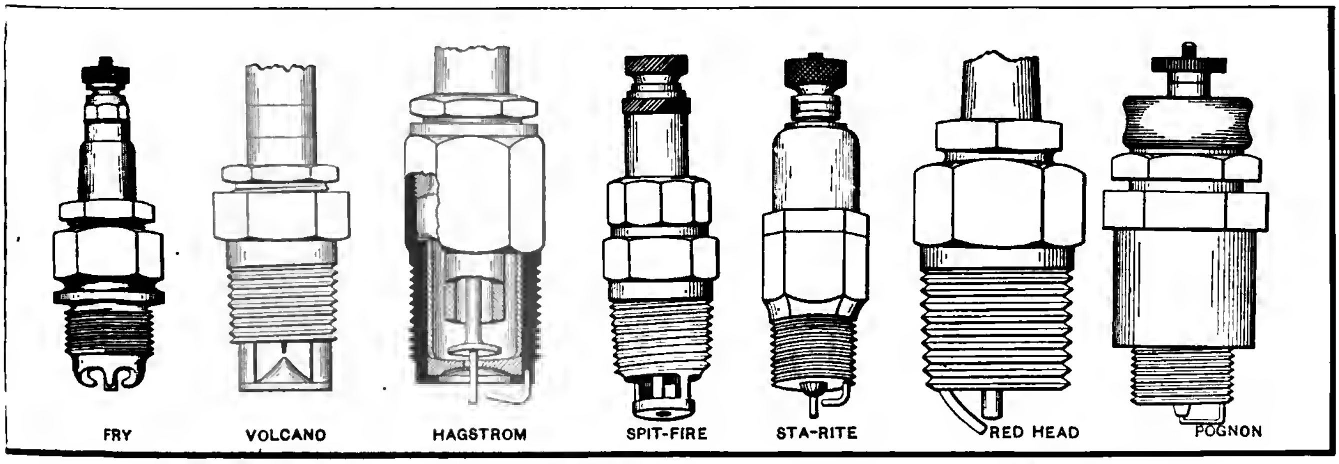
Another feature of merit is the change from right to left hand which can be effected by simply changing three screws. In this way dealers would not have to carry both kinds in stock, while the manufacturer gains also by making all of them just alike. Repair parts too are lessened in number and trouble reduced to a minimum. In place of the usual one spark gap four safety spark gap windows are provided. In case one of the cylinders is missing the spark will immediately jump across these windows, so that the ordinary man not understanding ignition can trace the missing cylinder as well as an expert.

K-W Ignition Company—This firm makes a low-priced magneto and a coil. The former is put out in two styles, one low-tension and the other a high-tension. Both are very simple in construction. Yet the efficiency and serviceability of both is unquestioned. This was well proven by an experience which a Cleveland man had with one of them on a Mitchell car, while touring in the West Indies last summer. On the boat a severe storm broke the car loose from its fastenings and damaged the axle, radiator and other parts located at the forward end of the chassis. When the damaged parts had been straightened and otherwise repaired, the magneto furnished the requisite spark on the first turn and, moreover, continued satisfactorily for some 1,000 miles of touring, which concluded the trip.

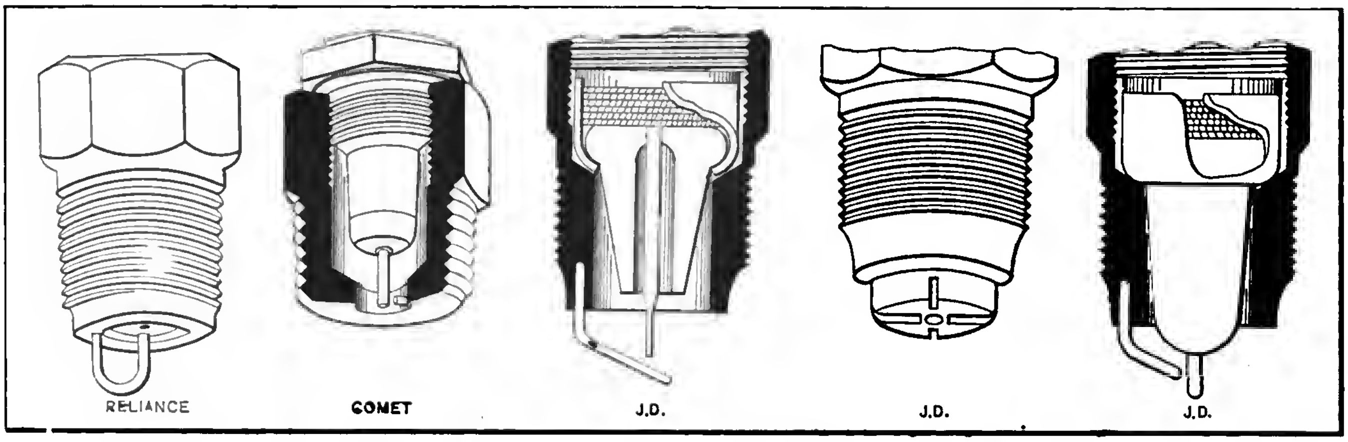
Buffalo Ignition Company—The Volta Magneto is continued for the season of 1910. It is well known as a true high-tension magneto with several valuable features. The whole device is small and compact, the magnets being arranged in pairs with additional pairs within. The contact-breaker box is both simple and accessible, the spring holding the cover on normally being such as to be turned aside by a simple twist of the finger. When so uncovered, the cam is found to have a diamond shape with rounded corners. The breaker is held against the cam, that is the hardened steel roller of it is, by means of a spring coiled around the pivoted end, movement of the arm tending to coil the spring tighter. In this way the tendency is to never lose tension.

Standard Sales Company—In the cut below, the Fry spark plug handled by this firm is shown first. It consists of a brass shell, within which is an all-porcelain center with a metal core, the lower end of which forms one electrode. By removing the binding nut the whole interior part is removable without disturbing anything else. Yet in spite of this accessibility it is sure to be gas tight, as gaskets are used against shoulders.

Volcano Spark Plug Company—This Ashland, O., firm makes a porcelain plug which has a number of important points of difference. The porcelain carries the one electrode as the



Seven Varying Spark Plugs Now On the Market, Showing the Differing Individual Sparking Points



Another Lot of Five American Spark Plugs of Unquestioned Merit, Nearly All of Porcelain

center part of the core, this tapering to a fine point. The other is formed by a cone-shaped projection, which rests on a sort of circular shelf, the latter being connected to the body of the plug by a pair of side columns. The latter being fixed in position, the inside electrode is slightly adjustable up and down to secure the right spark gap distance.

Hagstrom Bros. Mfg. Company—This plug, the third on the previous page, has the unique feature of an internal cavity, which is partially closed at the bottom by a porcelain disc which is forced into the brass shell before assembling. In addition to this the central electrode carries a shoulder just above the porcelain, which in combination with the very small hole through the latter effectually prevents any oil or other foreign materials from entering and short-circuiting the plug.

A. R. Mosler & Company—Among the many spark plugs made by this New York firm the Spit-Fire maintains its popularity. The construction shown, partially in the fourth position on the previous page, is such that the spark must jump or spit through a small hole, thus the derivation of the name. The frame work of the base portion is carried down as a cylinder with two slots on the sides and the central hole just mentioned. The central sparking point projects from the porcelain core down into the very center of this hole.

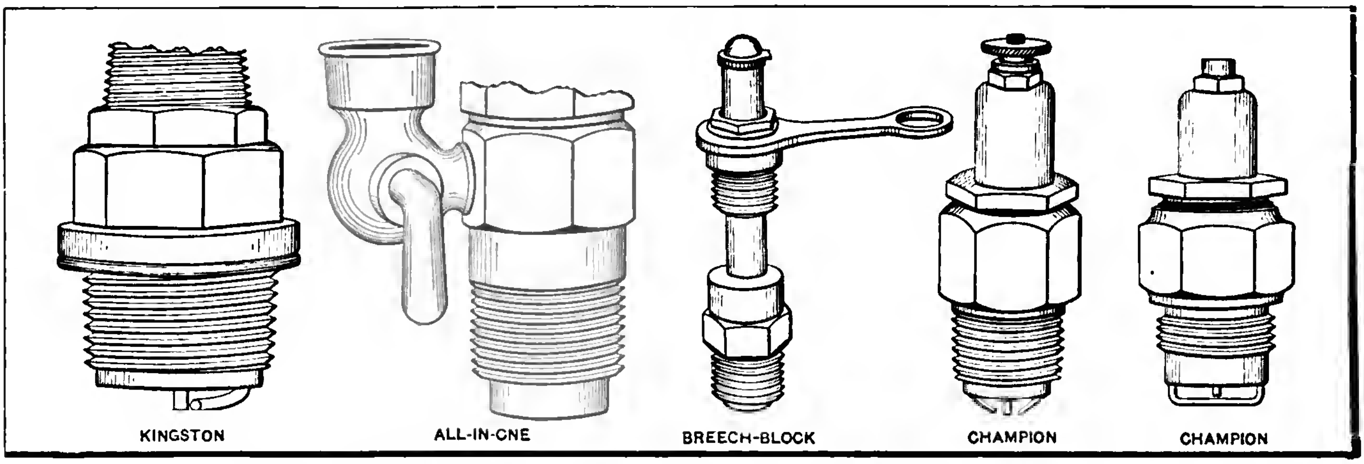
R. E. Hardy Company—At both the Palace and Garden shows, in addition to the well and favorably known Sta-Rite plug, this concern showed a new plug called Apropos. This had a central porcelain with a shoulder, which bore upon the brass shell, while the locking nut jammed down upon its upper surface. The result was a double gasket effect, which insured its being gas tight. The principal feature, however, was the shape of the lower end of the porcelain. The center of this was hollowed out to form a cone, with the sparking point placed in the center of the cone. Oil in the cylinder would, through capillary attraction, draw to the center, in which case it would flow down the sides of the cone and away from the point.

Emil Grossman—Red Head spark plugs, as the cut on the previous page shows, are very simple in construction, consisting of a central core which carries a perfectly straight electrode. This with an inserted platinum wire forms the spark gap, the latter being bent over close to the central point.

Jeffrey-Dewitt Company—Heading the line of plugs made by this Newark, N. J., firm is the Reliance plug. The feature of this is perhaps its ability to spark under water. Since short-circuits are the greatest source of plug trouble, one that will spark continuously under water should be perfectly safe under any less arduous conditions. This firm also makes a lower-priced plug with the same porcelain core, but in three differing styles. The three styles are known as petticoat type, conical type and closed-end type, the name giving some idea of the construction. Thus the first has a form of central porcelain so hollowed out and surrounding the electrode as to resemble a petticoat. The second has a solid conical shape of porcelain within a perfectly vertical hole in the brass, while the third has a closed end, through which four small slots and a central hole allow the spark to fire and ignite the charge.

Oakes & Dow Company—This firm makes the Sootless and Comet, the latter being illustrated above. It has a single central electrode which projects through a large hole in the brass shell. In one side of this latter hole a small platinum tit is set so as to come to within the proper 1-32 in. of the center piece.

Buffalo Carbureter Company—The All-In-One plug serves as more than a simple sparking point, in that it includes a priming cup, which may be used, taken with the pressure within the cylinder, to form a plug cleaning means, while the cup may be used in addition to convey kerosene to the cylinders as well as spark plug, thus cleaning out both. It is a very useful adjunct.



Quick-Detachable Idea and Multiple-Use Feature Appear on Some of the Current Plugs

WIND SHIELDS ARE NOW VERY WIDELY USED

WITH increased use has come increased knowledge of the many advantages of the wind shield, this resulting in a more widespread adoption. This matter has progressed in the past three years, until now it may be said that the present status is such as to include a wind shield among the many accessories looked on as necessary. Or, in the case of this being omitted, the omission is such as to call for its addition as soon as finances will allow.

Comfort, convenience, safety, health, and many more desirable conditions are furthered by the use of a wind shield. Thus, to expand on some of these or to prove their existence, one might take the first, comfort. No one will deny that driving against a head wind is uncomfortable, or against a driving rain or snow, or more, against a dust storm. All these render the driver of the car uncomfortable and uneasy, to say nothing of some of them making the practice of driving dangerous. With a sheet of plate glass stretched across the front of the car, all of them are avoided, as the air, whether laden with rain, snow, dust or other undesirable things, must pass over the driver's head.

In the last analysis, what is a wind shield but a sheet of plate glass, with perhaps a division across the middle or elsewhere, and adjusting means for retaining it in any desired position? This certainly describes the wind shield exactly, and the only difference among the many now placed on the market lies in the materials used, finish given to them, parting of the glass or non-parting arrangement as the case may be, adjustment mechanism and its working.

With the idea, then, of disseminating a wider knowledge of this desirable accessory, a number of its present forms will be described, the cases being taken at random from those exhibited at the Palace and Garden shows, just closed. Space being somewhat limited for such a large subject, the ones illustrated by means of drawings will not be described.

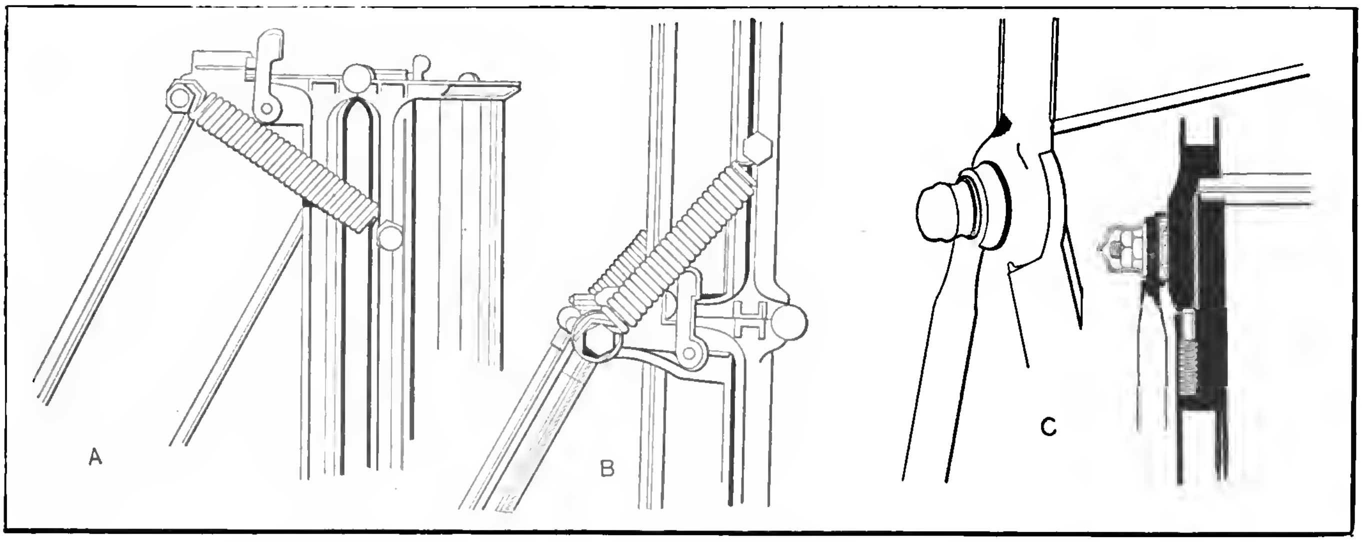
Banker Wind Shield Company—Two styles are made, both of a very high grade of material and workmanship. These are known as No. 1 and No. 2, the difference being small. Of the two, the latter is the one which is being pushed. The principal feature is that of the double fold, which allows of the shield being folded up and laid over the hood when its use is not desirable. Beyond this the glass is parted in the middle, but the parting line is rendered invisible by the absence of any molding or binding along either edge. This does not obstruct the vision as would a metal edge at that same point.

Rubber backing for the glass eliminates any possibility of noise, which, to put it mildly, is not needed. Aside from doing away with noise, this feature is of value, in that it lengthens the life of the whole device. The hinge is always a vital point, and this one has been designed with much care. It is of the so-called piano type, with a knurled locking nut which governs the opening and closing. When it is desired to open the shield so as to lay the top part down, this nut is turned part of a turn, which allows of its being pulled over to the side, and frees it from the knife edges which hold it. When freed, it turns over readily.

Chicago Wind Shield Company—Several named and lettered styles are marketed, among which may be mentioned: Styles R, O C, Dixie, Dixie Tube, Perretz, Telescope, S I, Oriole and Ziz Zag. These differ so widely that it would be impossible to describe all of them, so one or two will be selected for description. The Dixie is an inside folding wind shield, that is, the upper half folds over toward the driver, laying down close to the lower or fixed part when so folded. When folded, it is locked firmly at both top and bottom, so that the objectionable rattle is done away with. This fold is double, that is, the top of the shield has a compound movement about two pivot points, and does not describe a simple circle about the hinge. This is done to clear the steering wheel, which is usually so close to the dash board as to prevent the folding except as described.

Birch is the wood used, while the trimmings are of brass, with corners reinforced by special brass corner plates. The quarter-inch plate glass used is set into felt so as to stop rattling and lengthen the life. There are no thumb screws to take out, and the whole construction is such as to allow of reaching up from a seat at the wheel, folding it up or down, and going on without any fuss or trouble.

English & Mersick Company—This old-established New Haven carriage supply house is placing on the market the Tabor flexible wind shield. This, too, is made with an invisible central line of division, while the lower part is hinged to the dash board. The latter provision allows of the double fold, top over bottom, top and bottom over hood, which is so pleasant on warm days. Both of the joints are locked in the extreme and all intermediate positions, so that the top part alone, or both the top and bottom may be inclined. More than this the construction allows of this inclination being either toward the driver or away from him, thus, with the upper part vertical at the forward edge of the top, and the lower part sloping from the dash board line out to this, the position is perfect protection against fog or rain, while the shield is such a distance from the driver that he is enabled to see the road ahead very clearly, even with a clouded or befogged glass.



Spring Holding Mezger Wind Shield in Place (A & B), Also Action of Friction Automatic (C)

Emil Grossman—This firm, besides making "Redhead" spark plugs, and divers other automobile products, is the maker of the "Hydraulic" windshield and other types of the same general character. In this type of windshield, besides the automatic feature which prevents the shield from collapsing suddenly, French plate glass, very carefully annealed, is used, and, in its application, adequate means are taken to securely fasten the glass to prevent breakage. The metal work is very neat, has all the elements of needed strength, and a grade of liquid is used in the spring dashpot which remains at a constant state of viscosity under all temperature changes.

Hill Manufacturing Company—This Buffalo concern exhibited at the Palace show a full line of self-acting or automatic wind shields. These fold and are made up on a framework of 7-8-in. brass tubing, with 1-2-in. supporting rods. The shield is made in three differing widths, 40, 42 and 44 inches, which will take care of any ordinary dash board now used. The upper half of the shield may be tilted forward or backward at any angle, being held where set by compression.

Metal Stamping Company—The spring catch, which holds the shield in the folded or open positions, is the feature of this New York City product. It is made in two widths, both 29 in. high, these being 41 and 44 in. The catch is made sloping or tapering to a narrow edge, two semicircular notches being cut out of it on the two sides of the rod. Within the tubular framework of the shield are placed two spring-retained catches, one above and one below the parting, which catches slip into the notches through the impulse given them by the springs. This enables one to jerk the top out of its vertical position, and let go of it. The swing is circular and the catch at the bottom will retard the swing, and catch and hold it in the folded position.

This construction also does away with nuts, bolts or clamps, being complete in itself. The glass used is the best, selected, polished, French plate, clear and free from flaws. The frame is of heavy brass tubing mounted upon a mahogany filler board.

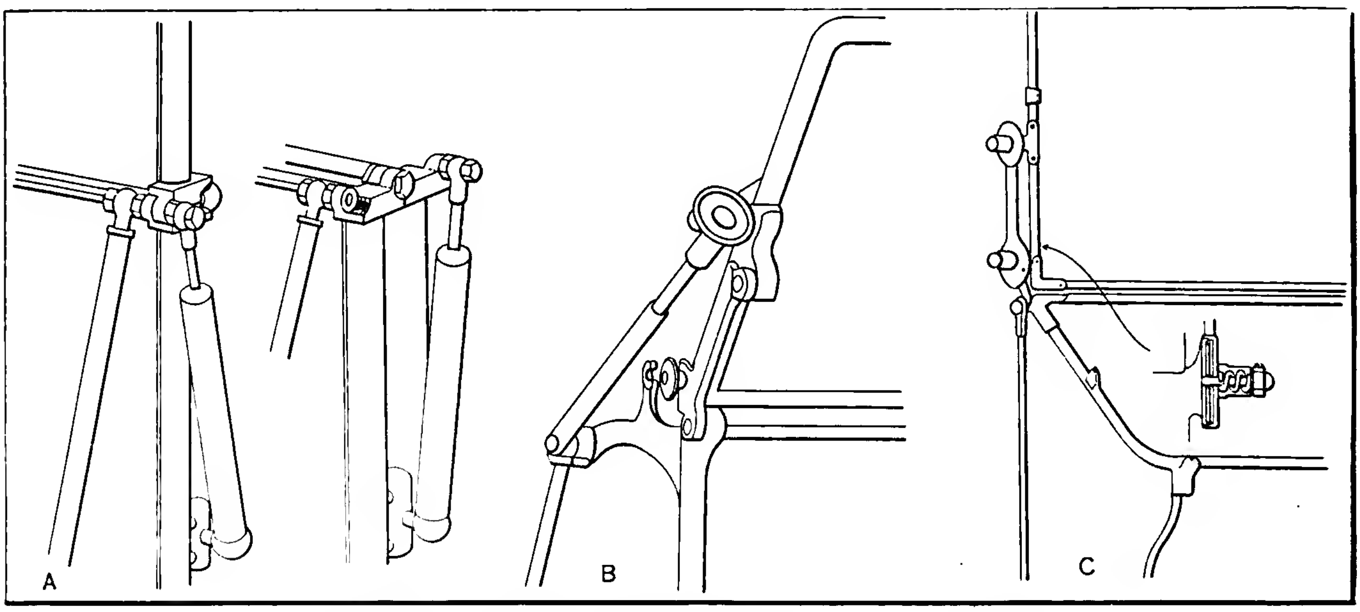
Novelty Manufacturing Company—Ajax is the name of the wind shield made by the automobile department of the Waterbury, Conn., supply house. It is described as strong, steady, silent, each one of these being considered a vital feature. At the Garden show this firm attracted not a little attention by giving away a small case, containing a mirror, powder puff and some powder. Needless to add this made the booth attractive to the ladies, while the result was to make the ladies more attractive.

Troy Carriage Sunshade Company—While many widely differing types and sizes of wind shields are made, the ones featured are numbers ten and twelve. The former is built, the makers say, to outlast the car, which speaks well of the construction. This has the lower part fixed, but the top or upper half, may be set in any one of four positions besides the most usual vertical and folded positions. A double pivot hinge allows of an offset position, that is the plane of the top either forward or back of the plane of the lower fixed part. Neither of the two models possesses any thumb screws to get out of order, or require time for manipulation. The upper sash, so-called, is self-locking in any position, the lock being a positive one. The lock is aided by crucible steel springs in keeping the contact parts in constant juxtaposition.

Like model ten, model twelve has the top hinged, but in addition the bottom is hinged to the top of the dash in a similar manner. This gives the bottom as many possible positions as the top, namely, four besides the vertical and horizontal ones. The whole wind shield, then, has all of the possible combinations of the two, considered collectively.

Vanguard Manufacturing Company—These Western makers have given the wind shield the name of the firm—Vanguard. It does not rattle, in fact, the makers say that it can not rattle. The shield parts in the middle, the brass binding along the two middle edges being very narrow, so narrow as to be practically invisible. The hinge is a two-radius one, so that the top part will swing down at the back without hitting the steering wheel, or in any way interfering with it. A clamp at the end of the two parts is hinged to the lower part, and held to the top by means of a thumb screw with a very large milled head. This clamping strip is also hinged to the bottom, so that when the top is swung over, the strip turns over with it, and the thumb screw comes into play again to lock it in the down position. The wood frame is of selected material, while the rod and bindings are of tubular brass, all other mountings, including the hinges, being of very heavy, machined brass.

Vehicle Apron & Hood Company—New and different in every respect are the 1910 wind shields of this company, the 1909 line having been discarded entirely. The newest shield is of the automatic variety, folding either forward or back. The folding action is controlled by a spring of oil-tempered steel, which is concealed in a cylinder at the ends or sides of the wind shield parts. In conjunction with the plunger operating the cylinder, this spring comes into action, the plunger having a large double-acting leather valve which controls the passage of the air in altering the position. The combination of the two is said to be very effective. The frames are of heavy brass tubing, and the hinges of manganese bronze castings, this material being well known for its wearing qualities and strength. The rods which brace the shield are of brass, and adjustable for length. Rattling is avoided by mounting the glass in a channel-shaped rubber.



Mechanisms of Hydraulic (A), Sprague (B), and Troy (C) Wind Shields

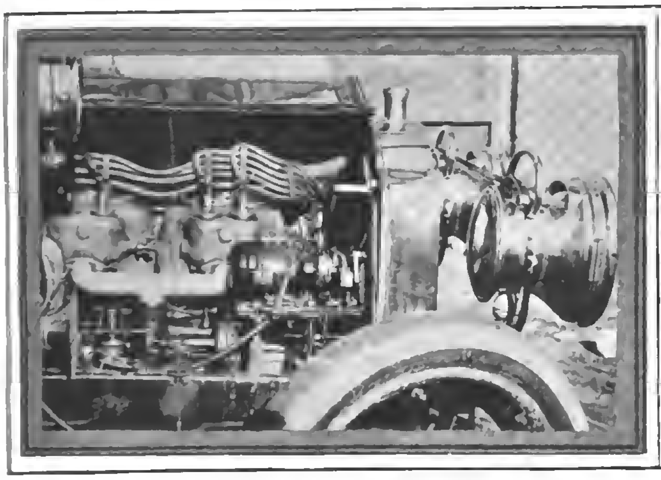


Fig. 1—Ward Leonard electric lighting dynamo shown on place beside the motor of an automobile, indicating compactness

Electric Lighting Takes on Significance

STORAGE batteries now seem to be of the greatest value in connection with gasoline automobiles due to the facility they offer in the process of lighting. In electric vehicle work this question of lighting has proven to be so pleasing, safe and reliable that autoists outside of the electric vehicle field have awakened to many of the possibilities and are strongly urging action.

Commercial activity is always but a reflection of a demand and, in view of the pressure which has been brought in this connection, makers of electrical equipment, as lamps, dynamos and storage batteries, are endeavoring to supply the requisite equipment. That attention to this matter in a commercial way has resulted in several solutions of the problem is now well established, and, among the systems which attract notice, that illustrated in Fig. 1 possesses more than commonplace novelty. This system was brought out by the Ward Leonard Electric Company (Bronxville), New York City, and, as the illustration portrays, it is compact, readily nested under the hood alongside of the motor, and as to its ability to serve, there seems to be no question unless to count its virtues.

WARD LEONARD LIGHTING DYNAMO FOR AUTOMOBILES

This system includes a dynamo D, taking its power from the automobile motor, through connection with the half-time gear system, or in any suitable way, and since the automobile motor runs at a variable speed, a means is at hand for regulating the voltage of the dynamo, in this case utilizing the principle of field control: that is to say, the field excitation is varied to suit the requirement as indicated by speed changes.

The drive takes place through a magnetic clutch which is so contrived as to eliminate the need of adjustment for any purpose. The clutch is so small that it adds but little to the dimensions of the dynamo, hence the objection which takes expression by way of comment on the space demanded is uncalled for and experience with this device affords evidence of its competence.

STORAGE BATTERY FLOATS ON THE SYSTEM

The storage battery, which is relatively small, floats on the system: that is to say, the battery, which may have the required number of cells in series as six, is connected across the terminals of the dynamo, hence the battery is in parallel with the dynamo armature, and since the fields of the same are shunt wound, they too are in parallel.

The dynamo is so wound that it is capable of charging the battery when the number of lights in circuit are less than the dynamo capacity, and the difference in potential across the terminals of the battery is that of the dynamo and the lamps in circuit at all times.

The dynamo has a capacity equal to the requirement of a large limousine; side-lights, searchlights, inside illumination and tail lighting being included. The battery, when floating, is always available to take the load if the dynamo is shut down, which would be true were it necessary to stop the automobile motor for any purpose, and when the automobile motor is started again the storage battery will then be charged automatically.

The wiring system in this application is so arranged that the ignition and lighting systems are quite independent of each other. The lighting circuit is what is technically designated as a "metallic circuit," which is another way for saying that the circuit is completed for both outgoing and return, rather than to use a so-called ground return, which is a technical way of stating that some part of the metallic frame work is utilized for the return circuit.

The advantage derived from employing a metallic circuit for the lighting system, entirely aside from questions of insulation, lies in the non-interference of the lighting system with hte ignition work; ignition wiring is "grounded," and were a grounded lighting system to be used also it is possible that some form of trouble would be experienced.

The storage battery used in this class of work is very interesting and will be the subject of separate discussion in an early issue of The Automobile. For the present it will suffice to state that, while any battery, if it has the required number of cells in series, will do the work, provided it is capable of being floated on the system and has a characteristic which will accord with the nearly constant voltage requirement as it is represented in lead storage batteries of well-known forms.

The new idea, however, seems to be in favor of a relatively substantial battery, one which will float on the system for, say, three years, and demand little or no attention in the interim. This is possible if the battery is very substantially made, and it is interesting to note that the introducers of this form of electric lighting decline to take notice of the question of weight with the idea of reducing the same to a low point.

It is claimed that the weight should be enough to assure permanence of lighting without attention, and were a battery of high weight efficiency selected, it is reasonable to expect that "buckling" and other battery troubles would be more likely. The plan then, considering the newer systems, is in favor of the greatest possible stability, excellence of lighting and low cost of maintenance even in the event of lack of care.

The batteries are especially sealed, loss due to "agssing" is reduced to a low ebb, and evaporation of the water of the electrolyte is aborted. Gassing does not transpire because the battery

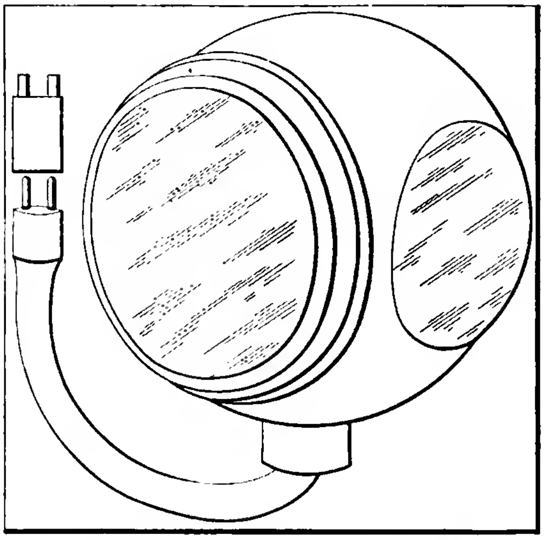


Fig. 2—Dietz tail lamp designed for electric lighting, and fitted for tungsten lamp, with suitable terminals

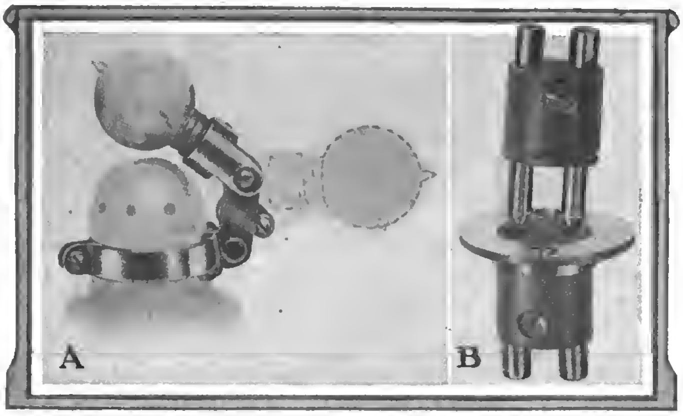


Fig. 3—Culver-Stearns electric combination lighting fittings; (A) presents lamp attachement, and (B) portrays the terminal

is never charged to a high potential difference—it floats—and the specific gravity of the electrolyte (liquid in the cells) should hold to a nearly constant level at all times. It is true, of course, that best results from any battery will follow if the cells are given the least bit of attention from time to time, but in this new form of lighting it is the purpose to reduce the matter of the care of the battery to a minimum. This will be quite possible in view of the present state of the art, from the battery point of view.

BATTERIES ARE USED WITHOUT DYNAMOS

This statement of the methods employed in lighting work would be incomplete without including one or two other variations which seem to be stable. In many cases, in the absence of a dynamo, the battery is of sufficient capacity to do the lighting and ignition work. This class of battery is selected for the service to be rendered and, in view of the extent to which lighting batteries are used, it is believed that the subject should be treated separately and at some length. This will be done at an early date.

LAMPS ARE MADE IN COMBINATION FORM

In connection with electric lighting the lamps are made in combination form; either acetylene or oil lighting may be taken advantage of in connection with the electric lighting, so that if the electric system should become deranged, the auxiliary system will serve in the emergency. Fig. 2 presents a Dietz electric tail lamp which is used to illustrate the nice way in which this class of work is being cared for by the makers of lamps, and, at the option of purchasers, lamps of this character may be had with an oil well and means for the use of oil burners when the emergency arises.

Fig. 3 presents three other forms of lamps, they being used ordinarily with electric (tungsten) lamps in place, and as an emergency measure the electric lamps may be swung back out of the way, and the oil burners may be lighted.

STABILITY IS PRESENT TO A MARKED DEGREE

In these methods of caring for the lighting question, it is the aim of the designers to eliminate contraptions and make the parts to suit the work to be done. It is now a recognized fact that good lighting is, like good brakes, insurance of a high order; indeed, it is useless to have good brakes if the lighting is not well cared for, on the ground that to arrest the motion of a car it is necessary to apply the brakes in time; no matter how good and effective the brakes may be, unless the distance is well regulated, the car cannot be brought to rest quick enough to serve the purpose.

CULVER-STEARNS ELECTRIC COMBINATION FITTINGS

As an illustration of the manner in which electric combination fittings are being made up, reference is had to Fig. 3, in which (A) is a fitting for a tungsten lamp to an oil lamp, and (B) presents a double pole terminal for the writing to lamps. These fittings are well made and appropriate to the needs.

Fig 4 of lamps made by C. T. Ham Manufcturing Company, Rochester, shows how the lamp makers are handling this phase of the problem. (A) represents the "Mars" tail lamp, (B) is the "Meteor" side-lamp, and (C) is the "Coupé." If so desired, these lamps may be fitted with electric combination fittings for tungsten lamps. It is a source of much regret that the whole electric lighting situation cannot be handled in a single number of The Automobile, but it will be the aim to give this matter much attention from time to time, and in the long run cover the whole situation. The interest taken by autoists at the two last shows rather goes to prove that it is a live subject, and that electric lighting is now on a very substantial basis seems to be a settled matter.

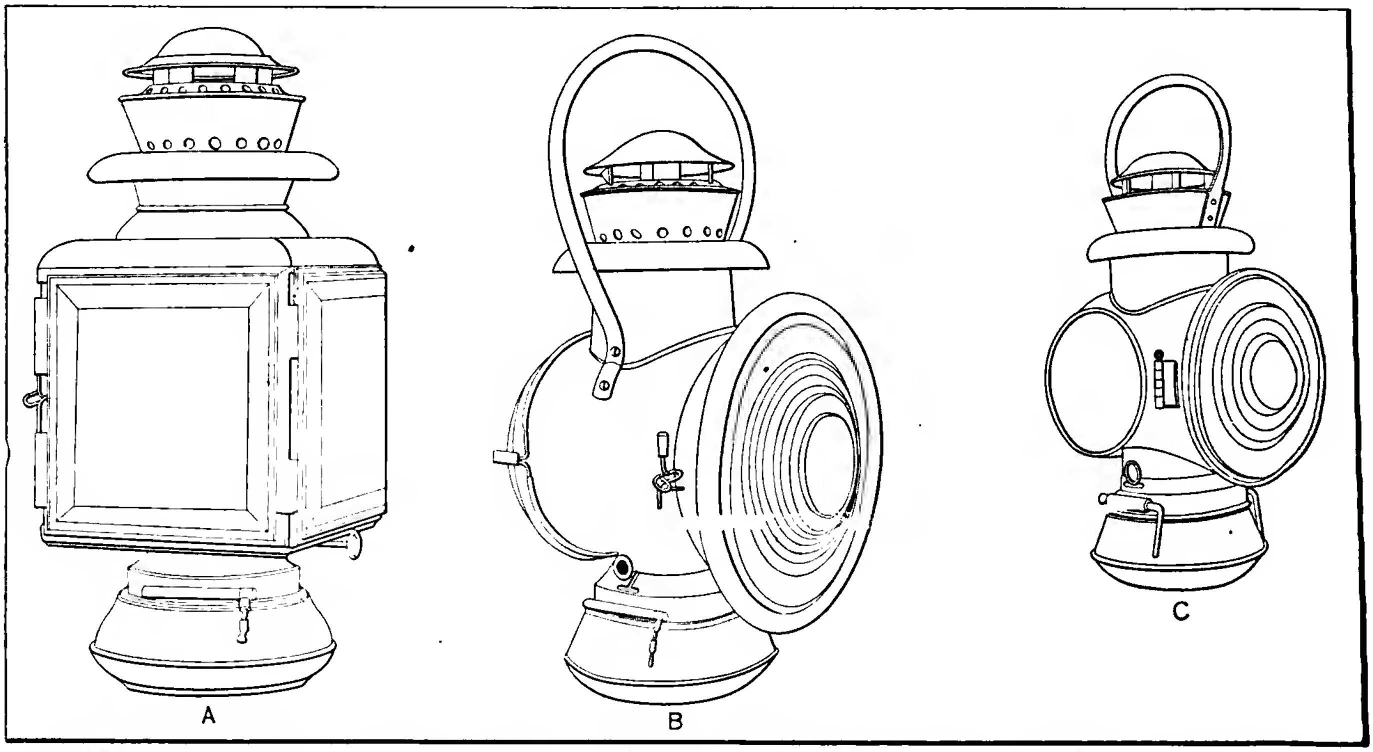
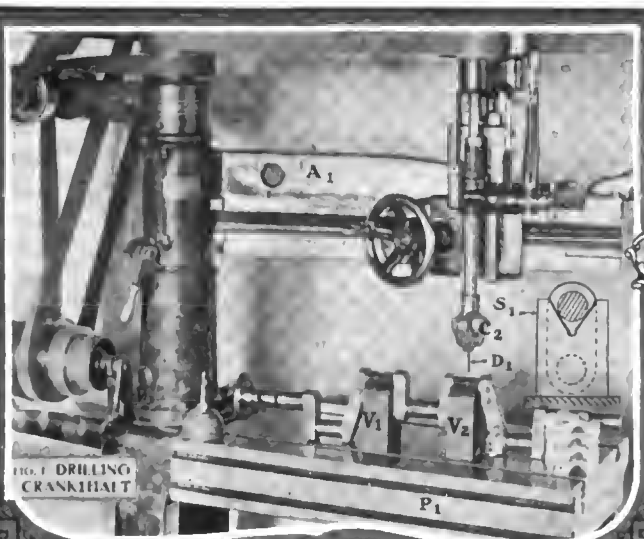


Fig. 4—Ham types of lamps for combustion lighting; (A) presents the "Mars," (B) shows the "Meteor," and (C) depicts the Coupé



In the Garage Repair Shop

By Thos. J. Fay

Fig. 1—Method of drilling crankshafts, using a radial drill, V-blocks and a little skill

THOUSANDS of problems confront the garage repair man and in many instances are difficult to solve, moreover, the work has to be started on a speculative basis in many cases, and if it remains in the land of speculation after the owner of the car pays the score, it is not a matter of great wonder. The bill will be no smaller on this account; the repairman is entitled to pay for speculating as well as for working; risk belongs to the owner of the car.

How to treat this problem intelligently, is a matter which puzzles the editorial office more, perhaps, than any other one matter, and, in the long run, it is very likely that, to start from the ground, and work up, is a necessity. If this way is to prove to be right, it is necessary to start with the very methods used in the plants in which the automobiles are made, on the count that, a repair, if it is anything, is but the process by which the parts required are made and installed. That the makers know how to produce these parts, is proven by their presence in the cars, and the question of quality is beside the repair problem, on the ground that good or not so good the parts have to be made for the specific undertaking if the owner of the car is to realize further service.

INGENUITY TAKES THE PLACE OF TOOLS FOR REPAIRS

It is not to be supposed that a garage repair shop will have at its disposal all the generic types of machine tools which will be found in well-equipped manufacturing plants, but it will be one of the aims in this series of articles to show how a given operation can be consummated in many different ways, thus enabling the "provincial" garage with limited equipment to undertake even difficult tasks, although hampered by lack of facilities.

To some extent simplicity will have a bearing, that is to say, some of the methods which will be described will be so out of keeping with the practices in the "big" well-equipped garages that in the absence of fair consideration of the many angled problem, garage repair men will feel called upon to criticize—let the criticism come; tell of a better method; it will be afforded a resting place in the columns of THE AUTOMOBILE.

Since a garage, if it runs a repair shop, must cope with all sorts of jobs ingenuity must take the place of equipment more often than not, and it will be one of the specific undertakings to afford an insight into methods which will serve even when the tools which are best are not available. To illustrate this point it is enough to say that a drill press, for instance, is likely to be available in even the most poorly equipped garage repair shop imaginable, and it should prove of advantage to some to know in how many ways a drill press can be made to serve, moreover, without countenancing an inferior repair job.

Crankshafts are of such great importance in power plant work and they have to be so intelligently treated, that one is taken as the first thing shown. In this case a radial drill, Fig. 1, is shown in position for drilling the oilholes on the connecting rod pins, this being a rather troublesome operation. The crankshaft C1 is set up in V-blocks V1 and V2, they being high enough to bring the "work" up above the face of the platen P1, to clear the flange and throws of the crankshaft, so that the frame will rest in the V-blocks as the section S1 shows.

The round part of the shaft rests in the V-blocks and self-centers so that the tendency to work out from under is but slight and may almost be neglected. With the work in place and level with the face of the platen, all that remains is to chuck the drill D1 in the chuck C2, and swing the arm A1 of the radial drill around and in line with the work. By means of the travel of the drill mechanism the drill may then be centered and if the chuck is a suitable one it will hold the drill sufficiently true to accomplish the task. This illustration seems to be one with possible trouble to contemplate because of lack of sensitiveness of the drill. There is something in this view; sensitiveness, under certain conditions, is absolutely necessary.

One of the advantages of illustrating methods used in manufacturing is here clearly brought out, it being the case that this big tool is actually used in the Moon plant for just the work which is here shown, and the timid repair man, lacking in broader experience, perhaps, will be able to advance with greater confidence. There is no reason why a repair shop should not undertake the replacement of a crankshaft, even if it is the kind which is drilled out for oil ways, but it may come as a surprise to some that it is this "drilling out" that takes time and requires some skill.

KINETIC BALANCE OF ROTATING PARTS

In working on parts which have to rotate at high speeds in service, it is necessary to have a nearly perfect kinetic balance. Fig. 2 illustrates the method in vogue for ascertaining a true "static" balance, that is to say, the balance which is necessary when the parts are not in rotation. For static determinations a set of balancing tracks T1 and T2 are placed on an even foundation, and when the work is placed on the tracks, it should come to rest in any position in which it may be placed. In the particular balancing equipment shown, the rest on the foundation is through leveling screws, L1, L2, L3 and L4, which is behind, hence does not show. This ability to perfectly level the balancing equipment is a very good idea which is in vogue in the

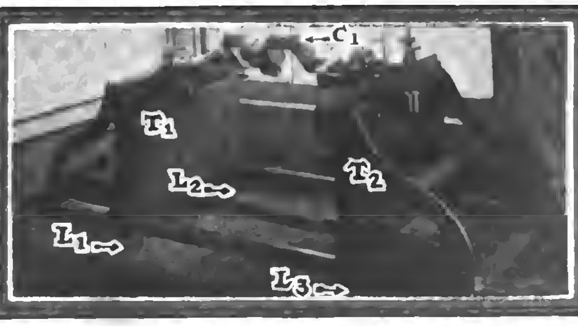


Fig. 2—Equipment used to determine the static balance of crankshafts showing method of leveling the same

Thomas plant at Buffalo, and some of the well-equipped garage repair shops have means at hand for ascertaining the static balance of the members which have to rotate.

A kinetic balance is a condition which must be arrived at in the designing process, hence the repair man does not have to cope with it as a rule. There is this to be said, however, when a repairman undertakes to improve on a designer, he must see to it that the kinetic couples are all satisfied. The mere fact that a crankshaft will prove out on a set of balancing rails, is no proof of its ability to run in a good state of balance.

Kinetic balancing must, of course, follow the condition of static balance, it being true that a part which is not in static balance cannot be balanced in a kinetic sense. For a perfect kinetic balance the conditions of a well-made six-cylinder crankshaft come near to satisfying the needs, and in future, as the situation would seem to warrant, this matter will be delved into at some length.

IN REPLACING A CRANKSHAFT AFTER REPAIR

It is first necessary to determine if the journals are all round; this is done by using a micrometer, making measurements across the diameter at the middle, and at the two extremities, then repeating these measurements across the diameter, but 90 around in order to determine if the journals are round.

The crankshaft, if the main bearings M1, M2, M3, M4 and M5 are not on the same axis, will fail to deliver satisfaction, and this form of trouble has been heard of. If, before assembling, the crankshaft is set up in centers in a lathe, it will be an easy matter to ascertain if all the bearings were turned and ground while on the same centers by the simple expedient of revolving the crankshaft on its centers E1 and E2, and by means of a piece of blue chalk note if contact (shown by the chalk line) is equal all around; shown in Fig. 3.

If the first try indicates that the centers are not common, the amount of the difference will then be a matter to be found, which to do requires a further investigation, using instruments as surface gauges, or of greater precision, in the process. Should the condition be acute, it is doubtful if the crankshaft can be used at all. That the trouble must be removed is one of the points which can be accepted without discussion, and if it is more than can be removed by setting the crankshaft up in centers in a grinder, the case is hopeless, unless it is possible to reduce the diameter of the main bearings M1, M2, M3, M4 and M5 enough to make up for the error, and allow of grinding sufficiently to bring the journals round (to the new diameter) and on the true axis of rotation. In deciding to reduce the diameter of a crankshaft for the purpose of correcting an error, it must be remembered that ability decreases as the cube of the diameter, and under such conditions but a slight decrease in diameter makes a considerable decrease in ability.

If the crankshaft is true on centers, referring to the main bearings, the next thing to do is to scrape in the bearings. This operation is performed by blueing the journal surfaces, using Prussian blue, and applying just enough of it (by smearing over the surfaces with the blue on the end of the index finger) to evenly color the metal all over the bearing surfaces. An excess should be avoided.

With the journals thus prepared, if the "brasses" are quite close to size (which may be determined by a dummy shaft of the exact right size layed in placed of the crankshaft) the crankshaft may then be substituted and rotated, to cause the blue to spread out over the surfaces of the brasses. If the brasses are to the right size the blue will show all over the surfaces which should bear.

BEARINGS SHOULD BE BACKED OFF IN TWO PLANES

Lubricating oil actually takes up room if it is present, which it must be if bearings are to be run for any length of time, even when the service is but slight; in a crankshaft, where the service is most strenuous, there is no possible chance of realizing service if the lubricating oil cannot work in and float the shaft on a film of the same. To be sure that the oil will work in, the brasses are scraped in such a way that they do not bear all around the diameter. In scraping it is the idea to back away (by scraping) toward the horizontal center line, as shown in the section S1, so that the shaft bears on the top and bottom and for a distance for about 1-3 around. When this condition is arrived at, the blueing should show, but there is no need of backing off more than a few thousandths of an inch at the points of no bearing, it being the case that oil will get by even if the distance is considerably less than five thousandths of an inch.

When the scraping is continued until the bearing around the girth is right, the next thing to do is to back off the metal in the axle plane. This is done by scraping in such a way as to leave a pair of truncated cone shapes (so to speak) with the crest at the center. This leaves the bearing surfaces firm at the center, and as the wedge-shape bearing increases toward the ends of the bearings, the pressure becomes less, with slight indication of blue at the outer ends.

The amount to back off in the axle plane is difficult to fix in exact measurements, but there is this to say: Trouble will be more likely when parallel scraping is resorted to than when the bearing metal is scraped away, for if lubricating oil is enabled to enter by scraping back toward the horizontal center around the girth, this same lubricating oil must be given a vent or it will stay in, prevent new oil from entering, and in a very short time it will have its lubricating qualities worn out, grit will accumulate, and the bearing will "freeze." The section B1, B2, B3, and B4, indicate, to an exaggerated degree, the backing off process in the axle plane of the journals.

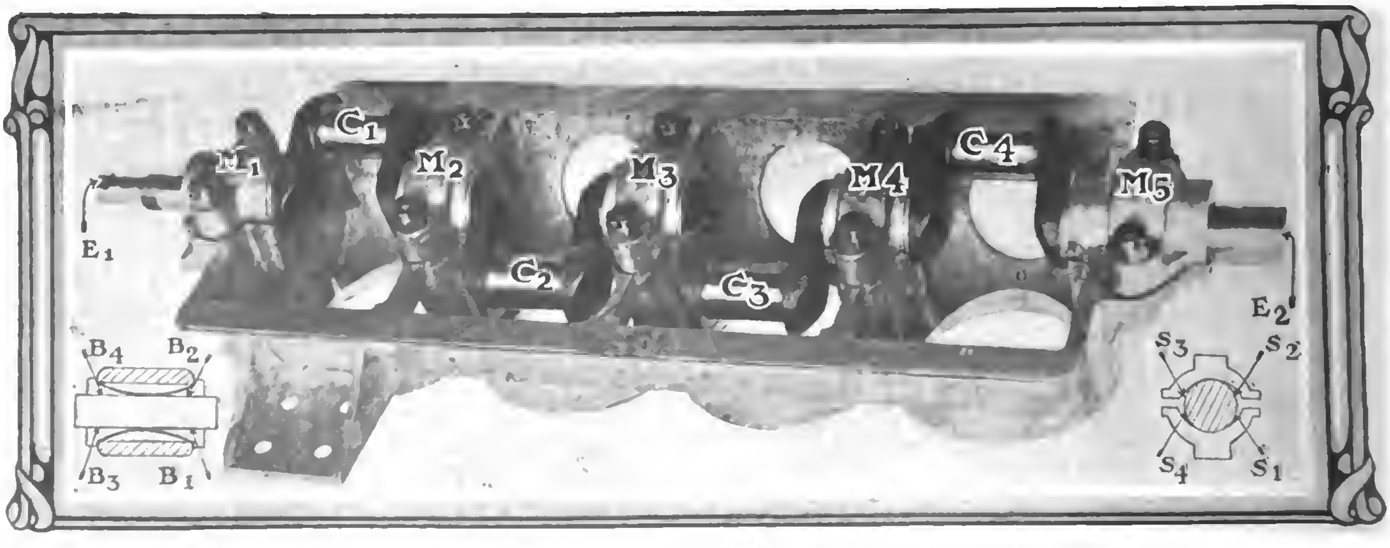


Fig. 3—Crankshaft in place after bearings were scraped in and liners reduced to requisite thickness to let cap down to contact

LINERS ARE NOT ALWAYS USED IN CRANKSHAFT WORK

When the two halves of the "brasses" are so accurately made that they come together properly, which should show in the trying process with blue on the journals, it is not necessary to consider the use of liners. If the fit is not "neat," then it is necessary to employ liners, and in this practice it is better to allow for them beforehand, and use several thicknesses of suitable material for the purpose. Paper is frequently employed, it being the case that "detail" paper, such as is used for detailing out work in the designing office, comes in several thicknesses, ranging from 0.005 to 0.015 inches, and with this selection of thicknesses it is possible to arrive at a good fit in a short time.

While paper works very well indeed, and seems to stand up under service conditions, even so many motor repair men prefer sheets of copper, using them of two or three separate thicknesses to facilitate arriving at a good fit of the bearings. This method would naturally be more satisfactory to a car owner on the ground that he might then be able to tighen up the bearings (without going to a repair shop), in the due course of time, by the simple expedient of removing a liner; if there are several, and all of a different thickness, he may then take his choice of them, removing the ones which will afford the nearest to what he might be willing to designate as a good fit of the bearings.

WHITE METAL USED IN CRANKSHAFT WORK

The average repair man must rely upon the vendors of Babbitt metal for the quality of the material, and yet when all things are considered, the two horns of the dilemma are: (a) The requirement is the most exacting of all applications of this class of material. (b) Babbitt is the most varied metal which it is possible to purchase.

It is a trick worth noting, the method by which clever repair men "fetch up" inferior Babbitt so that it will serve in a crankshaft job with reasonable certainty. The process consists in purchasing the best babbitt, according to the fellow who keeps all his grades in one bin, and after receipt melt down in an iron pot enough (nearly) to do the contemplated repair. When the Babbitt is at a fairly high heat (so that it "sparkles" the charcoal which is placed as a powder over the surface to prevent oxidation), tin is added in quantity sufficient to render the metal "cold short."

It is easy enough to ascertain when the right amount of tin is added; the metal (a little of which can be taken from the pot in a ladle, and quenched in water), will then fracture readily. It is not necessary to bring on an excess of the condition designated as "cold short," but it is better to do so than to let the metal go without enough tin in it to bring it up.

Instead of dealing with this relatively inferior white metal, even when it is tin corrected, it is better to have on hand a quantity of Fahrig metal, Parsons bearing metal, or other equally good material of this character as used in motor crankshaft bearings. Fahrig metal, according to analysis by Robt. W. Hunt & Co., is composed of:

CHEMICAL COMPOSITION.

Tin, 90 per cent.
Copper, 10 per cent.

This analysis is subject to such variations as will naturally creep in by way of such impurities as reside in copper and tin; the total of the impurities makes no great difference in this class of work.

In working this metal, in order to realize proper results, it is necessary to heat it to a dull red heat. This is extremely important, and many failures are directly due to pouring at a low heat.

PRIVATE GARAGES SHOULD LIMIT THE FIRE HAZARD

EVERY district has its special fire risk, and the insurance question is looked after by local boards of fire underwriters, who have in mind the local conditions and the fundamental risk involved; no set of rules, under the circumstances, will serve for every case, and when private garages are projected it is well to consult the local board, as well as to file plans with the "building department" having jurisdiction. In a general way, even though absolute rules may not be given, it will be possible to offer a set of rules such as will afford an insight into the intricacies of the requirements, and enable the prospective owner of a private garage to appreciate the necessity of proceeding with care and discrimination.

Ashes must be cared for in metal cans.

Blower system must be provided with metal conduits connecting each machine with shaving vault, such conduits passing to the outside of building at each floor.

Boilers must be outside of building, or if located in extensions, must be cut off by standard fire door. In wood-working establishments a door must be provided at each side of the communicating opening.

Buckets—There must be two buckets of at least 10 quarts on each floor, including basements, for each 1,000 square feet of floor area, same placed on permanent shelves, hooks or racks elevated not less than 2 feet nor more than 4 1-2 feet above the floor. Buckets to be painted red and marked "Fire" with letters not less than 2 1-2 inches in height, to be kept full of clean water and inspected once a week. If water in buckets is likely to freeze in cold weather, enough salt to be mixed therewith to prevent freezing. In rendering establishments, paint, oil and varnish stocks, or any other place where inflammable liquids form part of the stock, one-half of the number of buckets must be filled with sand instead of water. Wooden buckets will not be accepted.

Ceilings or side walls must not be paper or cloth or wood.

Communications must be provided with standard fire doors at each side of the wall constructed and installed in accordance with rules of the New York Board of Fire Underwriters.

Condition—Premises must be cleaned up and kept clean. Stove pipe holes must be closed up. Sawdust must not be used in spittoons or for catching oil or drippings. Broken plastering must be repaired.

Drying—Drying rooms must be constructed in accordance with the requirements of the New York Board of Fire Underwriters.

Fire Heat—Glue must be heated by steam. Melting of pitch, rosin, wax, paraffine, sulphur, etc., must be by a safe method. Soldering irons must be heated by stationary gas mufflers. All low gas stoves shall be placed on iron stands or the burners shall be at least 6 inches above the base of the stoves and a metal guard placed 4 inches below the burners and all wood work under them shall be covered by metal. Connections must be made by iron piping; rubber tubing must not be used.

Flues—Chimneys must be built of brick and rest on the ground. Stove pipes must run horizontally into the chimneys. Stove pipes must not run through floors or partitions.

Floor Openings—Openings for stairways, elevators, dummies, etc., must be closed or enclosed so as to prevent the spread of fire from floor to floor. Dumb waiter shafts open in the basement must be provided with the same kind of doors as floors above. Hatches with automatic attachments must be arranged to close the shaft even when the car cable is down, with not over 2 square inches of uncovered opening.

Gas Brackets—Open gas lights in show windows must be protected by globes. Swinging gas brackets must be made stationary or proper guards must be provided for same. Metal must be put on ceiling over all gas jets less than three feet below same.

Heating—Steam heat must be substituted for stoves or furnaces to secure removal of charge for latter.

Lighting—Gas or electric lamps must be substituted for oil lamps.

Oily Waste or Rags—Must be cared for in self-closing metal cans.

Packing Materials—For loose packing materials wherever used a covered bin must be provided, not larger than 4 x 4 x 4 feet (64 cubic feet) lined with heavy tin extending well over edges of the same, joints locked and tin nailed under joints in the same manner that the covering is applied to standard fire doors. Cover must have substantial fastenings and fit closely.

Shaving Vault—Must be of brick, ventilated, and located outside of building. If adjoining boiler house the opening to boiler room must be at right angles to fire hole of boiler and not nearer thereto than six feet; such opening to be protected with fire door.

Shutters—All openings (windows, etc.) in exterior walls excepting those on street front, must be provided with fire shutters or doors constructed and attached in accordance with rules of the New York Board of Fire Underwriters.

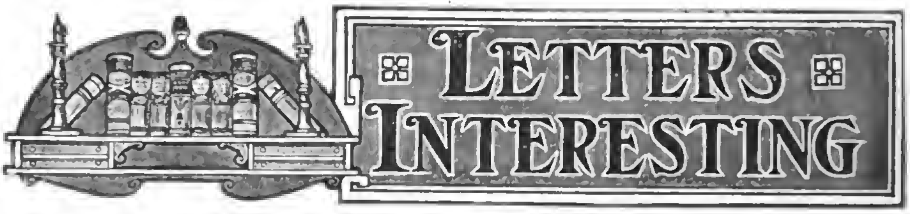
Skylights—Must be of rough glass 1-2 inch thick (wire glass preferred) supported in substantial metal frame, but when over elevator shafts thin glass in metal frame with wire mesh over should be used.

Storage of Oils, etc.—All oils, varnishes, turpentine, alcohol and similar articles must be stored outside of buildings.

Unsafe Heating Apparatus—Flues, stoves, furnaces, steam pipes, etc., reported unsafe by the New York Board of Fire Underwriters must be corrected in accordance with the specifications of the Heating Department of that Board, which will be furnished on application to the Board, and which must be signed and returned when fully complied with.

Watchman and Clock—Watchmen must be maintained nights, Sundays and holidays, or all the time when property is idle. Watchmen must patrol the property, making records once each hour on an approved clock, records to be dated and preserved in good order for examination by inspectors.

Watchman's Lantern—Must be of protected tubular make and only signal, lard, or sperm oil shall be used therein.



CYLINDER OIL CONGEALS

Editor THE AUTOMOBILE:

[2,139]—This is my first offense, but it seems serious enough to risk asking about. I have been draining my water system—I have a four-cylinder water-cooled automobile—this fall, but find that with this cold snap and the thermometer going to six degrees below, and seldom getting higher than 20 above during the day, that the oil in the cylinders congeals to the extent that I cannot turn the engine over, unless I fill the engine with hot water. I now have a supply of denatured alcohol on hand and propose to keep it right along, so will not have to drain every time, but while it will not freeze, it will no doubt get as cold in the cylinders as before. So, what can I do to make the engine turn over more easily? I keep my machine in a barn with a cement floor, without any heat, and it gets pretty cold these mornings. I have been taking "The Automobile" only a few months, but you have a life subscriber in me from now on!

Clinton, Mo. E. T. MONTGOMERY.

Aside from selecting the oil with care, so as to obtain one which will remain liquid at the lowest temperature encountered, there is very little that you can do, unless you want to install a heating system in the garage. This latter would be a very wise move as it will not only insure against a repetition of the trouble of which you speak, but will also result in the machine being kept in better condition at all times, as there will be hot water at all times, to wash it off, while the garage being heated will insure a comfortable place in which to do repair work and make adjustments. All these things contribute to the longevity of the machine, and can be measured in actual dollars and cents. If you were to look into the cost of installing a simple heating arrangement, you would be surprised at its lowness. If the barn is small, a simple stove will do the work, and this only needs to be kept burning during the night, at which times a very low fire will answer the purpose. If the barn is very big, a stove with some very simple piping around the room will do the work.

It would seem as if the time you waste every time you want to take the machine out, would be worth something to you. Capitalizing this, won't you find that you are money in pocket in installing a heating system?

TO INSERT PISTONS

Editor THE AUTOMOBILE:

[2,140]—How can you replace the piston in a single-cylinder engine when it is taken out at the top? The rings catch. I have asked many experts, have bought all the books on kinks in repairing, and still cannot seem to get the piston in. When the cylinder is taken off and the piston removed through the bottom it is an easy matter, it can be entered by springing each ring with the hands, when entering it into the cylinder, but I cannot replace it when taken out through the top.

Mooers, N. Y. W. U. TAYLOR.

This repair may be effected by the same method as is used to remove rings from a piston; that is, by the use of very thin, flat pieces of steel. Only, in the removal of the rings, the steels are inserted below the rings, while in the insertion of the piston and rings into the cylinder, the steels are set around the outside.

Make or obtain three or four very thin flat pieces of steel, the thinner the better. Place these around the piston and rings, which should be in place as well as the connecting rod, spacing them equally. Then with a rubber band, string, or something of that sort, spring the rings in close to the piston, as close as is possible, paying particular attention to the lowest ring.

Now insert the whole outfit into the cylinder through the open head, down as far as you can, which will doubtless be down to the bottom ring or the lower end of the flat steels. Then draw the steels upward slowly so as to partially uncover the lowest ring, say so as to uncover about half of it, at the same time forcing the piston into the cylinder. If the steels hold the rings into the grooves in the piston as they should, the lower ring will enter the cylinder bore. Then the steels may be drawn off of that ring entirely, and the piston pushed down until the next ring catches. Draw the steels up so as to half uncover this and repeat the performance described in connection with the first ring. This is simply repeated with each one of the rings, no matter how many you have, and should be successful in every case if manipulated rightly.

CARE OF TIRES IN WINTER

Editor THE AUTOMOBILE:

[2,141]—How is the best way to care for tires during the winter when the car is not in use? Should tires be washed clean when put away for the winter, or does water injure them? G. G. S.

Annandale, Minn.

When the use of the car is given up for the cold weather season, the car should be jacked up off of the tires, some air let out of them so as to reduce the pressure, and the whole washed very thoroughly, particular attention being paid to the removal of all traces of oil. Contrary to your implied idea, water does not harm the tires or the rubber composing them in the least, but oil and gasoline do. In case you wish to go into the matter a little further, and do a more thorough job of putting them up for the winter, proceed as follows:

After washing thoroughly, take the tires off of the wheels, take the tubes out of the shoes, paint the inside of the shoe and the outside of the tube with graphite, wrap both very carefully in cloth or heavy paper, paper over cloth being the best, then store in some dry, dark place, preferably where the temperature is very even all winter and not far from 30 deg. Fahr. Light is a great enemy of rubber, as is also heat; by putting the protective covering around the tires, then keeping them away from light and heat, there will be absolutely no deterioration, no matter how long they may be kept put away. This method of procedure is really worth the time it takes.

SAFE MAXIMUM SPEED

Editor THE AUTOMOBILE:

[2,142]—In your column of "Letters Interesting, Answered and Discussed," will you please give the maximum safe speed at which the average automobile engine may run. In other words, what is the greatest speed that the magneto of such a motor may have to stand? We have had an instance here of a Bosch armature being "shot" by racing the motor to get out of a "stall." Of course, this speed was excessive, but is not the magneto designed to stand such speeds?

Sumter, S. C. C. T. MASON.

In the usual case, the speed of the motor is only limited by the ability of the cast-iron flywheel to withstand the centrifugal force at that speed. The safe allowable linear speed, based on a liberal factor of safety, is about 6,000 ft. per minute. This, then, governs the speed, as knowing the diameter, it is a simple matter to get the circumference in ft. Then by dividing the safe linear speed per minute by the circumference, you get the safe allowable speed in revolutions per minute. Thus, to give a specific case, take a flywheel of 17 in., an ordinary size. The circumference of this in ft. is 4.45. Then, for a 17-in. flywheel the safe allowable speed is $\frac{6{,}000}{4.45} = 1{,}348$, or, in round figures, 1,350 r.p.m.

This, however, is figured with a factor of safety of 10, so that it may be exceeded slightly with safety. Using smaller flywheels, the speed may be increased in proportion, while with steel for the material instead of cast iron, the rotative speed may be increased in the ratio of the strength of the two materials.

The following speeds of a number of French engines are of interest as bearing on the subject, indirectly; De Dion, 1,400; Farcot, 1,500; Chenard-Walcker, 1,500; Darracq, 1,500; Sultan, 1,600; Renault, 1,600; Unic, 1,650; Sizaire-Naudin, 1,700.

Each and every one of these, to the best of our knowledge, is ignited by means of magneto, so that this list would seem to answer your question, at least as to safe practical speeds.

However, for racing purposes, the magneto is also used for ignition, and there these speeds are exceeded. Thus, the Arrol-Johnston (English) four-inch racer was tested up as high as 2,400 r.p.m., and is ignited by magneto, so that this rotative speed should be safe for the magneto armature. The English Napier is now magneto-ignited, and for the six-cylinder engine a rotative speed of 3,000 r.p.m. is claimed to be not only possible, but usual practice.

In your case, something else must have been the matter, as we have never heard of this trouble before.

ANSWERED AND DISCUSSED

BISSELL'S NEW HELICOPTER

Editor THE AUTOMOBILE:

[2,143]—The writer has been reading all you say in "Letters Interesting" about aeroplanes and begs to inclose herewith a sketch of a combination helicopter, aeroplane, parachute and gyroscope, all in one to make her safe, sane and reliable. The engine is at the bottom where it ought to be, and the "gladiator" sits in the middle behind the vertical shaft, where he is protected from all shocks and accidents. The propeller on the front is universal and can be turned in any direction. There are two guide planes in front of it, one smaller so if there is a severe side wind the planes can be reversd. The large plane is horizontal and the small one vertical. The guide handle also twists to tighten up on a leather strap that wraps around it and thereby push down on the spiral spring to loosen the belt that runs the front propeller so that all the power can be transferred to the vertical propeller which has adjustable blades.

One man can operate the whole thing himself. He gets on the seat, reaches up and gives the flywheel a whirl to start the engine, then he twists the little hand-wheel above his nose which controls the roof blades, and the machine rises. Then he lets go on the clutch and starts the pulling propeller, turning it well to the left side so he won't turn around himself, and gradually bringing this steering handle back to a position in front of him as the machine gets under way.

As there is very little head resistance this should be a fast machine. It can't be upset for obvious reasons, and the data already available indicates that a 20-horsepower engine would be sufficient to make it fly, as the whole apparatus, including a man and ten or fifteen gallons of gasoline wouldn't weigh over 400 pounds. Kindly advise me what you think of the scheme. "T. K."

Pittsburgh.

Another case where the proof of the pudding is in the eating. The only way to tell whether your machine is any good is to make one and try it. We doubt, however, if you appreciate the difficulties of using a single vertical propeller. With any sort of a propeller, there is just as much tendency for the propeller to stand still and the machine go around, as there is for the machine to stand still and the propeller go around. Apparently you intend to overcome the tendency of the machine to go around by means of the front propeller. It would be much more economical of power, though, if you used the vertical propellers turning in opposite directions, or other means of balancing the tendency directly.

We would like to know how you worked out the proportion of power to weight, and what authority you have for assuming that 20-horsepower acting on your vertical propellor will give a thrust of 400 pounds. Your weight, too, is doubtful. With a 160-pound man, an engine which cannot weigh less than 100 pounds, and 50 pounds of gasoline, you have but 100 pounds left for the framework and the propellers. The 80 feet of steel tubing in your fly-wheel-propeller rim will weigh more than that alone. A little consideration of the design, reproduced below, would seem to show that the inventor had not given enough thought to a number of salient points. As for instance, the adjustable blades at the rear, how do they clear the front end mechanism?

NO KEROSENE USED

Editor THE AUTOMOBILE:

[2,144]—We desire to call your attention to article on page 1049 of your December 16 issue, under heading "Troublesome Carbon." Replying to "F. H. T.," would say that he will have absolutely no trouble in getting his car started if he will immediately after cleaning one cylinder start the engine, and if the same is a four-cylinder car the three cylinders will be in working order and will soon get the fourth cylinder to firing properly. If the engine is started after each cylinder is treated with Prest-O-Carbon Remover there will be no trouble whatever in keeping the engine going and it will certainly clean out every particle of carbon. What we are especially interested in is your statement at the bottom of the column stating that it is believed to contain kerosene in large amount. Now we want to particularly caution you against making a statement that you know absolutely nothing about. As a matter of fact, there is not a particle of kerosene in Prest-O-Carbon Remover. We absolutely guarantee it in every way to do the work we claim it will do. We believe you realize the Prest-O-Lite Company has got too good a reputation and too large a business to try and push the sale of anything that is not high-class in every particular.

THE PREST-O-LITE COMPANY,
J. A. ALLISON, Secretary-Treasurer.

FULL VS. SEMI-ELLIPTICS

Editor THE AUTOMOBILE:

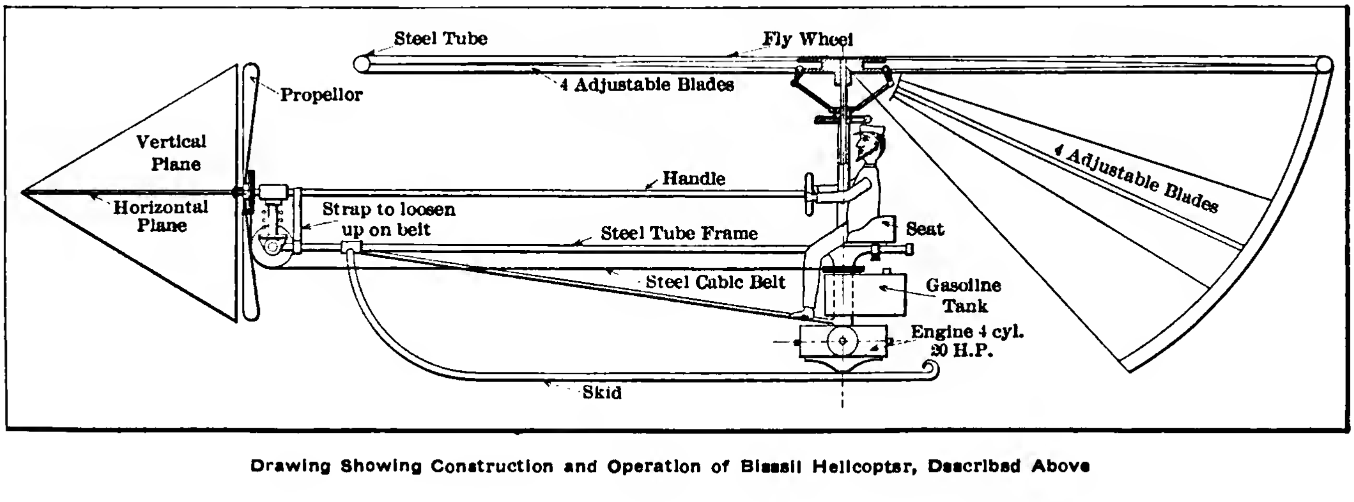
[2,145]—Will you please tell me in your columns why full elliptic springs are not in use more than they are. I had a car last year with full elliptic springs which rode very easy; this year I have a new car with semi-elliptic springs and a longer wheel-base and I feel the bumps much more. I intend changing for a new car with full elliptics unless I learn of some serious reason why they are faulty. C. F. H.

Milwaukee, Wis.

The relative advantage of full and semi-elliptic springs is one of the questions in automobile design which are still far from having reached a definite status. It seems as though a great many makers have decided to compromise on the three-quarter elliptic. You are mistaken in assuming that the difference in riding qualities in your two cars is due solely to the different types of springs. It is just as easy to make an easy-riding semi-elliptic and a hard-riding full elliptic as the reverse; and if you buy another car selected simply because it has full elliptics, you will run a good chance of being "stung" again. The difficulty is not in the type of springs, but in the proportioning of their stiffness to the weight of the car and its load.

Before going so far as to get another car, we think you had much better see what can be done to improve your present one. If the springs seem short, compared to those in use on other cars, it may be possible to arrange for longer ones. Shock absorbers, of one of the many types on the market, might do the trick, or a set of new springs of more or fewer leaves. The cost of such additions or alterations would be insignificent compared to the cost of a new car, and, if the present machine suits you in other respects, might be much more satisfactory in the end. If you will tell us the type of your car (runabout or touring), its weight, the length and width of the springs and the number and thickness of the leaves, we will be glad to advise you more definitely.

Or, it is possible that some spring maker will be glad to take the matter up with you, pointing out where the present spring suspension is defective, how it may be remedied with the least trouble and expense; also, the total expense.



Drawing Showing Construction and Operation of Bissell Helicopter, Described Above

BEST WAY TO CRANK

Editor THE AUTOMOBILE:

[2,146]—I have noticed in your issue of December 2 that C. S. J., of Paterson, N. J., is experiencing some difficulty in cranking his Lozier car, and he asks for some suggestion on how to overcome it.

I do not understand what the difficulty can be, because I own both a four-cylinder Lozier "Briarcliff" and a six-cylinder Lozier touring car, both of which I can crank with ease; and if C. S. J. will follow out my instructions, as given by the accompanying photographs, I believe he will have no further trouble.

I trust that these photographs will be of interest both to you and to your correspondent. GAYNOR KEELER.

Albany, N. Y.

The photographs, which we gladly show in the adjoining column, certainly reveal no alarming difficulties. Moreover, they illustrate, better than anything we have ever seen before, the one and only right way to crank a car. Nearly everybody knows by this time that the compression of the motor should be overcome by pulling the crank up, rather than by pushing it down. For this should the motor backfire, in the former case the crank would simply be jerked from one's fingers; while in the latter the shock would come against the rigid arm, and, if the arm should bend, the crank would be likely to hit the cranker on the jaw. The advantages of cranking left-handed are not so plain. It will be seen, however, that if after the suppositious backfire the crank should swing completely around, in the left-handed case the jerk would tend to throw the arm out of the way; whereas right-handed the arm would be thrown directly in the path of the return swing, and would receive a painful bruise, if not a broken bone. Another reason is that, owing to the direction the crank turns in, one can brace better for the upward pull when the crank is in the left hand.

Grasp Starting Crank In Left Hand;

Next, Push the Crank In;

A Pull Upward Throws the Motor Over;

Then—Listen! There She Goes

Now, No Use Arguing the Matter

LIKES STORAGE TANKS

Editor THE AUTOMOBILE:

[2,147]—Referring to the article entitled "The Private Garage Problem," by M. A. Hall (pages 1083-1086), in your December 23, '09, issue, in which Mr. Hall makes some suggestions about underground gasoline storage tanks, permit me to make some comment thereon.

While extremely valuable to the motorist of moderate means, Mr. Hall's suggestions on storage tanks are apt to be somewhat misleading to those not thoroughly familiar with the strict requirements of insurance companies and municipal ordinances as to the storage of gasoline. One of these rules, and one that is rigidly enforced, is that forbidding the storage of gasoline under pressure.

Mr. Hall's seeming preference for air pressure in forcing the gasoline out of the storage tank instead of the slow, uncertain suction pump, has the writer's heartiest approval. Of course there are some splendid double-action continuous-flow pumps on the market, but they are rather expensive, and since the idea is to cut down expense, these higher priced pumps must be eliminated.

Now for the point I wish to make. The two cocks shown in the diagram (the inlet for the air and outlet for the fluid) are all right so far as they go and permit the flow of gasoline to be stopped instantly—BUT they do not allow the compressed air left in the tank to escape, hence the gasoline in the tank remains under pressure, which is contrary to the regulations I have mentioned.

The writer has seen this defect overcome in the equipment of a one-barrel tank which he purchased from a Pittsburgh, Pa., firm. Stopping the pump stops the flow of gasoline after which a small cock (attached to the outlet pipe of the pump) is opened and permits the air to escape. The main air-cock is then closed and locked to prevent leakage or pilfering. Supplementing Mr. Hall's suggestion, I might state that the whole outfit did not cost more than the home made one would with the added assurance that it conforms absolutely to insurance and municipal requirements.

Mr. Hall's statement that a garage without this equipment loses money for its owner is borne out by comparisons of my own gasoline costs before and after the purchase of the tank. Apart from the great saving in this direction, the refilling of the car tank is no more trouble than drawing a pail of water from a water faucet, and most car owners know what that means. T. M. DAY.

Pittsburgh.

The writer above missed the point that it was possible in the design shown to open the air supply cock, allowing the air pressure to escape, when desirable or necessary.

MAGNETOS ON AEROPLANES

Editor THE AUTOMOBILE:

[2,148]—In your issue of December 23 we find a news paragraph under the caption, "Now an Aeroplane Magneto." It may be of interest to you to know that the use of "Now" in that headline is rather misleading, for several special magnetos for aeroplanes, with certain parts built of aluminum, have been made and used with success by the Bosch Magneto Company for considerably more than a year. Moreover, a magneto of power which weighs as little as 11 pounds has been among the models of Bosch magnetos for several more than 12 months.

But it must be borne in mind that in spite of some demand for magnetos of light weight for aeroplane use, there are some masters of the air who are not particular about what their magnetos weigh. On this subject Mr. Wilbur Wright, when interviewed a day or two before his historic flight up the Hudson, said "a heavy magneto which helps develop one-quarter more horsepower is all right; and I am perfectly willing to take a few more pounds handicap provided I can get the extra one-quarter horsepower." These remarks of Mr. Wright's were brought out in discussing two models of Bosch magnetos which he was using. One, a rather small magneto, was a new Bosch device with which he was experimenting.

On the subject of aeroplane ignition, you will doubtless be interested in the reports covering the ignition of the aircraft at Rheims and Brescia. From complete data and records in our hands covering these two meets we have compiled the following data:

At Rheims the four great prizes were won by Bosch equipped aeroplanes. Curtiss took the Gordon Bennett Cup and the Prix de la Vitesse; while Farman with his Gnome motor which is Bosch equipped captured the Grand Prix de La Champagne et de La Ville and the Prix des Passagers.

Of twenty contestants in these four contests the motors of eight of the aeroplanes were equipped with Bosch magnetos, seven with batteries and six with other ignition apparatus.

At the Brescia meet Curtiss won the Grand International Prize de Brescia and another minor prize; while Calderara with his (Italian) Wright Bosch-equipped biplane captured four prizes. In other words, six of the nine events were won by aeroplanes equipped with Bosch magnetos, and these contests included prizes for starting, passenger carrying, circling, high flying for the day and other special prizes for the varying lengths. The results show that the Bosch ignition was found efficient and serviceable in all sorts of contests and under greatly varying conditions.

In both of these meets it is interesting to observe that the Bosch magneto was the ignition most favored, while the use of batteries was next in popularity, but not a single prize was won by an aeroplane which depended on batteries, and of the 13 prizes of the two meets (Rheims and Brescia) 10 prizes and trophies were won by aeroplanes equipped with Bosch magnetos; the other three prizes were won by Rougier with a Voisin aeroplane with Gibaud equipment.

While what has been is of interest to every one connected with the aeroplane industry, what is going to be is of no less importance, and an illuminating side light on the enormous growth of the aeroplane industry may be gained from the fact that orders for 700 Bosch magnetos for 1910 aeroplanes have already been booked. Of course, these 700 magnetos are not for American use exclusively, but include the orders of French, German and other European aeroplane makers.

BOSCH MAGNETO COMPANY.
Per Harlow Hyde.

BY H. H. FRANKLIN, PRESIDENT, H. H. [illegible]

UNQUESTIONABLY the incoming Legislature will undertake to modify the existing motor vehicle law. There is so much interest in motor vehicles that users, manufacturers and legislators will consider that they should undertake to do something in motor vehicle legislation. What all should recognize is that the public does not need a new law, or more law, so much as it needs an enforcement of present law.

Against the operation of the present law, the great complaint is that of reckless driving and the consequent killing and maiming of innocent people upon the highways. The trouble is not that the speed restrictions are not severe enough, or that the penalties for their violation are not heavy enough, but that public officials do not exercise the power which the law gives. If a driver operates "a motor vehicle on the public highway at a rate of speed greater than is reasonable and proper, having regard to the traffic and use of the highway, or so as to endanger the life and limb of any person, or the safety of any property," he is guilty of a misdemeanor and liable to a fine of $100 for the first offense; for the second offense to a fine of $100 and 30 days' imprisonment: and for the third to a fine of $250 and 30 days.

The law goes further and says that even if the speed of the motor vehicle is safe as to the traffic of the highway and does not endanger life or property, still at street intersections, at sharp curves and on bridges, etc., the speed shall not exceed four miles per hour, and in closely built-up portions of cities and villages shall not exceed ten miles per hour, and in other portions of cities and villages shall not exceed fifteen miles per hour, while in the open country, it shall not exceed twenty miles per hour; *i. e.*, the law says *first*, that the speed must always be safe, and *second*, that, whether safe or not, it cannot exceed the prescribed limits.

However, the law does not stop with the foregoing, but says that if any city or village is dissatisfied with the above provisions, by action of its common council or board of trustees, and by posting certain specified signs, it may provide for such lesser speed as it shall desire, except that such provisions for lesser speed shall apply to all vehicles and shall not be less than ten miles per hour in incorporated villages.

Is there any dissatisfaction on the part of the public with the speed restrictions of the present law? Clearly not. If dissatisfaction existed, it would appear in the cities of the State, where motor vehicle accidents principally take place; and if it did appear in the cities, it would manifest itself in a disposition to take advantage of the provisions of the law which authorizes any city of the State to make the speed limits whatever it sees fit, provided the restrictions are made to apply to all vehicles and provided the certain specified signs are posted. So far as I know, no city of the State has taken advantage of these provisions of the statute.

Is the law too lenient as regards penalties for violating speed provisions? Clearly not. If it were too lenient we would expect to find justices of the peace and courts of special sessions giving convicted violators of the motor vehicle law the full penalties prescribed. On the other hand, it is doubtful if a case can be found in the State of New York where the punishment of the convicted offender has been as severe as the law would allow.

If the speed provisions and the penalties for their violations are as severe as they should be, clearly there is nothing further that the public needs for its protection except the enforcement of the law. Enforcing the law will stop speeding and stop accidents more than all the amendments to the existing law and more than any new law that the Legislature can enact.

THE MOTOR WISE GRASP OPPORTUNITY

Dealers must dispose of the grist. The mill is grinding out automobiles on a basis of, perhaps, 280,000 this year. There is a good automobile for every one of the possible purchasers in this vast assortment by virtue of proper selection, but in the absence of care in making the distribution there may be a number of misfits.

The motor wise among the dealers are bound to take due cognizance of the great loss which the industry must endure, if, in the distribution of the product of the year, the automobiles and the purchasers are not in harmony with each other. No automobile is good if it is not suitable for the intended work, and the dealer, in selling a car, must ascertain if the service to be rendered is that which the car is capable of.

There is just as much possibility of delivering the wrong automobile if it costs the price of a house and lot as will be true of the cheapest automobile made, and, considering the future of the industry, there is every reason why the dealer should find that class of customer who will be able to utilize his make of automobile, and that, too, to excellent advantage. If there is a buyer for every automobile made, and apparently there is, then there is absolutely no reason why dealers should employ hypnotic methods—persuading beggars to sport diamonds is bad business. The idea that the purchaser must take care of himself may be a good dictum in general, and in law, but the automobile business needs all the prestige it can get from wise and fair dealing and that it is wise to overtion to rub pollen off the sleeves of veteran engineers, which would be a logical conclusion under an arrangement of this sort.

GARDEN DELIVERED ITS QUOTA OF SUCCESS

Without attempting to analyze the statements of the officials who proclaim the show at the Garden as the greatest success of the industry; that the attendance was fully 30 per cent above that of last year, and that arrangements are now on for the proper launching of the next year's exhibition of the swollen A.L.A.M. membership (there are now 62 members), it is well within reason to point out than any of the earlier talk about abandoning shows is without the pale of a sane possibility.

The attendance, this year, was the buying kind, and this was adequately indicated by the weight of actual purchasing, not counting the possibilities and as is generally well appreciated, shows do not, as a rule, make a large number of sales on the premises. Autoists go there to see things, and to make comparisons while the opportunity affords. This year, for some reason which has not been explained, these same autoists were ready to make purchases, and that a good increase in actual sales were consummated is assured. The number of agency representatives who visited the Garden this year was far in excess of all previous showings, and that this means something to the makers of automobiles is also a matter which cannot be denied.

S. A. E. HELD SECOND HALF OF ANNUAL MEETING

NEW YORK CITY, Jan. 13—The second half of the dual annual meeting of the Society of Automobile Engineers opened at 10 o'clock a. m. at the Engineers' Society's building, with an attendance which was regarded as very satisfactory indeed, numbering in its makeup many of the most enthusiastic of the men who are responsible for the high qualities of automobiles as they obtain in America at the present time.

When the ballots were duly counted, this having been the meeting which shouldered the pleasant duty of determining as to the personnel of the officers of the society for the ensuing year, it was found that a perfect accord of the members was indicated, and the officials duly elected were made known to be as follows:

LATEST OFFICIAL MAKE-UP OF THE SOCIETY

President, H. E. Coffin; first vice-president, H. G. Chatain; second vice-president, Prof. Rola C. Carpenter; managers, H. Cunz, W. C. Wall and H. M. Donaldson; treasurer, A. H. Whiting (re-elected). Alexander Churchward is the society's secretary. This office is appointive.

According to the by-laws of the society, there are five past presidents to hold a position in the council; when the number exceeds five, one will be retired every year. As it is, considering the past presidents available, all are members of the council, they being as follows in the order of service: A. L. Riker, Thos. J. Fay, and Henry Hess, who just retired to make room for the new president.

THE FUTURE OF THE SOCIETY LOOKS BRIGHT

When the new president took the chair, after passing over purely routine matters, he entertained the members present in divers ways, among which the question of the duties of such a society were discussed. The paper, by B. D. Gray, in relation to motor tests and methods of recording them, brought out many points of more than a little merit, and Mr. Coffin, in handling this discussion, pointed out that the cost of making tests, conducting original investigations and reaching satisfactory conclusions would be very great.

It was said, among other points which were brought out, that it is highly improbable that any single manufacturing company will be likely to stand the cost of such investigations, and to illustrate just what this means an example was cited, in which it appears that one company, desiring to ascertain more information about internal combustion motors, expended the enormous sum of $100,000 without exhausting the subject from its angle.

That there are many things to be ascertained before internal combustion motors will be on a basis of finality is now assured, and, as Mr. Coffin stated, "Few, indeed, are the concerns who have had time in which to go into the matter sufficiently to feel that motors are, even now, beyond swaddling clothes."

The committee on test, under the direction of B. D. Gray, as chairman, will handle the matter from a certain point of view, rather with the hope, perhaps, that purchasers of automobiles, when they desire to ascertain if the manufacturer, in any given case, is making a delivery in accordance with the specifications, will be in a position to determine (upon a standard basis of comparison) by having a test run, just what the real status may be.

This may look to the casual observer like a simple thing to do, but when all angles are contemplated it is so extremely difficult as to hold all the elements of a first-rate problem, even under the guidance of a special skilled committee, under the auspices of the first body of engineers in America, nor has this problem been solved by any of the older bodies of automobile engineers as they exist abroad.

AFFILIATED MEMBERSHIP TO BE INSTITUTED

Last year, when the "International" grade of membership was established in the society, it was thought that about all avenues of utility from the membership point of view were closed. It has been found, however, that there is still room to expand, and the last effort in this direction is by way of an "Affiliated" member, the status of which will be gone into at a later moment.

The papers, as previously announced, were added to by a very interesting paper on the subject of transmission gears by Dr. G. W. Sargent, and, in view of another arrangement which the society has consummated in relation to the publication of papers, this paper will be given out at an early date.

The new arrangement, which is now assured, is one in which the society will spread broadcast all the facts, including discussions, as they appear in the very desirable papers which are read from time to time before the society. The new arrangement has the advantage of giving to the society an additional income, it being the cast that the principal automobile publications in America will take and pay for the matter on a fixed "minimum" basis, and, additional, on a word basis, for all above a certain minimum. The papers are of the greatest possible interest to those who have to struggle with the problems of the day, and they should prove of excellent value to autoists in general. This arrangement, then, kills three birds at one time; *i.e.*, engineers will have the information at their disposal, the society will realize an additional income, and autoists will benefit by closer contact with the engineering subjects of the day.

A BANQUET ENDED THE YEAR'S ACTIVITY

In the evening, after the business of the year was concluded, the members and guests retired to the Engineers' Club, and at 7 o'clock were seated to a "spread' which proved to be one of the most enjoyable in the history of the society. At the appropriate instant the retiring president related the incidents of his year of labor, and, as might have been expected, the experiences were of an advantageous character, giving to the society many things which it wanted, and planning for the future the remaining matters which are to make the society large, influential and of the greatest advantage to the industry.

The membership has grown steadily, and to-day, counting "live" members, the society numbers upwards of 300 engineers, besides a fine showing of associates, internationals and possibilities. The idea of a neutral society of engineers of the automobile fraternity has proven to be well founded, and it is now assured that the society will grow and prosper; this alone is a matter of relatively large importance, considering the needs of the industry, it being true that everything should be subordinated to the question of the quality of the products which come from plants. That associated engineers will be able to do better than will be possible under any other way of proceeding is too sure to require discussion, but what is more to the point, this society has already made a "dent" in the quality of the automobiles made. The following members and invited guests attended the banquet:

H. W. Alden, Detroit; Joseph A. Anglada, Brooklyn, N. Y.; Bertram Bailey, Minneapolis, Minn.; Albert C. Bergmann, New York City; E. T. Birdsall, New York City; H. H. Brown, Boston; Rolla C. Carpenter, Ithaca, N. Y.; Henry Cave, Springfield, Mass.; Alexander Churchward, New York City; Howard E. Coffin, Detroit; H. F. Donaldson, New York City; Burton G. Ellis, Medford, Mass.; Thos. J. Fay, Brooklyn, N. Y.; Peter Fogarty, New York City; D. B. Gray, Providence, R. I.; Charles F. Herreshoff, Detroit; William Hesselkus, New York City; C. B. Hayward, New York City; William Herreshoff, Bridgeport, Conn.; Henry Hess, H. L. Hess, Jr., Philadelphia; M. R. Hutchison, New York City; Lindley Hubbell, Hartford, Conn.; W. P. Kennedy, New York City; William V. Lowe, Fitchburg, Mass.; Arthur R. Mosler, New York City; George C. McMullen, Buffalo, N. Y.; A. L. McMurtry, New York City; A. F. Masury, New York City; Frank Matheson, Wilkes-Barre, Pa.; Frederick S. Newman, Chicago; A. L. Riker, Bridgeport, Conn.; C. C. Reddick, Richard F. Russell, Brooklyn, N. Y.; G. W. Sargent, Reading, Pa.; A. J. Slade, New York City; Herbert L. Towle, New York City; H. M. Swetland, New York City; Allan H. Whiting, New York City; E. R. Whitney, Philadelphia; Clarence E. Whitney, Hartford, Conn.; Frank E. Whitney, Philadelphia; S. L. Wetherill, Philadelphia; Lawrence R. Whitcomb, Boston.

Invited Guests: G. K. Bradfield, G. G. Behn, F. E. Bright, W. J. Childs, M. J. Lathrop, C. H. Taylor.

MEETING OF A. A. A. LEGISLATIVE BOARD

Eleven State associations of the American Automobile Association were represented in the session of its national legislative board, held at headquarters, 437 Fifth avenue, Wednesday of last week, and presided over by Chairman Charles Thaddeus Terry. Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, Ohio, Colorado and Nebraska were the States that supplied delegates, and a thorough discussion of the general legislative situation occupied several hours. Much time was devoted to the Federal Registration Bill and the National Legislative Convention which will take place at Washington, D. C., February 15, 16, 17.

The sole point sought to be effected by the Federal Registration Bill, as outlined by Chairman Terry, is to afford a motor vehicle user, after he shall have obtained his license to operate from the State of his residence, to procure from the Federal bureau in Washington a Federal license which will enable him to operate without the necessity of procuring any further license, or of paying any further fees, wherever he may choose to take his car. The bill does not in any effect interfere with States rights to regulate automobiles in all other respects, as to speed, signal devices, brakes and the like, and it leaves every State free to regulate the use of motor vehicles within its borders as it may choose in all these respects.

There was a thorough discussion of the question of the special taxation of automobiles, whether under the name of registration fees or license fees. It was the sense of the meeting that on principle there was no justification for charging automobilists for the use of their cars, anything more than such sum as should be sufficient to cover the cost of registration and the issuance of identification marks. Besides Chairman Terry those present were:

Maryland—H. M. Rowe, Automobile Club of Maryland.
Massachusetts—J. P. Coghlin, Worcester Automobile Club; A. E. Lerche, Springfield Automobile Club; R. C. Cooley, Springfield Automobile Club; W. A. Thibodeau, Auto Legal Assn., Boston; Francis Hurtibus, Jr., Bay State Automobile Association.
Vermont—S. S. Ballard, Automobile Club of Vermont.
Connecticut—C. H. Gillette, Automobile Club of Hartford; H. W. Weed, Automobile Club of Bridgeport; C. M. Robinson, New Haven Automobile Club.
Pennsylvania—Powell Evans, Automobile Club of Philadelphia.
New York—H. A. Meldrum, Automobile Club of Buffalo; Howard F. Martin, Albany Automobile Club; O. A. Quayle, Albany Automobile Club; Bert Van Tuvle, Automobile Club of Rochester; J. B. McMurrich, Oswego Automobile Club; H. F. Elliott, Bronxville Automobile Club.
New Jersey—A. G. Batchelder, Summit, N. J.
Delaware—John Bancroft, Delaware Automobile Association.
Colorado—G. A. Wahlgreen, Denver Motor Club.
Nebraska—D. C. Bradford, Omaha Automobile Club.
Ohio—A. J. Pray, Columbus Automobile Club.

PROSPECTIVE LEGISLATION IN KENTUCKY

LOUISVILLE, KY., Jan. 17—Closely akin to the Wyatt-Bosworth amendment, providing for good roads, three proposed bills are to be submitted to the Kentucky General Assembly next month. One of the bills establishes the office of county road engineer and authorizes each county in the State to issue bonds to improve and build roads. The second bill creates a State department of public roads under the Commissioner of Agriculture. This will be headquarters where all contracts for road building and improvements will be drawn up and let to construction companies. The third bill provides for a fund to build and maintain roads in the State. This fund is to be established by means of a tax levy, the amount of which is to be fixed by the Legislature.

OHIO AFTER LICENSE DELINQUENTS

COLUMBUS, O., Jan. 17—By orders issued by the Ohio State Automobile Department, all cars not provided with the mahogany tag of 1910 will be held up and the drivers or owners arrested for violation of the law. A grace of ten days has been allowed for all owners to secure their 1910 tags, and a large number have failed to take advantage of the extension of time. Hereafter orders have been issued for all owners to be prosecuted. Police will see that the law is obeyed.

BRISCOE STRONG FOR GLIDDEN TROPHY

EDITOR THE AUTOMOBILE:

In view of the recommendation made by an official of the American Automobile Association relative to discarding the famous Glidden trophy and returning it to its donor, Charles J. Glidden, I take this opportunity to protest any such action by the Contest Board of the A. A. A.

I protest not only for the Maxwell concern, but for many other concerns holding membership in the Manufacturers' Contest Association and who have competed for this trophy since its presentation to the A. A. A.

To discard this classic touring trophy of the country at this time, after it has accomplished so much good for the industry, is, in my opinion, an extraordinary action and one which would be regretted not only by motor car makers but by the public as well.

Surely no automobile trophy ever competed for in this country has done so much toward the progression of the motor car industry, not excepting even the Vanderbilt Cup.

Donated in the early days, when the automobile was looked upon as the rich man's toy, it created enthusiasm throughout the territories through which the Glidden Tour was run; it showed the public in general that the motor car could accomplish all that was claimed for it; it demonstrated that the "horseless carriage" had become a permanent fixture in social and business life; it has done more than anything else to sound the death knell of the horse and its relegation to the farm; it has given manufacturers a superior opportunity to learn the strong and weak points of their cars, which could not have been learned under general touring conditions. This, in brief, is what the Glidden Trophy has done for the industry, sport and pastime, and it is this same famous classic trophy that certain interests would now bury in the historic archives of motordom!

The Glidden Tour is well known by the public at large, from Boston on the east to the Golden Gate on the west, and from the Gulf of Mexico to the Great Lakes. It is the public barometer as to what the various cars can do in endurance, mountain climbing, plunging through sand or gumbo, or speeding over macadam roads. The Glidden Tour has taken the automobiles through country hardly passable by horse vehicles, and has fully demonstrated that the motor car can accomplish what no other form of transportation can.

None of these would have been learned so rapidly if not for Mr. Glidden's generous offer in donating the famous trophy which bears his name. As a pioneer he certainly is entitled to any credit which may be his. Personally I believe that too much credit cannot be given him for his foresight and keen intuition of the benefits to be derived from an annual contest such as the Glidden Tour has developed into. I doubt if Mr. Glidden himself even dreamed what wonderful beneficial results would be accomplished for the motor car when he first donated the trophy.

To me it sounds inconsistent for this A. A. A. official to recommend the withdrawal of the Glidden Trophy and offer certificates in its place, when in the same statement he says: "At this time suitable resolution should be offered expressing the appreciation of our Association to the generous donor of the Glidden Trophy, and a committee appointed to present such resolution to Mr. Glidden, with power to arrange with him as to the disposition of this trophy. Too much credit cannot be given Mr. Charles J. Glidden for his generosity and foresight in offering this trophy which has made it possible for this tour to become an event of national importance."

In other words, the recommendation is made to withdraw the trophy when in the same breath it is conceded that in offering the trophy Mr. Glidden "has made it possible for this tour to become an event of national importance." Let us keep the trophy and continue it in the high place which it has earned.

BENJAMIN BRISCOE,
President Manufacturers' Contest Association.

A. A. A. CONTEST BOARD IS BUSY

The new contest board of the American Automobile Association is bending every effort toward the rounding out of the projected racing circuit for 1910, and it will be its endeavor to make a schedule of meets and contests in such a way as to avoid long jumps for racing teams. The middle West and South will doubtless figure prominently in the schedule. Both Atlanta and Indianapolis have speedway promoters with ambitious plans for the year. The Southern Motordrome managers figure on two or three sets of dates, while it is said that Savannah plans some sort of a successor to the grand prize race of Thanksgiving Day, 1908. Indianapolis, according to report, has applied for dates that will include Memorial Day, July 4th and Labor Day. In the East it is said that Brighton Beach will be the scene of four 24-hour races, while the Vanderbilt Cup contest has been timed to occur about the beginning of October.

A. L. A. M. NOW LICENSES SIXTY-TWO MAKES

AT a well attended meeting of the board of managers of the Association of Licensed Automobile Manufacturers January 13, with President Clifton in the chair, Col. George Pope, chairman of the show committee, in his report stated that all records had been broken by the A. L. A. M. Show at Madison Square Garden this year, the daily attendance showing an increase of 30 per cent over former years. He announced plans for housing the big A. L. A. M. membership in the Garden at the 1911 show.

Alfred Reeves was unanimously elected general manager of the association. He was formerly general manager of the American Motor Car Manufacturers' Association, a majority of the members of which have joined the A. L. A. M. Coker F. Clarkson, who has been assistant general manager of the A. L. A. M. during the past year, will continue in this position.

The American Motor Car Company, Indianapolis, Ind.; Dorris Motor Car Company, St. Louis, and Mack Bros. Motor Car Company, Allentown, Pa., were granted licenses under the Selden patent. There was a number of other applicants for licenses, but the three above mentioned were the only ones admitted.

An important feature of the meeting was the empowering of the executive committee to institute such suits against automobile manufacturers who are infringers of the Selden patent as counsel may advise. There are now 62 makes of gasoline cars licensed under Selden patent, more than one-third of these having been so licensed since Judge Hough of the United States Circuit Court broadly sustained the Selden patent as covering the modern gasoline automobile. The complete list of licensees, and the cars they manufacture, revised to January 15, is as follows:

American Locomotive Company, Alco; American Motor Car Company, American; Apperson Bros. Automobile Company, Apperson; Autocar Company; Autocar; Bartholomew Company, Glide; Brush Runabout Company, Brush; Buckeye Manufacturing Company, Lambert; Buick Motor Company, Buick; Cadillac Motor Car Company, Cadillac; Chalmers-Detroit Motor Company, Chalmers-Detroit; Corbin Motor Vehicle Corporation, Corbin; Columbia Motor Car Company, Columbia; Dayton Motor Car Company, Stoddard-Dayton; Dorris Motor Car Company, Dorris; Elmore Manufacturing Company, Elmore; Everitt-Metzger-Flanders Company, Studebaker E-M-F, Studebaker-Flanders; H. H. Franklin Manufacturing Company, Franklin; Haynes Automobile Company, Haynes; Hewitt Motor Company, Hewitt Truck, Everitt; Hudson Motor Car Company, Hudson; Hupp Motor Car Company, Hupmobile; Jackson Automobile Company, Jackson; Knox Automobile Company, Knox; Locomobile Company of America, Locomobile; Lozier Motor Company, Lozier; Mack Bros. Motor Car Company, Mack Truck; Matheson Motor Car Company, Matheson; Maxwell-Briscoe Motor Company, Maxwell; Mercer Automobile Company, Mercer; Mitchell Motor Car Company, Mitchell; Moline Automobile Company, Moline; Moon Motor Car Company, Moon; Mora Company, Mora; National Motor Vehicle Company, National; Nordyke and Marmon Company, Marmon; Olds Motor Works, Oldsmobile; Packard Motor Car Company, Packard; Palmer & Singer Mfg. Co., Palmer-Singer; Peerless Motor Car Company, Peerless; Pierce-Arrow Motor Car Company, Pierce-Arrow; Pierce Motor Company, Pierce-Racine; Pope Manufacturing Company, Pope-Hartford; Premier Motor Manufacturing Company, Premier; Regal Motor Car Company, Regal; Reo Motor Car Company, Reo; Royal Tourist Car Company, Royal Tourist; Alden Sampson, 2d, Sampson Truck; Selden Motor Vehicle Company, Selden; Simplex Automobile Company, Simplex; F. B. Stearns Company, Stearns; Stevens-Duryea Company, Stevens-Duryea; Studebaker Automobile Company, Studebaker-Garford; E. R. Thomas Motor Company, Thomas; Waltham Manufacturing Company, White; Willys-Overland Company, Overland, Marion; Winton Motor Carriage Company, Winton; York Motor Car Company, Pullman.

The following were in attendance at the meeting:

James Joyce, American Locomotive Company; George H. Strout, Apperson Bros. Automobile Company; John S. Clarke, D. S. Ludlum, Autocar Company; A. Y. Bartholomew, Bartholomew Company; Frank Briscoe, Brush Runabout Company; W. C. Durant, Buick Motor Company; W. C. Leland, Cadillac Motor Car Company; Hugh Chalmers, Chalmers-Detroit Motor Company; Herbert Lloyd, H. W. Nuckols, Columbia Motor Car Company; M. S. Hart, Corbin Motor Vehicle Corp.; Wm. R. Innis, Everitt-Metzger-Flanders Company; G. H. Stilwell, H. H. Franklin Mfg. Company; Elwood Haynes, Haynes Automobile Company; E. R. Hewitt, Wm. E. Metzger, Hewitt Motor Company; R. D. Chapin, Hudson Motor Car Company; G. A. Matthews, Charles Lewis, Jackson Automobile Company; A. N. Mayo, Knox Automobile Company; S. T. Davis, Jr., A. W. Robinson, Locomobile Company of America; H. A. Lozier, Lozier Motor Company; F. F. Matheson, Matheson Motor Car Company; Benjamin Briscoe, Maxwell-Briscoe Motor Campany; Wm. T. White, Mercer Automobile Company; Henry Plow, Mitchell Motor Car Company; W. H. Van Dervoort, Moline Automobile Company; C. C. Hanch, Nordyke & Marmon Company; H. B. Joy, Packard Motor Car Company; L. H. Kittredge, Peerless Motor Car Company; Charles Clifton, Pierce-Arrow Motor Car Company; George Pope, A. L. Pope, Pope Mfg. Company; H. O. Smith, Premier Motor Mfg. Company; R. E. Olds, Reo Motor Car Company; Geo. J. Dunham, Royal-Tourist Car Company; G. E. Mitchell, Alden Sampson, 2nd, R. H. Salmons, George B. Selden, Selden Motor Vehicle Company; F. B. Stearns, F. B. Stearns Company; Wm. R. Innis, Studebaker Automobile Company; E. R. Thomas, E. R. Thomas Motor Company; Windsor T. White, Waltham Mfg. Company; Thos. Henderson, Winton Motor Carriage Company; Thos. C. O'Connor, York Motor Car Company.

SUCCESS OF THE PALACE SHOW

At the meeting of the committee of management, American Motor Car Manufacturers' Association, held at the New York headquarters last week, R. E. Olds, chairman of the show committee, rendered his report of the Grand Central Palace show, indicating that the affair exceeded in attendance, in the amount of business done and in profits any previous automobile exhibition held at the Palace. A dividend of 72 per cent. on the amount paid for space was declared to the Importers' Automobile Salon and the Motor and Accessory Manufacturers, who were interested in the show with the organization of makers.

A letter was approved to be sent to every member of the association relative to the annual meeting to be held in Chicago on February 9, for action on the association's agreement which expires by limitation on that date. The clause reads as follows:

The term of this agreement is for five years, but any party hereto shall be considered as withdrawn from the terms hereof who fails to pay the sum or sums hereinafter mentioned within thirty days of demand therefor by the committee heretofore created.

Upon motion, duly seconded, the resignation of Alfred Reeves as general manager, was accepted with regrets.

It was voted by the association to present R. E. Olds, chairman of the 1910 show committee, a suitable token in appreciation of his leadership in connection with the show.

At the meeting were H. O. Smith, chairman, Premier Motor Manufacturing Company; W. H. Van Dervoort, Moline Automobile Company; R. E. Olds, Reo Motor Car Company; Charles Lewis, Jackson Automobile Company; Benjamin Briscoe, Maxwell-Briscoe Motor Car Company; Henry Plow, Mitchell Motor Car Company; C. C. Hanch, Nordyke & Marmon Company; S. H. Mora, Mora Company, and Alfred Reeves, general manager.

LICENSED DEALERS TO ORGANIZE

A call has been issued with a view to forming an organization to be known as the "Licensed Automobile Dealers of New York." The meeting will be held at the Hotel Astor, Thursday, January 20, at 2 o'clock. The call is signd by the Sidney B. Bowman Automobile Company (Apperson and Marmon cars), The White Company (White cars), Geo. C. John (E. M. F. and Flanders), Oldsmobile Company of New York, General John T. Cutting (Oldsmobile), E. R. Thomas Motor Company (Thomas), Maxwell-Briscoe Company, Inc. (Maxwell), Carl H. Page & Co. (Chalmers-Detroit), R. M. Owen & Co. (Reo and Premier).

It is understood that the formation of the proposed Licensed Automobile Dealers of New York is the forerunner of similar associations in all of the big cities of the country.

MITCHELL COMPANIES ARE CONSOLIDATED

RACINE, WIS., Jan. 15—The Mitchell Motor Car Company and the Mitchell & Lewis Company, which manufactures farm wagons and buggies, were united yesterday in a new company capitalized at $10,000,000, to be known as the Mitchell-Lewis Motor Company. The new concern will be headed by William Mitchell Lewis, son of William T. Lewis, who has heretofore been at the head of both concerns.

William T. Lewis will retire from active work, but will remain in an advisory capacity as charman of the board of directors. The officers of the new Mitchell-Lewis Motor Company are: William Mitchell Lewis, president; Henry G. Mitchell, vice-president; George B. Wilson, second vice-president; Frank L. Mitchell, treasurer; G. Vernon Rogers, secretary; John W. Bate, designer and superintendent, and James W. Gilson, sales manager.

Contestants in the French Reliability Trials for Voiturettes, Climbing the Grade at St. Germain

HIGH PERCENTAGE OF CLEAN SCORES IN FRENCH TRIALS

PARIS, Dec. 28—Sixteen out of twenty-nine have survived with perfect scores in the first reliability trials held in France. The event was an endurance test of 2,000 miles spread over fifteen consecutive days, with conditions similar to those of the sealed bonnet tests of America, with the exception that the seals were replaced by an official observer. As the French observer is too often lacking in seriousness, and can be accused of such crimes as leaving his car to go shopping or sight-seeing en route, it has been decided to replace him by seals on the bonnets when the time comes for holding the next competition.

The percentage of clean score survivors is remarkable when it is considered that the event was run in midwinter over roads which were bad under the French standard. It is true there was never much mud plugging, but always a hard surface so full of pot holes that it had a masterly power of shaking nuts loose and causing the rupture of sundry bolts. As an example of the progress that has been made, it is worth recalling that in a similar event two years ago, over a good road guarded by military, there was an elimination of 50 per cent. after six days' running. This year about 35 per cent. have disappeared after fifteen days on the open road. Next year the average speed will be raised from 15 1-2 miles an hour to 19; the daily runs will be made longer, and not even the opportunity will be given to clean fouled spark plugs.

Although officially known as voiturettes, it needs a stretch of the imagination to place some of the competitors in this class. Light racing cars would be a more correct definition. Cylinder dimensions were fixed at 4.9 by 5.9 maximum bore and stroke for a one lunger; 3.9 by 5.1 for two cylinders and 3.1 by 4.7 for four cylinders. A considerable amount of speed can be got out of four cylinders of over 3-inch bore and nearly 5-inch stroke, as was fully proved during the trials. Officially, however, the extra speed above 15 1-2 miles went for nothing.

With one or two exceptions the competing vehicles were light sporting cars, many of them capable of doing 50 miles an hour on the open. Under the rules they had to be equipped for winter travel, complete with mud guards, hood, wind shield, lanterns, etc., and have comfortable touring bodies. One of the competitors went to the extent of furnishing a comfortable inside steering body, although the majority had the smallest wind shields and the lowest hoods possible, their drivers considering speed of far more importance than comfort.

Single cylinders were not as numerous as might have been expected, there being but three of this type in the sixteen clean-score winners. There were no two-cylinder cars, but plenty of small fours. The distinctive feature of the motors was the proportion of long strokes. Among the singles the dimensions in one case were 120 by 140, and in all others 100 by 130 millimeters. In the four-cylinder class the greatest proportion of stroke to bore was 1.84, and the lowest 1.38, the average being about 1.50. In the majority of cases the fours had their cylinders in one casting without a central bearing. High-tension ignition was used invariably, without any storage batteries as a stand-by.

In every case failures were due to careless driving or minor defects. George Sizaire, the one-lunger expert and speed champion, was put out of business by the breakage of a ball in a front wheel bearing. One of the four-cylinder Rolland-Pilain vehicles —the most racy looking and speediest of the whole lot—had to pull up sharp when going at 40 miles an hour. The result was a quick skid and an equally quick smashing of a rear wheel. Phil De Marne played at racing with his four-cylinder Gregoire until a back spring failed him when taking a gully at high speed. He changed the leaf alone in half an hour, but henceworth was counted among the out-and-outers. A Sizaire-Naudin went out through a valve sticking in its guide. A Hurtu broke its gasoline pipe; a Barre jumped its fan belt, and another car from the same factory damaged its radiator in a collision; a Doriot-Flandrin had a leaky radiator; a Corre-La Licorne bought bad gasoline on the road and lost so much time getting rid of it that it was not worth starting again; a friction-driven Turicum had to tighten up nuts on its friction disc; the driver of a similar type of car made by Fouillaron loitered so much that he came in beyond his time limit; a Doriot-Flandrin driver became weary of changing tires, and a Zenith car sneaked home without saying good-bye to anybody.

Those that came through after making all controls on time, without changing a part and without adjustments, represented eleven firms. Alcyon was the only one to put in three cars and bring all three through with perfect scores. Delage and Demeester started with only one each and finished perfect; all the others lost one or two cars. The perfect scorers are:

Alcyon (3) four cylinders, 2.9 by 4.3 bore and stroke.
Delage, four cylinders, 2.9 by 4.7 bore and stroke.
Demeester, four cylinders, 2.9 by 4.3 bore and stroke.
Gregoire (2), four cylinders, 3.1 by 4.3 bore and stroke.
Rolland-Pilain (2), four cylinders, 3.1 by 4.3 bore and stroke.
Corre-La Licorne (2), four cylinders of 2.4 by 3.9 and 3.1 by 4.3 bore and stroke.
Sizaire-Naudin, single cylinder, 4.7 by 5.5 bore and stroke.
Hurtu, single cylinder, 3.9 by 4.3 bore and stroke.
Barre, four cylinders, 2.9 by 4.7 bore and stroke.
Doriot-Flandrin, single cylinder, 3.9 by 5.1 bore and stroke.
Turicum, four cylinders, 2.9 by 4.3 bore and stroke.

FRENCH COMMERCIAL TRIAL RESULTS

PARIS, Jan. 12—Improvements in wheels, rubber tires and suspension are the strongest features of the commercial vehicles taking part in the recent French trials, and lubrication is the weakest, according to the technical report just issued by the judges. Of the 22 disqualified vehicles three only were thrown out by reason of accidents to wheels and tires, and of these three, one had a special type of tire being tested for the first time. Steel tires were not obligatory except under the military rules, and were not very generally employed. Their defect was a certain amount of skidding on the greasy Belgian block, and a tendency to flatten out under the continued action of the road. Shock absorbers were used extensively in conjunction with solid rubber tires, and proved most satisfactory. As the chassis in most cases is a lighter construction than a few years ago, it was possible to lengthen the springs considerably, while diminishing their width, with very good results. The improved suspension not only gave a longer life to the wheels, but was most advantageous to the mechanical organs, which in this competition finished in better condition than ever before.

The official report has not so much praise for the lubricating systems, so far as their economy is concerned. "One truck, weighing 5 3-4 tons, used 1 3-10 gallons of lubricating oil and 24 pounds of grease for a distance of 1,500 miles, while another vehicle, weighing a few pounds more, passed over the same route and used 30 gallons of oil and 15 pounds of grease; a third, weighing a few pounds less than the first vehicle, but covering a distance of 1,800 miles, consumed 66 gallons of lubricating oil and 42-5 pounds of grease. With such examples it would be most difficult to average the oil consumption of trucks."

Progress has been made in the use of various fuels by the internal combustion motor, but, in the opinion of the jury, it is desirable that the theoretical compression of the motor should be established with a full knowledge of the fuel that is about to be employed. "If the compression had been made higher the consumption of 50 per cent carburetted alcohol, which is at present equal to that of gasoline, would doubtless have been better than with this fuel. Benzol being fixed as a fuel by reason of its low price, constructors did not hesitate to modify their cooling arrangements, and to adequately warm their carburcters in order to get the most economical results.

The causes of the 22 failures out of the 54 vehicles starting in the competition are set forth in the official report. The Schneider Company had a vehicle in the ditch for 2 hours 20 minutes, and arrived late at the control; a second vehicle was disqualified by reason of magneto trouble. Krieger lost three vehicles, one by reason of ignition and carbureter trouble, a second by the loss of a rear tire, and the third by a serious leak in the gasoline tank. Panhard had a seized piston on one truck, a breakdown of the water circulating system on another, and a cracked cylinder on a third, following the breakdown of the water circulating system. Berliet figured for two vehicles in the failure class by reason of one running backwards on a hill, owing to oil on the brakes, and colliding with a following vehicle. Malicet & Blin also ran back on a hill and collided with a tree. Delaugere & Clayette burned out the anti-friction metal in a connecting rod, lost a tire, and had to change a spring hanger.

A two-cylinder Cohendet went into the ditch, but got out in time to qualify for the military portion of the trial. De Dion-Bouton had a single-cylinder delivery van which went out of business with its only cylinder cracked; a four-ton truck from the same factory broke its differential. Peugeot suffered a seized connecting rod bearing, and in another case lost a vehicle in a collision. Dietrich had two losses, one from magneto breakdown and the other by late arrival. An Aries had to be towed up a hill owing to the gears not working.

One of the Alcyon Voiturettes That Made a Perfect Score in the Recent French Reliability Trials

THE NEW LOS ANGELES MOTORDROME

Considerable interest is shown in the proposed construction of a one-mile board track at Santa Monica, a suburb of Los Angeles, Cal. Definite announcement of the plans has been made by F. E. Moskovies, the head of the enterprise, and an engineer of note. The project was quickly financed, a California railroad company assuming one-half of the stock, while the other half was immediately taken up by individuals.

Positive dates have been set for the opening meet and a sanction granted by the Contest Board of the A. A. A.—the first sanction to be granted under the new working agreement between that body and the Manufacturers' Contest Association. Seven days, April 8-9-10 and 13-15-16 and 17 are the dates selected.

In principle, this innovation will greatly resemble a bicycle track. It will cover one mile in a perfect circle, the turns having an enormous radius, even greater than that of the famous Brooklands track in England. The width will be 75 feet, the whole uniformly banked to a gradient of three in one, and 25 feet high on the outer edge. The track proper will be constructed of "two by fours" of Oregon pine properly planed down and finished in a way to insure the greatest smoothness.

A notable feature of the Los Angeles Motordrome, as it will be known, lies in the fact that owing to peculiar construction it will be completely closed against the non-paying public by its outer rim. The grand stand will encircle a certain portion of the track, having its main floor on a level with the top of the 25 foot outer edge. This grand stand will extend quite a distance around the track with entrances at various points on the ground. Its projectors claim that through its novel construction racing risk will be reduced, and greater speed made possible, and while there has been much discussion among experts relative to the merits of board surface for racing, yet some of the best engineers and drivers in the country have fallen in readily with the idea.

NEW ORLEANS READY FOR MARDI GRAS

New Orleans, Jan. 17—The New Orleans Automobile Club has been working upon its annual Mardi Gras Speed Carnival plans, and announcement has been made by the director of contests, Homer George, of the various events of the meet. Already entries have been received from George Robertson, with a Simplex; Ralph De Palma, with the Fiat Cyclone; Barney Oldfield, with his Benz, and Ben Kirscher, with a Darracq. The Jackson and Cole factories have named two cars each.

The list of events for the two days calls for fourteen races, for all classes of cars from the stock chassis of 161 to 230 piston displacement, to the free-for-alls. Three big amateur events are on the list, each with a $500 trophy. These have attracted entries so far representing New Orleans, Chicago, Atlanta, St. Louis and New York. Others are assured. Two of the events are at five miles and one at ten.

Two free-for-all races are carded each day, and one handicap. The feature of the first day is the New Oreans Hotel Sweepstakes at twenty-five miles, open to cars of A. A. A. classes 1, 2 and 4, with $250 in cash to the winner, donated by the Grunewald, St Charles, Montleone, New Denechaud and Cosmopolitan hotels. The second day's feature is the Crescent City Motor Derby at fifty miles, for the same class of stock chassis, with $250 in cash to the winner, donated by the New Orleans Progressive Union. A purse of $250 cash has been donated by New Orleans dealers to be divided among the three drivers scoring the greatest number of points in two days.

BUFFALO TO HAVE AERO SHOW

Buffalo, N. Y., Jan. 17—The Aero Club of Buffalo is making arrangements for a contest of aeroplane models to be held in one of the largest halls in the city about March 1. President John M. Satterfield will contribute a silver trophy. The club's total membership is now 61.

ANOTHER CHAPTER OF DETROIT GOSSIP

Detroit, Jan. 17.—Official announcement is made that the Lozier Automobile Company will remove to Detroit, negotiations which have been under way for some time having proved successful. Several prominent Detroiters are interested in the undertaking, and it is understood the company name will be changed to the Lozier-Detroit, following a practice prevailing among a number of local auto makers of incorporating the city name. This will add still another high grade concern to the already long list of automobile factories located here.

The Watt Motor Company, organized last November, has increased its capital stock from $100,000 to $300,000, the increase, it is announced, being occasioned by demands for the stock. A large factory will be erected in the spring.

The Ford Motor Company is now installed in its immense plant in Highland Park, just north of the city, where it will have a daily capacity of two hundred complete cars. This effectually serves to quiet rumors circulated for months, supposedly originated by disgruntled contractors, that the main building, 75 x 862 feet and four stories in height, was unsafe and would be torn down. A machine shop 840 x 140 feet, one story high, has just been completed and many more immense buildings will be constructed at once.

The Lotz Auto Company has been incoporated with a capital stock of $300,000, one-third of which is paid in. The principal stockholders are John A. Lotz, a local real estate man; Joseph Christian, Chicago; John McQueen, George Cooley and Arthur A. Fletcher. The company will manufacture a runabout and four and six-cylinder cars, the prices ranging from $600 to $1,500. It will also produce a new rubber tire, the invention of George Cooley, of Grand Rapids. A factory will be erected.

The Oriental-Detroit Company, an automobile manufacturing concern headed by O. F. Mead, of this city, and capitalized at $100,000, has secured a tract of land in Birmingham, just outside of Detroit, and will erect a factory for the manufacture of a high-powered two-passenger roadster to be marketed at a nominal price, as well as several other types of cars.

Further evidence of prosperity is found in the purchase by the Chalmers-Detroit Motor Company of another five and one-half acres of land adjoining its present plant on the east, and on which it is the intention to soon erect another addition to its already enormous plant. The company has just completed a four-story building which added one third to its factory space, making 500,000 square feet that are now available.

NEW HEIGHT RECORD AT LOS ANGELES

Los Angeles, Cal., Jan. 17—The principal event of the week of aviation trials was the new height record established last Wednesday by Louis Paulhan on a Farman biplane. The altitude was figured as 4,165 feet, and as it has been confirmed by the International Aeronautical Federation, which at the time was in session at Paris, it will stand as the official record. The best previous performance was Latham's 3,444 feet, at Mourmelon, France, January 7.

Paulhan again got into the limelight Friday, making a cross-country dash of twenty miles and return from the aviation field to San Pedro harbor, where he rounded the wireless telegraph mast. On the same day Curtiss set a record of 2:12 for the one-and-a-half-mile course. To-day Paulhan went after the distance record, but after covering 75.6 miles in 1 hour 58 minutes 27 2-5 seconds descended because of a leak in his gasoline tank. Curtiss made ten laps of the course in 23 minutes 4 2-5 seconds. Paulhan's best time in this event was 25 minutes 5 1-5 seconds.

Los Angeles, Cal., Jan. 18—Louis Paulhan again distinguished himself by a remarkable cross-country flight. Flying both with and against a wind that kept the other aviators down, he went from Aviation Field to "Lucky" Baldwin's ranch, 23 miles away, and returned to his tent, in 1 hr. 2 min. 42 4-5 sec.

What Clubs are doing these Winter Days

CAPITAL CITY CLUB ELECTS A NEWS LATE

Washington, D. C., Jan. 17—The sixth annual meeting of the Automobile Club of Washington was held to-night, and the following officers were elected for the ensuing year: President, H. Chadwick Hunter; vice-president, John K. Heyl; secretary-treasurer, Elliott P. Hough; captain, Joseph H. Falconer; lieutenant, D. J. Dunigan; governors, L. A. Dent, W. D. West, W. S. Duvall and W. H. Smith. This is an entire new slate with the exception of John K. Heyl, who was advanced from secretary to vice-president. An amendment to the by-laws was adopted in order to consolidate the office of secretary and treasurer. The retiring president, W. D. West, submitted a report which showed the club had been instrumental in securing a number of concessions for automobilists. Fifty-five new members were admitted during the year. The new president, Mr. Hunter, is one of Washington's pioneer automobilists and has been identified with every movement of interest to the motoring fraternity. He is also an authority on aviation.

BETTER ROADS BELOW MASON AND DIXON'S LINE

Baltimore, Jan. 17—The residents of Baltimore county, headed by the Good Roads Association of that section, are after improved crossroads, and have asked the Automobile Club of Maryland to help them in their efforts. The plan of the countyites is in the shape of a bill providing for a $1,500,000 bond issue, from which amount $100,000 is to be given to each of the 15 districts, to be expended in five years on improved crossroads, as the State has appropriated ample money for the turnpikes. The bill further provides that the money shall be handled by the commissioners of Baltimore county, and that the highways commission shall be composed of three county commissioners, the county roads engineer, and two other members selected by the judges of the Circuit Court for Baltimore county. The bill will be placed before the General Assembly, now in session. Members of the automobile club will put the plan before the directors at the next meeting.

BEEFSTEAK DINNER TO CHRISTEN CLUB HOUSE

Louisville, Ky., Jan. 17.—Right royally was the new clubroom of the Louisville Automobile Club christened Thursday evening. The occasion was announced as the club's "first beefsteak dinner," and it was probably the most unique event in the history of the organization. The business meeting began at 8 o'clock, at which certain changes in the by-laws and constitution were considered, with a view to making them conform to present day conditions, surrounding the sport of automobiling. Under the leadership of President Eugene Straus, the membership of the club has been increased until it now includes nearly every owner in the city. When an effort was made to exclude dealers from active membership it was promptly voted down. The club and the dealers are now in closer touch than at any previous time.

After the supper President Straus was presented with a handsome loving cup.

HARRISBURG, PA., NOMINATES FOR ELECTIONS

Harrisburg, Pa., Jan. 17—At the nomination meeting of the Automobile Club in the Metropolitan Hotel the following were put up for election next month: For president, W. O. Hickok, 3d; first vice-president, Frank H. Bomgardner; second vice-president, David G. Bowman; third vice-president, Dr. John Oenslager; treasurer, John C. Nissley; secretary, J. Clyde Myton. For the board of governors, Frank J. Brady, O. C. Robertson and H. C. Wright were nominated, to succeed C. G. Nissley, Roy W. Senseman and Dr. John Oenslager.

SYRACUSE OFFICERS RE-ELECTED FOR 1910

Syracuse, N. Y., Jan. 17.—The annual meeting of The Automobile Club of Syracuse was held at the Yates Tuesday night of last week. Hulburt W. Smith was re-elected president, and all the other officers and directors were re-elected. Annual reports by President Smith and Secretary Forman Wilkinson showed large gains in membership and finances during the year. With five new members elected that night, the club closed the year with a total membership of 410, of which 373 are resident and 37 out-of-town members.

During the year over 500 tourists have been routed from place to place at the club office, of which number 206 registered. More than 600 road signs giving warning of dangerous crossings, bad hills, sharp turns, etc., were placed along the main roads leading in and out of the city.

The club endorsed a plan to lay out a new State road from Cortland to Binghamton, and drafted recommendations to the State Highway Commission regarding improvements to roads hereabouts.

HARTFORD, CONN., CLUB INAUGURATES NEW YEAR

Hartford, Conn., Jan. 17—The first meeting of the local automobile club for the new year was held in the clubrooms on Allyn street Tuesday evening, and was purely a social session. No report on the "all-Connecticut" endurance run was submitted, but one is expected shortly. There was an informal discussion of the subject, and it was evident that there is considerable interest in the proposed event.

Refreshments were served, and everybody had a good time in the cozy quarters. The club membership continues to increase, and includes practically all the representative automobilists of the city.

QUAKER LADIES HOLD A BANQUET, TOO

Philadelphia, Jan. 17—The Ladies' Quaker City Motor Club held its annual banquet last week in the clubrooms at the Hotel Majestic. Gold and white, the club colors, were prominent in the decorations, and were repeated in the handsomely designed menu cards. During the affair a cable message was received announcing the election of the L. Q. C. M. C. to associate membership in the Royal Automobile Club of London. The committee in charge was composed of Mrs. Edward B. Finck, Mrs. Joseph J. Martin, Sr., Mrs. Joseph J. Martin, Jr., Mrs. Samuel E. Baily, Mrs. Charles Snyder and Dr. Katherine Sweeney.

BISON CITY'S AUTOMOBILE CLUB WILL BUILD

Buffalo, Jan. 17.—The board of directors of the Automobile Club of Buffalo has decided to build or buy quarters for a country clubhouse, the location of which will be within 20 miles of the city. It is planned to have the house ready for occupancy by July 1, and it will be located upon one of the principal automobile routes leading from the city. The building committee numbers 24 of the most prominent and wealthy members of the club, and is headed by Vice-President Harry Thorp Vars.

NORRISTOWN, PA., CLUB HAS 150 AT BANQUET

Norristown, Pa., Jan. 17—The Norristown Automobile Club held its annual banquet at the Jeffersonville clubhouse last Saturday night. One hundred and fifty members and guests were present, among the latter being numerous legislators, the county commissioners, State Highway Commissioner Joseph W. Hunter and representatives from all the nearby automobile clubs. Theodore L. Bean was toastmaster.

THE STUDEBAKER-E-M-F IMBROOLIO

Detroit, Jan. 18—Charges and counter charges continue to fly back and forth in the Studebaker-E-M-F controversy, which was scheduled for trial before Judge Swan, in the United States circuit court to-day, and which because of the disclosures made by both parties to the suit holds the center of the stage.

When the injunction proceedings came up to-day before Judge Swan, the attorneys for the Studebaker Company asked for a postponement of the case, owing to the fact that John S. Miller, its principal counsel, was also counsel for John R. Walsh, the convicted Chicago banker, representing him in mandamus proceedings. The E-M-F attorneys acquiesced in the request, and it was finally decided to have the hearing January 25.

When Judge Warrington, at Cincinnati, declined to have anything to do with the case, sending it back to the local United States Circuit Court, where the first action was taken by the Studebaker Automobile Company, E-M-F attorneys immediately filed an answer to the bill of complaint, in which some interesting facts are contained.

After going in detail into the business relations existing between the two companies prior to the ruction, showing how the factories were enlarged to supply the Studebaker Company with additional cars for which it was to be sole distributor, affidavits from majority stockholders in the E-M-F Company are presented to show that the schedule of cars called for by the Studebaker Company was arranged and passed upon by all the directors, and that F. S. Fish, chairman of the Studebaker Automobile Company, referring to the schedule of 15,200 cars for the first year, assured the E-M-F officials that the schedules so carefully prepared would be adhered to; that the Studebaker Company had every reason to believe the E-M-F Company would not be able to build cars as fast as the Studebakers could sell them; and that if through any unforseen cause the South Bend concern was unable to market the cars enumerated in that schedule by months it would arrange to take and pay for the cars and store them until they could be sold.

That the rescinding of this selling agreement by the E-M-F Company because of the alleged failure of the Studebaker Company to live up to the terms was welcomed by agents throughout the country it is endeavored to show through a printed volume of letters from agents who declare they were unfairly dealt with by the Studebakers in the matter of discounts, and that in order to handle E-M-F cars they were forced to purchase another car made by the Studebaker Company which they could not sell. As indicating what the rescinding of the agreement means to the E-M-F Company figures are submitted showing that by selling direct to dealers the company will take in an additional million dollars in profits and yet give the dealers fifty per cent. larger discounts than were allowed by the Studebaker Company.

Meanwhile the Studebaker Company has not been idle, last Saturday morning filing ten and one-half pounds of affidavits in the U. S. circuit court. The list comprises some one hundred and seventy-five separate affidavits from Studebaker agents all over the country, one of the chief points made being that they had rather work for the straight low discount offered by the Studebaker Company and have the prestige of that concern back of them than get the higher rate offered by the E-M-F. It was also declared that through the widespread publicity it has given the matter of discounts the E-M-F Company is demoralizing the automobile trade, rival agents being apprised of the discounts offered and other trade secrets, and being thus able to undersell.

The Studebaker Company charges indirectly that the E-M-F Company long contemplated a break, and seized upon the first excuse to cancel the selling agreement.

These affidavits, as well as providing interesting reading alike for the trade and the general public, are of value as outlining the lines along which the battle will be fought by both parties to the suit. Every point will be bitterly contested, and whichever party proves victor the case will go down in the annals of the automobile industry as one of the most expensive bits of litigation ever indulged in.

PACKARD DEALERS AT INFORMAL DINNER

Dealers in Packard cars who attended the Madison Square Garden Show were dined by the Packard Motor Car Company last Wednesday evening. The entertainment was given in the small ballroom at the Hotel Astor, and was informal in character, story telling taking the place of the usual set speeches. After the dinner courses had been served the room was darkened and an hour was given to the recital of an automobile story called "On the Road to Anywhere," illustrated by stereopticon pictures and enlivened by instrumental music and songs. The party included the following:

H. B. Joy, S. D. Waldon and C. J. Moore, of the Packard Motor Car Company; M. J. Budlong, New York; Alvan T. Fuller, A. Measure, L. R. Mack, F. C. Graves and I. H. Bolen, Boston; J. W. Tarbill, C. C. Blackmore and J. M. Richardson, Cincinnati; R. J. W. Hammill, Baltimore; C. M. Lines, Cleveland; E. C. Johnson, Philadelphia; W. N. Murray and H. P. Johnson, Pittsburg; Elliott Flint, George Cokely, Providence, R. I.; J. J. Mandery, Rochester, N. Y.; H. E. Greene, H. T. Warmick, Amsterdam, N. Y.; C. J. Bousfield, Bay City, Mich.; R. W. Whipple, Binghamton, N. Y.; W. R. Densmore, Buffalo, N. Y.; F. E. Avery, Columbus, O.; F. L. MacFarland, Denver; A. E. Barker, Detroit; C. G. Embleton, Hartford, Conn.; A. H. Dorscy, Memphis, Tenn.; F. B. Willis, Indianapolis; C. G. Welch, Milwaukee, Wis.; E. P. Moriarty, Kansas City, Mo.; G. M. Reddick, Denise Barkalow, Omaha, Neb.; Ginder Abbott, New Orleans, La.; E. C. Anthony, Los Angeles, Cal.; J. Schaitt, W. E. Seeley, Bridgeport, Conn.; J. A. P. Ketchum, H. G. Ketchum, Saratoga Springs, N. Y.; T. A. Bryson, Savannah, Ga.; C. H. Goss, St. Johnsbury, Ga.; O. L. Halsey, St. Louis; C. A. Benjamin, Syracuse, N. Y.; A. M. Thompson, Toronto, Can.; C. B. Rice, Utica, N. Y.; S. A. Luttrell, J. A. Muelheisen, Washington, D. C.; C. P. Joy, St. Paul, Minn.; C. E. Jones, H. M. Allison, Chicago; C. A. Fitzgerald, Newark, N. J.; Russell Huff, C. A. Du Charme, E. P. Chalfant, F. R. Humpage, W. L. Gleason, Allan Loomis, J. J. Ramsay, H. H. Hills, J. F. Baines, H. E. Stowell, W. H. Workman, L. W. Conkling, Detroit; E. B. Jackson, A. E. Corbin, C. W. Doty, New York.

GET DRAWBACK ON EXPORTED TIRES

Akron, O., Jan. 17—A ruling which interests the tire manufacturers of this city has been obtained from the Treasury Department at Washington, D. C., on the exportation of automobile tires. The shipment in question was made by the B. F. Goodrich Company, and the claim was that imported leather washers and steel rivets or studs had been used in the tires. The drawback allowed will equal the duty paid on the imported materials less the legal deduction of one per cent.

The regulations prescribe that the preliminary entry must show the marks and number of the shipping packages, and the number of tires of each size contained in each package, and the amount used, including waste, of the imported materials. Although the value of the materials in question in a single tire is small, in a large shipment it is worth saving.

"DUTCH" DINNER FOR NEWSPAPER MEN

Newspaper men and the advertising managers of a number of licensed companies were guests at a "Dutch" dinner given to themselves last Thursday at Mouquin's. Many of the representatives of the automobile journals and the New York, Chicago, Boston and Philadelphia daily papers were present.

The celebration started at 10:30 p. m. with a grand march around the floor of the Garden, led by a band. The two-score merrymakers were then transported to the restaurant on one of the new White gasoline trucks, on which they found standing room only. R. H. Johnston was chairman of the committee which arranged the dinner, and he presided over the deliberations of the session, which lasted well into "the cold gray dawn of the morning after."

Testing the Ice on Hudson River with a Maxwell "Q-Sportsman"

The photograph shows Berry Rockwell, advertising manager, and Arthur See, racing driver for the Maxwell-Briscoe Motor Company, visiting Rockland lighthouse, about a mile out from shore at Tarrytown, N. Y. At this point the river is three miles wide. The car weighs 1,400 pounds, and the ice is about seven inches thick

Hoosier Y. M. C. A. a Live One—Manufacturers and retailers of automobiles in Indianapolis are much interested in the automobile course given by the Y. M. C. A. as part of its industrial training. At the opening course, Ellwood Haynes, president of the Haynes Automobile Company, Kokomo, Ind., gave an interesting lecture on the development and various uses of the gasoline motor. Various lectures and instruction periods have been arranged for by the following committee: G. A. Weidley, Premier Motor Manufacturing Company; Howard Marmon, Nordyke & Marmon Company; Will H. Brown, Overland Automobile Company; Fred I. Tone, American Motor Car Company; George M. Schebler, of Wheeler & Schebler; W. G. Wall, National Motor Vehicle Company; Warren D. Oakes, Parry Automobile Company; Frank L. Moore, Fisher Automobile Company, and Fred I. Willis, Hearsey-Willis Company.

Carriage Company's Successful Motor Buggy—The United States Carriage Company of Columbus, O., which recently went into the business of manufacturing motor cars, has designed a combination wagon and call buggy for undertakers which has been quite popular. The wagon is equipped with a gasoline motor and is designed to do the service of both the call buggy and the wagon for the undertaker's assistant. The United States Carriage Company is also equipping a number of ambulances and hearses with motors.

"Get-you-home Tire"—C. S. Averill, of Syracuse, N. Y., together with a number of others is interested in this tire, which is said to be so constructed as to not collapse for several hours after it has been punctured. A test of the new tire was made recently as follows: An automobile weighing 4,800 pounds was equipped with the "Get-you-home" tire; with a large nail and hammer four punctures were made in the tire at noon, after which the car was driven all day around the city without any signs of collapse. The first indications of collapse occurred 18 hours after the punctures were made.

Rambler Truck Rescues Horses—In San Diego, Cal., recently a Rambler automobile hose truck was pressed into service to relieve a team of horses which had become stalled in the mire. The horse-drawn apparatus was on a railroad track with each pair of wheels against the rail down to the hubs in mud. The Rambler truck pulled it out without any damage and with apparently little effort. It is said that this piece of fire apparatus has answered 82 alarms and coverel about 2,000 miles since it was installed there six months ago.

Spokane Dealers to Organize—Plans are being made to organize a Spokane, Wash., auto dealers' association; this for mutual protection. It is expected to have 16 members, taking in every selling establishment in the city, and it is believed that by the organization those concerned will be brought closer together in a business way. It is also proposed to control road races and endurance runs in that vicinity. Harry Ball, L. W. Hodgins, H. P. Banta and J. A. Stoner will back the project.

New Factory for Cleveland—F. E. Stiverson, formerly sales manager for Ohio for the White Company, has organized a company known as the Stiverson Motor Car Company. The company will soon begin the erection of a plant near Cleveland at a cost of $100,000. Stiverson announces that his company will build both four and six-cylinder cars. The car will be known as the Stiverson and will be equipped with several different styles of body.

Hudson Company's Officers—The new personnel of the Hudson Motor Car Company, of Detroit, following its absolute separation from the Chalmers-Detroit Motor Company, is announced as follows: Chairman board of directors, J. L. Hudson; president, R. D. Chapin; vice-president, H. E. Coffin; secretary, F. O. Benzer; treasurer and general manager, R. B. Jackson.

Stein Increases Capital Stock—A recent meeting of the Stein Double Cushion Tire Company, Akron, O., increased its capital stock from $100,000 to $200,000, this preparatory to erecting a large addition to the factory. Increased demand for tires makes this step necessary. The president of the company is C. K. Sunshine and M. M. Neuman is secretary-treasurer.

Inquiries for Factory Sites—The Commercial Club of Superior, Wis., reports that several motor car manufacturers have made inquiries as to sites along the new belt line, the Interstate Transfer railroad, giving facilities for Superior and Duluth, Minn., the twin cities. The steel trust is now erecting the first unit of a huge plant at this point.

Mansfield Rubber Company, Mansfield, O.—At an annual meeting of stockholders the following board of directors was elected: C. H. Walters, F. H. Walters, C. R. Grant, James E. Waite, R. C. Kinnaman, F. M. Bushnell and F. A. Wilcox. A recent fire caused a damage of $16,000 to this plant.

International Harvester Company, Akron, O.—This company is planning to erect several additions to its plant in the Spring. These additions will give it a capacity of 4,000 cars, and for the purpose of carryng out the plans more than $75,000 worth of new machinery has been ordered.

United Motor Company, Denver.—Plans are under way for the erection of a new automobile plant in Denver which it is said will employ between 750 and 1,000 men. The principal product will be an automobile truck designed on an entirely new plan.

Will Make Magnetos.—The Duplex Coil Company, Fond du Lac, Wis., will start the manufacture of magnetos on February 1. New machinery, screw tools and drill presses are now being installed in the factory.

IN AND ABOUT THE AGENCIES

Studebaker Opens Twenty-four Agencies—The Columbus, O., branch of the Studebaker, which was formally opened in a new store room on North Fourth street the latter part of 1909, has placed 24 sub agencies in Central and Southern Ohio, which is the territory covered by the Columbus office. In all 53 counties are included in the Columbus territory. Sub-agencies have been placed in Dayton, Springfield, London, Marysville, Marion, Bucyrus, Ashland, Mansfield, Mt. Vernon, Newark, Coshocton, Bellaire, Athens, Logan, Lancaster, Circleville, Zanesville, Chillicothe, Delaware and Middleport.

New Rainier Agencies—The following Rainier agencies have recently been given out: In Charlotte, N. C., C. C. Coddington will distribute Rainiers for North and South Carolina; H. H. Tifft, Jr., becomes the Rainier agent in Georgia with headquarters at Atlanta; W. H. Johnson will handle the Alabama business with headquarters at Birmingham. The New England distributing point will be Boston, where Rainier cars will be sold by the New England Motor Vehicle Company, 591 Boylston street. Negotiations are in progress for the opening of agencies in the West and Middle West.

Sterling, Cleveland—The Sterling will be sold in Cleveland by the Sterling Motor Sales Company, formed during the week. The company is incorporated for $30,000. J. C. Koepke, general manager of the company, was formerly superintendent of the garage maintained by the Ohio sales branch of the White Company. Several downtown locations are being considered by the Sterling Company and a site will be chosen for a large garage within a few days.

New Pittsburg Selling House.—L. E. Randle, of the Shady Side Motor Car Company, and J. J. Feicht, who is Pittsburg agent for the Reo car, have formed the Liberty Automobile Company. They will have offices and garage at 5958 Center avenue, in the building formerly occupied by the Central Automobile Company, where they have made extensive improvements. Their agencies will be the Regal, Hupmobile and the Hart-Kraft commercial wagon.

Republic Tires, Philadelphia—The Lyman Tire & Rubber Company, occupying temporary quarters at No. 1324 Arch street, Philadelphia, has just closed a deal with the Republic Rubber Company, of Youngstown, O., whereby it has acquired the sales rights for Republic Staggard tread tires in the district included in eastern Pennsylvania, southern New Jersey, Delaware, Maryland, District of Columbia and Virginia.

Rainier, Waverly, Electric, and Crane & Breed Commercial, Philadelphia—The latest newcomer to the automobile trade is the Collings Carriage Company, Inc., with salesrooms at 1719 Chestnut street, which has recently acquired the Philadelphia agencies for the Rainier, the Waverly electric and the Crane & Breed commereial cars, one of the most comprehensive lines in the city.

Everett "30" and Rausch & Lang, Spokane, Wash.—The Pacific Motor Car Company will handle these two cars in addition to the Stevens-Duryea agency which they now have. They will soon break ground for a $10,000 garage. H. B. Housten has been engaged as salesman. Mr. Housten was formerly with the Diamond Rubber Company, San Francisco.

Lovell-McConnell, Newark—This company, which has been located in the Currier building, has outgrown its present quarters and is now erecting a new plant on Emmett street. The new buildings are to include a power plant building and garage. They are well known as the manufacturers of the Klaxon and Klaxonette, both audible signals for automobiles and motor boats.

New Cleveland Agency.—The Crest Motor Company has been formed and will act as Cleveland agents for the Warren-Detroit, the Paige-Detroit and the Abbot-Detroit. Within a short time the company will locate in a large building nearing completion on Euclid avenue, in the heart of automobile row. Demonstrators are expected within a week.

Palmer-Singer and Stoddard-Dayton, Philadelphia—The first of February will witness the removal of the Philadelphia Palmer-Singer and Stoddard-Dayton representatives to new buildings—the former at 336 North Broad street and the latter at 253-255 North Broad street. The "Courier," another Dayton product, has been added to the Stoddard-Dayton line.

Detroit Electric, Cleveland—L. L. and H. R. Applebaum have been appointed Cleveland agents for the Detroit Electric and have located in spacious salesrooms on Euclid avenue. Both are experienced business men and L. L. Applebaum has been connected with the Anderson Carriage Company, Detroit, makers of the Detroit Electric, for several years.

Sternberg Motor Trucks, Chicago—The Western Motor Car Company, of Chicago, has been selected as distributors in Chicago, northern Illinois and northern Indiana for the Sternberg motor trucks, manufactured by the Sternberg Mfg. Company, of Milwaukee. They are now building a $60,000 factory at West Allis, a manufacturing suburb.

American Locomotive Company, Chicago—A new building is to be erected for the Alco branch establishment on the corner of Michigan avenue and Twenty-fifth street. This will be a three-story building with a large sales and storage room for demonstrating and used cars. This branch will be in charge of B. C. Day.

New Milwaukee Quarters for Reo—The Curtis Automobile Company, Wisconsin agents for the Reo, has leased a three-story brick building under construction for its garage and salesrooms. The Reo headquarters have been situated at 180 Fifth street, Milwaukee, for several years.

Billy-Four, Washington, D. C.—Stanley P. Depew has acquired the agency in the District of Columbia for this car, which is a product of the McNabb Iron Works, of Atlanta, Ga. Business will be carried on in connection with the Washington Garage Company, Fourteenth and C streets.

Marmon, Pittsburg—The Keystone Automobile Company, of the East End, will handle the well-known Marmon car in addition to its regular lines, which include the Stoddard-Dayton, Welch, Velie, Columbus, Overland, Courier, and the Rapid motor trucks.

Hopewell, Newton, Mass.—On February 1 Hopewell Bros. will move from Cambridge to Northern Massachusetts, the factory at Cambridge proving inadequate to supply the demand. The new establishment has every facility for filling orders promptly.

Recent Baltimore Agencies—The following cars will be handled in Baltimore as follows: Matheson, E. L. Leinbach; Alco, Neeley & Emsor; Flanders, Dixon C. Walker Auto Company; Hudson, Zell Motor Car Company; Apperson, Boyd, Eastman Company.

Billings & Spencer, Detroit—Owing to an increase of business in the Middle West, this company will establish an office in Detroit with Clair L. Barnes, general sales manager, dividing his time between the factory offices at Hartford and Detroit.

Ohio "40," Pittsburg—The Park Automobile Company, which is composed of H. G. Knapp, J. C. Armor and A. G. C. Quay, and is located at 210-212 West Ohio street, North Side, has secured the agency for the new Ohio "40." The company has a storage capacity of forty cars in a fireproof garage.

Kissel Kar and Maxwell, Janesville, Wis.—The Baack-Reed-Gage Company, of Janesville, recently organized, will handle these two lines for 1910. The new garage is expected to be ready for occupancy on February 1.

Manhattan, Trenton, N. J.—C. B. Ackers has been appointed agent in this city for the Manhattan commercial cars, manufactured by the Mack Bros. Motor Car Co., of Allentown, Pa., which makes one and five-ton trucks and sight-seeing cars.

Parry, New York City—George H. Robertson, one of America's foremost racing drivers, has secured the New York agency for the Parry Automobile Company, of Indianapolis, Ind. He will be located on Broadway.

Mitchell Motor Car Company, Racine, Wis.—The new office building of the Mitchell Motor Car Company at Racine, Wis., is ready for occupancy and several departments are already using the new quarters.

Overland, Hartford, Conn.—E. H. Harris has taken the agency of the Overland which was recently relinquished by A. W. Peard, who introduced it in this section of the State two seasons ago.

Cole "30," Philadelphia—The Stoyle-Vogel Company, Broad and Race streets, Philadelphia, agents for the American, has rounded out its line by acquiring the local rights for the Cole "30."

Kissel Kar, Kenosha, Wis.—The Kent Motor Car Company, of Kenosha, Wis., organized several months ago to handle the Buick, has contracted for the Kissel Kar, made in Hartford, Wis.

Moon Agencies Established — The Moon car will be handled in Buffalo by Geo. G. Buse, in Cleveland by J. H. Greenwald, and in Lexington, Ky., by the Smith-Watkins Company.

Velie, Philadelphia—The Standard Motor Car Company, of 614 North Broad street, has just made a contract with the Velie Motor Car Company, of Moline, Ill., to handle the Velie.

E-M-F and Flanders, Pittsburg—The Pittsburg Automobile Company, Grant boulevard and Seventh avenue, has secured the agency for the E-M-F "30" and the Flanders "20" cars.

National, Detroit.—C. W. Sumner has secured the agency for the National car in Detroit and the State of Michigan. He is the manager of the Racine Boat & Automobile Company.

Franklin, Montreal, Quebec—The Wilson Automobile Company will represent all Franklin products, including pleasure and commercial cars.

Brownlee Auto Company, Austin, Tex.—This company has established a branch agency in Austin; the headquarters is located in San Antonio.

Hudson, Hartford, Conn.—George D. Knox has taken the Hudson for Hartford and Tolland counties, Connecticut.

Reo, Racine, Wis.—Jacob Stoffel has been appointed district agent for the Reo with F. Bosustow as his associate.

PERSONAL TRADE MENTION

Walter G. Pearson, former president of the Pearson Motor Supply Company, New York and Brooklyn, died on January 14 after a prolonged illness. Mr. Pearson was at one time editor and publisher of *Motor Car* and secretary of the Long Island Automobile Club during 1905-1907.

M. B. Fletcher has joined forces with the Premier Motor Car Company, Indi anapolis, Ind. He will act in the capacity of traveling representative for the company. Mr. Fletcher was previously identified with retail automobile trade in Denver, Colo., and has a wide acquaintance in the territory he will cover.

Oscar Stegman is now associated with Landau & Golden, consulting engineers, 1779 Broadway, New York, in the capacity of Western engineer. Mr. Stegman will be located in Milwaukee, Wis.

W. A. Webber, well known to the automobile trade, is now in charge of the Parry Boston Company, Inc., in Boston. He has established temporary headquarters at 2407 Columbus avenue.

Marcus Allen is now the sales manager of the Dorian Demountable Rim Company, 114 Liberty street, New York. He was formerly connected with the Empire Tire Company.

E. O. Wood has become identified with the General Motors Company, Flint, Mich., as assistant to W. C. Durant, chairman of the executive committee.

W. H. Schwartz has been elected sales manager of the Metz Company, manufacturers of automobiles, in Waltham, Mass.

EXCELSIOR SUPPLY STILL EXPANDING

CHICAGO, Jan. 17—An excess of business is gratifying, but sometimes it brings in its wake other things not so pleasant; thus, the necessity for opening a new branch with new ties to make, new friends to find out, and many other similar things. The Excelsior Supply Company, with headquarters at 237 Randolph street, this city, who have for some time carried on a huge supply business on the Pacific Coast, has now found this business so large that a Pacific branch has become a necessity.

So, to look after the interests in this territory, a branch of the Chicago establishment has just been opened with a full line of automobile supplies and Excelsior motor cycles. This will be in charge of T. A. Skinner, well known in the West as one of the Excelsior hustlers, with Frank W. Sanford as his right-hand man.

This centralizing of shipments and the maintenance of an elaborate stock will materially aid delivery both in time and expense. The stock carried will be the most complete line of automobile accessories carried west of Chicago and will run close second to the large supply houses of that city.

Making this a distributing point for the Excelsior Auto-Cycle will materially aid in meeting the demand for this machine on the Pacific coast which has, during the past year, been many times greater than it was possible to meet.

Special attention will be given to all lines of accessories manufactured or controlled by the Excelsior Supply Co.

SNOW REMOVAL BY MOTOR TRUCK

The work of removing the last fall of snow from the streets of New York furnished a striking example of the efficiency and earning capacity of the motor truck as compared with the horse-drawn vehicle. In order to expedite his task, Wm. N. Edwards, Commissioner of Street Cleaning, secured the services of a White 3-ton gasoline truck and put it to work side by side with the horse-drawn wagons so that the comparison between the two might be based on similar conditions of service.

The official figures of the Street Cleaning Department show that the White truck did at least four times the work of the ordinary two-horse truck. First of all, the motor truck carried 10 cubic yards of snow as compared with 5 cubic yards carried by the ordinary contractor's wagon, such as a brick cart. The motor truck was loaded at Union Square, made the trip to the dock at the foot of East Eighteenth street, was unloaded and returned to Union Square in an average of 40 minutes, while the best recorded time for a two-horse truck was 1 hour 20 minutes. The rate paid by the city was 36 cents a cubic yard, so that the White truck earned $7.20 while the best of its horse competitors was earning $1.80.

If the average performance of the two-horse truck was considered, the comparison in favor of the motor truck was even better. At frequent intervals horses would fall down and it was a matter of no small time and labor to get them on their feet again. Again, all of the teams traveled in a beaten track. If one team was delayed all those behind it were halted. The motor truck, under such conditions, would simply pull through the drifts at the side of the road and pass around the stalled teams. Furthermore, the efficiency of a two-horse truck gradually diminished as the day advanced, while that of the motor truck was unchanged. If it had been desired, the White truck would have kept in service for 24 hours a day, by employing another chauffeur, while the hours of service of the horses were necessarily limited by their physical strength.

MORE PLANTS IN INDIANA

INDIANAPOLIS, IND., Jan. 19—A number of new companies for the manufacture of automobiles and parts have been organized during the last few days, while there are said to be several others which will have their organization completed within a short time.

One of the most important recent organizations is that of the Standard Automobile Company at Wabash, which has an authorized capitalization of $500,000. A large number of business men are interested in it, the directors being G. J. Kobusch, W. S. McCall, A. R. Walton, W. B. Phelps and F. D. McMahan.

Another new company is the Diamond Automobile Company at South Bend, which has an authorized capitalization of $50,000. The directors of this concern are J. W. Ricketts, Hannah Ricketts and Grace C. Ricketts.

In this city, the Arthur B. Brown Manufacturing Company has been organized to manufacture tires. The company is composed of W. H. Coburn, F. H. Keller and P. A. Meek and has a capitalization of $10,000.

Another new local concern is the Haywood Tire & Equipment Company, which will do a general automobile and tire repair business. The company has an authorized capitalization of $6,000 and the directors are F. H. Rupert, M. Rupert and M. E. Haywood.

Approximately 35,000 automobiles will be made in Indiana this year, of which 20,000 will be made in this city.

RECENT INCORPORATIONS

Asbury Park Automobile Company, Asbury Park, N. J.—Incorporated with a capital stock of $50,000, by D. C. Haven, F. T. Weeden, W. C. Weeden and L. T. Croce, to manufacture automobiles and conduct a garage.

Wind Shield Manufacturing Company, Newark, N. J.—Incorporated with a capital stock of $100,000, by C. A. Metzger, R. H. Montgomery and R. M. Owen, to manufacture wind shields, automobile specialties, etc.

Maurer Garage Company, of Sheboygan, Wis.—Incorporated with a capitalization of $15,000, by Albert G. Maurer, William Casper and Fred C. Voigt, to conduct a large garage near the Hotel Foeste.

Lotz Auto Company, Detroit—Incorporated with a capital stock of $30,000, by J. A. Lotz, George Christianson, George Cooley and others, to manufacture three types of cars and a new rubber tire.

Alden-Sampson Manufacturing Company, Pittsfield, Mass.—Incorporated with a capital stock of $300,000, by L. E. Sampson and G. E. Mitchell, to engage in a general automobile business.

Hoosier Automobile Company, Garrett, Ind.—Incorporated with a capital stock of $80,000, by J. A. Moore, P. C. Little, J. B. Mager and others.

The Maurer Garage Co., Sheboygan, Wis.—Incorporated with a capital stock of $15,000, by Albert G. Maurer, William Casper and Fred C. Voigt, to conduct a garage.

The Swiss Magneto Company, Madison, Wis.—Incorporated with a capital stock of $20,000, by Bascom E. Clarke, James L. Clarke and E. F. Parkinson.

Connecticut Shock Absorber Company, Inc., Meriden, Conn.—With a capital stock of $110,000. Its purpose is to manufacture automobile devices.

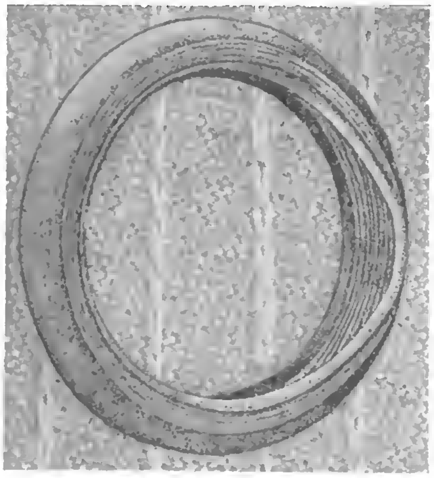
American Engine & Motor Company Dover, Del.—Incorporated with a capital stock of $1,000,000.

Reynolds Motor Car Company, Detroit—Incorporated with a capital stock of $40,000.

White Three-Ton Gasoline Truck Removing Snow in New York City

Information for Auto Users

Bragg Stitched Tires—Exceptional mileage records are claimed for the tires made by the Seamless Rubber Company, of New Haven, Conn., the construction of which is partially explained by the tire name. In the ordinary tire the layers of fabric are united solely by the rubber with which they are impregnated, being otherwise independent of each other. The Bragg Company claims that this is insufficient and that the layers are sure to work apart, thus weakening the tire and finally giving rise to a blow-out. In the Bragg tire the layers of fabric are united by rows of stitching around the circumference of the tread. The carcass of the tire thus becomes practically a solid piece. Twelve thousand stitches is the average number in a tire. The cut shows a Bragg tire in which the rows of stitching appear as lines, against a background of the stitched fabric, full size.

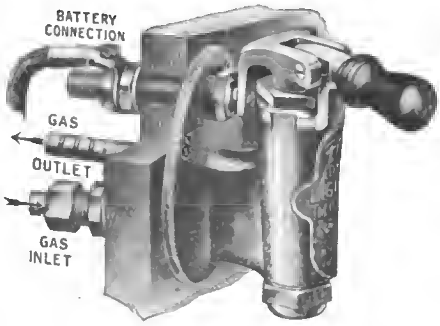


BRAGG TIRE WITH STITCHED FABRIC

The fabric used in the tire is woven of long fiber Sea Island cotton, impregnated between calendar rolls with the finest "up-river" Para rubber. Fabric so treated will not deteriorate as will fabric upon which an inferior grade of rubber is used. The tread is a rubber compound of especially good wearing qualities, to which is due the record of over 10,000 miles without re-treading. The process employed in curing is that known as the one-cure, wrapped tread process. There is no partial curing; the one-cure process assures a uniformity which cannot be obtained by any other method. No metal whatever comes in contact with the rubber of the tread, so that the life cannot be burned out, as may be the case with a mold-cured tire.

"Flash" Lamp Lighter—The greatest objection to acetylene headlights is the necessity of stopping the car and fussing with matches in order to light them. Several attempts have been made, with more or less success, to devise an electrical method of lighting them, and the latest in this line is the "Flash," made by the Motor Specialties Company, of Boston, Mass. The "Flash" is claimed to overcome all the objections cited against former devices of this sort.

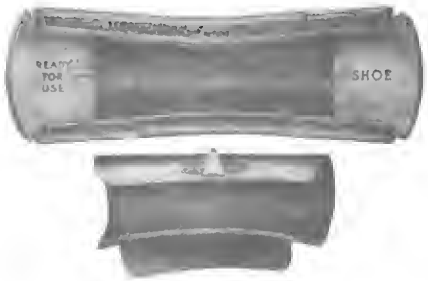
The most important part is the dashboard controller, which combines a gas valve and an electric contact, the timing



FLASH LAMP LIGHTER CONNECTIONS

being arranged so that sparks are brought to the burners before the gas appears at them. A single turn of the controller handle to the left closes the primary circuit through a special single-unit coil, inducing hot sparks at the burners. The same movement opens the gas valve. At the end of this movement the sparks are cut out and the lamps left lighted. A turn in the opposite direction extinguishes the lamps. Current is taken from the regular storage battery or from four dry cells. Regulation of gas pressure is accomplished by the needle valve on the tank, which may be any of the standard types.

Hagstrom Blowout Patch—This handy patch, which has found a good market among automobilists, has been improved for the coming season by the addition of a fabric flap, which passes under the bead of the tire. The patch goes on the inside of the show to be repaired, and is shaped to fit closely. On one side it has a sheet metal hook to fit under the bead. The fabric flap, which is the 1910

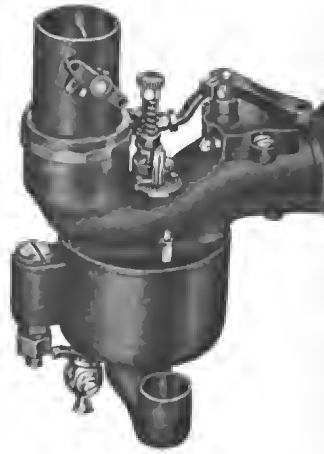


HAGSTROM BLOWOUT PATCH

improvement, is on the opposite side from the hook. The sleeve is applied directly under the blowout of rim-cut, with the hook on the rim-cut side or the side which appears to be the weaker. The flap assists the hook in holding down the worst blowout. It is claimed that old tires past the stage where re-treading would be profitable will still yield several hundred miles service when repaired with this patch.

The Hagstrom Brothers Manufacturing Company, of Lindsborg, Kan., which makes this patch, has also brought out a new soot-proof spark plug. A factory in Stockholm, Sweden, which for generations has been making the finest porcelain in Europe, will provide the insulators for this plug.

The "Siro" Carbureter—The essential feature of this carbureter is a reciprocal mechanism which controls the inflow of air and gasoline under all positions of the throttle. The "Siro" consists of a U-shaped mixing chamber, at one end of which is a throttle valve and at the other a mechanically-operated auxiliary air valve. These valves are so connected that when the throttle valve is being opened the auxiliary air valve also opens in exact proportion. At the bottom of the "U" is a main air inlet concentric with the float chamber, with the gasoline jet in its center. The jet is controlled by a needle valve interconnected with the throttle and the auxiliary air valve. The movement of the needle valve is affected by a cam, adjustable by a pointer on a dial.



THE SIRO CARBURETER

All the functions of the carbureter are thus controlled mechanically, there being no spring-operated valves. At a definite place in the opening of the throttle the needle valve lifts out of the nozzle to supply more fuel for the excess of inflowing air. This action is accomplished by a piece of glass-hard steel sliding up the surface of an inclined plane or cam, which is provided with an adjustment for advancing or retarding its position. The precise setting is determined once for all on any given motor. The adjustment of the carbureter is not subject to atmospheric or climatic conditions. All working parts are in blind bearings, preventing air leaks, and are made of bronze, fitted to gauges and interchangeable. The maker is the Siro Carbureter Company, Springfield, Mass.

"Beats All" Oiled Shirt—This garment has been placed on the market by the Standard Oiled Clothing Company, of 152d street and Tinton avenue, New York, to replace the rubber and gossamer shirts hitherto worn by automobilists. It is not subject to the action of gasoline or lubricating oil, and neither its appearance nor its durability suffer by contact with them. It is thoroughly waterproof and can be easily folded and stowed away, not being liable to cracking.

INDEX TO ADVERTISERS

(Continued on page 60)

IN this issue there are 92 Special Notice advertisers. Six hundred interesting lines of reading matter worth your careful perusal. Somebody wants to sell you a car. Another wants to buy a car. One wants a situation—maybe there is one who wants to employ you. Tires are advertised at a bargain—and you can find several who repair tires. Among the miscellaneous, there is paint and a patent for sale. One advertises for a partner and another wants capital to manufacture and market a new motor.

Correspond with some of the advertisers, or if you are in the field with something to sell, get in line with the others and send us your copy with remittance at rate of twenty cents per line (seven words make a line) and we will put your ad with the "92." For this twenty cents per line we carry your ad to over fifteen thousand subscribers weekly, which by a conservative estimate accepted by publishers generally, means over sixty thousand readers.

Address, THE AUTOMOBILE, 231-241 West Thirty-ninth Street, New York.

(Continued from page 58)

FOR SALE—New unit power plant, 4-cyl., 26-H.P. motor, multiple disc clutch, sliding gear transmission carbureter, coil and timer, muffler, gear-shifting levers, starting crank, $300. Address "Motor" care of The Automobile.

FORD OWNERS and dealers—Send for catalogue showing our outfits to convert any runabout into a handsome roadster; also Rumble and Surrey seats for "N. S. R. T.," enclosed fenders, dash hoods, folding hoods, glass fronts, oilers, magnetos and every part for these cars. Ask for Catalogue A. Write to-day. Auto Rebuilding Co., 1307 Wabash Ave., Chicago, Ill.

FOUR Fisk tires 36-in. x 4½-in. Four inner tubes 36-in. x 4½-in. Not used 125 miles. In fine shape. Rings, clamps and bolts for same. Will be shipped boxed C. O. D. privilege of examination to best offer. Send bids to H. B., 21 Hermon St., Worcester, Mass.

GENTLEMEN'S mink-lined coat, with elegant Persian lamb collar; outside English broadcloth; cost $175; will sell $35; never used; pair beautiful cinnamon bear robes, $30, cost $160; ladies' fur coat, $30. Call or write. J. Roberts, 104 West 114th St., New York.

GUARANTEED TIRES.

36x4½ Anti Diamond	$40.00
34x4½ Anti Diamond	35.00
30x3 Clincher Diamond	12.00
880x120 Hartford Midgeley	50.00
36x4½ Goodrich Bailey	30.00

Coleman's Polar Oils, non-carbonizing, zero test. Write for price list. Ten new Remy high-tension magnetos, with coils, at $35.00; 10,000 Standard and Metric new Wico Spark Plugs at 32 cents. Wm. R. Coleman, 1409 Broadway, New York. Telephone, 3001 Murray Hill.

ONE-CYLINDER Rambler Engine, new, complete, with transmission, radiator, hood, etc., $75 cash. A. R. Co., 1307 Wabash Ave., Chicago.

RADIATORS, hoods, mud guards, metal dishes, gasoline and water tanks. If building or remodeling a car, it will pay you to write us, as we lead in this line. Auto Sheet Metal Works, 2230 Michigan Ave., Chicago, Ill.

RUMBLE SEATS $10 each, Surrey Seats $20 each; Fenders with mat and brass-bound running board, $12 set. Cash with order. A. R. Co., 1309 Wabash Ave., Chicago.

RUMBLE and Surrey Seats made for any car. Name car and send for catalogue. A. R. Co., 1309 Wabash Ave., Chicago.

SECOND-HAND TIRES. Big stock. All sizes. Illinois Tire Co., 3111 Michigan Ave., Chicago, Ill.

STARTER successfully in use on motor car; automatic action, operated by foot lever; applicable to any gas engine for automobile; motor boat or stationary work; compact; demonstration given to interested manufacturers. Licenses issued on reasonable terms. J. W. Tudor, 35 Congress St., Boston, Mass.

TIRE SALE EXTRAORDINARY—All brand new stock. Must sell; mail orders filled, subject to prior sale. Not the kind usually advertised.

Size	Shoe	Tube	Size	Shoe	Tube
32x4	$16.00	$3.75	28x3½	$7.50	$2.00
34x4	18.00	4.00	28x3	9.00	2.25
34x4½	19.00	4.00	30x3	10.00	2.50
34x5	18.00	4.00	30x3½	13.00	3.00
36x3½	12.00	3.00	32x3½	15.00	....
36x4	16.00	4.00	34x2½	12.00	....
36x4½	16.00	4.00	30x4	....	3.50

36x5............$16.00; $4.00.

A. H. Kasner, Oldest Tire Dealer in U. S., 152 Church St., New York City, near Chambers St.

TRUSTEE'S SALE.
Stock of the Gearless Motor Car Co., consisting of five and seven-passenger bodies, frames, radiators, lamps, gas tanks, dashes, springs, wheels and sundry parts at sacrifice sale. Write for quotations. W. H. H. Rogers, Trustee, Rochester, N. Y.

WE HAVE on hand a full line of new and second-hand tubes at low prices. We sell and supply all makes of solid and pneumatic tires. Tire repairs our specialty. Chicago Tire Repair Co., Michigan Blvd., at 35th St., Chicago. 'Phone, Douglas 4592.

2-CYLINDER opposed motors, 5x5 A. C., with trans., $63.00; 5x5 W. C., $60.00; 5x6, with trans., $70.00; 4x4 A. C., $40.00; 4-cylinder A. C., $75.00; 1-cylinder Olds, $35.00; 2-cylinder, 5x5 Rambler, $65.00; planetary trans., $18.00; selective type, with levers, $45.00; new ball-bearing axles, $30.00 per set; chain drive, $35.00; shaft drive, $35.00; new 28x3 wheels, $12.00 per set; 32x3½, with tires and tubes, $90.00; 34x4, with tires and tubes, $94.00; 30x3, with solid rubber tires, $55.00; ¾ elliptic springs, 40 in. long, $2.25; scroll top, $3.50; fenders, per set, $8.00; pressed steel frames, 34x120, with sub-frame, $15; others, $10.00; brass hood radiators, $22.00; locking steering gears, $10.00; complete, $15.00; second-hand carburetor, $2.50; 3-cylinder coils, $7.00; 4-cylinder, $8.50; 6-cylinder, $14.00; 5-passenger upholstered body, $40.00; Thomas body, $50.00; tops, $15.00; wind shields, brass bound, $10.00; upholstered seats, iron for top, $20.00; gas lamps, $7.00 per pair; generator, $5.00; tires, 28x3, $9.50; 30x3½, $13.00; 32x3½, $15.00; 34x4, $18.00; 36x4, $21.00; tire chains, 30x3, $3.50; 32x3½, $4.25; 34x4, $4.90; 34x4 inner tubes, $5.50; 34x4½, $6.25; 36x5, $6.70; tool kits, $3.10 per set; worth $6.50; 8-in. hack saw blades, 30c. per doz.; 9-in. hack saw blades, 40c. per doz; Ideal fire extinguishers, 75c. each; combination plyers, N. P., 25c.; 6-in. Stillson wrenches, 55c.; 8-in. Stillson wrenches, 67c.; thirty-eight only auto clocks, with brass stand, $2.00 each; trunk racks, $2.00 each. Get our No. 65 list. Auto Parts Co., 517 W. Jackson Boul., Chicago, Ill.

$20.00—New 4-cyl. Splitdorf Dash Coil.
22.50—Now 22-25 H. P. Radiator and Hood.
35.00—60 H. P. Radiator and Hood.
7.00—4-Feed Kinsey Force Feed Oiler.
10.00—6-Feed Kinsey Force Feed Oiler.
2.50—15 and 20 Gal. Gasoline Tanks.
3.00—Mufflers.
1.00—Each Quick Detachable Rims.
.50—Each 34x4, 34x4½ and 30x3 Clincher Rims.
15.00—Set Hartford Shock Absorbers.
10.00—Set 4 Wheels with Clincher Rims 30x3½, New, Less Hubs.
These are all highest class accessories. Send for complete list. I. L. Breakstone, 1712 Michigan Ave., Chicago, Ill.

Situations Wanted

CHAUFFEUR-MECHANIC, years' experience and best of references, would like position as demonstrator; would consider first-class driving job; go anywhere. Address "M. P.," care The Automobile.

FIRST-CLASS chauffeur-mechanic, eleven years' experience, desires position as demonstrator with reliable firm, or first-class private position. Address "B. M.," care The Automobile.

TO AUTOMOBILE FIRMS and manufacturers—Wanted position as salesman and demonstrator with automobile firm; best of English experience and references. Driven in all competitions. Apply G. N., care of The Automobile.

WANTED—Opportunity to learn driving and repairing automobiles, with view of buying business or interest in, if satisfactory; well versed in mechanical work. Address E. D., care The Automobile.

YOUNG man, American, thoroughly trained in manufacturing, shop systems and economics, having had several years' experience in the production of automobiles, desires to secure a position as production manager or works accountant. Address "James," care The Automobile.

Help Wanted

AUTOMOBILE oil salesman wanted, familiar with garage trade. Only good men need apply. "L. N. T.," care The Automobile.

INTEND opening branch automobile factory in Indiana; will require heads of departments, assistants, foremen, etc. Address York Motor Car Co., York, Pa.

WANTED—Salesmen and garage keepers to handle second-hand cars in every city of over 3,000 inhabitants. Address Box 87, care The Automobile.

WANTED—By a company manufacturing automobiles, a thoroughly competent and experienced man as head inspector of assembling and testing room. R. F. Ayers, 66 West Broadway, New York City.

Repairing

RADIATORS repaired by experts. Ship to us and follow with letter. A. R. Co., 1307 Wabash Ave., Chicago.

SEND US BROKEN CYLINDERS, crank-cases, etc., to be repaired by autogenous welding. Quicker and much cheaper than ordering replacement parts. No charge unless weld is successful. Estimates and references given. Remember we repair any broken metal parts without solder, pressure or brazing. Try us. Waterbury Welding Company, Waterbury, Conn.

TIRES REPAIRED—Automobile owners, do you want your tires repaired or re-covered by the people who know how? Give us a trial and be convinced. Inner tubes vulcanized at short notice. Jungkind & Vogler, 158 Chambers St., New York City. Telephone 3386 Cortlandt.

Garages For Sale or For Rent

A WELL established automobile business and repair garage for sale; chance for a live mechanic; good terms to proper party; should have some capital; best reasons for selling. Apply L., The Automobile.

CHOICE PLOT, 50x100, in West 47th St., with building, suitable for automobile garage; must positively be sold to partition estate. McDonald, 269 W. 45th St., New York.

FOR SALE—Garage located in the Shenandoah Valley, at Winchester, Va., on the New York-Atlanta Highway; good business location for hotel or printing company. N. A. Cooper, Winchester, Va.

WE HAVE a few choice offices left on the second and third floor of our downtown branch wholesale store, 1327 Race St., most desirable for branch offices of automobile accessory manufacturers. Address Keystone Lubricating Co., 20th and Allegheny Ave., Philadelphia, Pa.

Auto Schools

INDIVIDUAL road work. Small group classes. Day and evening in four or eight weeks' courses. Provision for out of town men. Booklet and pass to visit school on request. West Side Y. M. C. A. Automobile School, 310 West 57th St., New York City. Telephone 3800 Columbus.

THE STEWART Automobile Academy, 231 West 54th St., New York: best equipped motoring school in city; up-to-date motors, chassis and ignition systems; educated, practical instructors; for owners, prospective owners, women; separate courses for chauffeurs; modern cars for road work. Telephone 5409 Columbus.

Insurance

FIRE, THEFT, liability, collision, accident, property damage, and transportation fully covered, lowest rates. Colman Company, 165 Broadway, New York. 'Phone, Cortlandt 2409.

Miscellaneous

AEROPLANE—Mechanical engineer of wide experience desires to communicate with manufacturer interested in aeronautics, that would be willing to undertake the building of an aeroplane possessing great merits; metallic construction; greater speeds and lifting power and automatic equilibrium. Address "M. O. F.," care The Automobile.

FOR SALE—A valuable patent, shock eliminator and eradicator; it is positively simple and absolutely makes riding a pleasure; owner of this patent being a private party has not the time or facility to manufacture same; will sell it outright or on a royalty; prefer hearing from some manufacturer or those connected with automobile trade. Address "Patent," care The Automobile.

PARTNERS WANTED—I have an established, proven business paying $20 to $25 a week now; no competition; excellent chance for ground floor; $1,500 to $2,000 cash insures an equal share in profits which will double income. Apply Box 98, care The Automobile.

(Continued on page 61)

THE AUTOMOBILE

DETROIT SHOW OPENED UNDER AUSPICES of DETROIT DEALERS' ASSOCIATION

DETROIT, Jan. 26—Wayne Hotel Gardens on Monday evening, when the Detroit Show opened, presented a scene of activity which has been described as fully representative of the automobile situation in general as it obtains at the heart of the automobile industry. The Detroit Automobile Dealers' Association is the moving spirit in this demonstration in a large way, and it has proven by the results already realized that the 33,000 square feet of available space in the Garden is far from half enough for the purpose.

When the scheme of decoration greeted the eyes of the spectators last year the sentiments voiced were in substance that the last word was said. Sculptor Wagner evidently failed to consider last year's effort in the light of finality, for in all truth the decorative scheme this year is a pronounced, artistic innovation. In a word, the decorative idea comprises a Venetian Garden for the lower floor, and trellis-work through which is entwined Southern smilax, and in harmony with this artistic atmosphere, a myriad of canary birds in golden cages which are placed haphazard, as it were, completes the plan.

View Taken at Opening Time Showing Confusion

Approach to the upper floor is by means of a grand stairway, flanked at its base by two figures of "The Motor Girl" in heroic size, sharing the pleasant task of holding a silken banner between them, indicating the way to the hall above. As the visitor arrives at the head of the grand stairway, "Science," and "Labor" as represented by appropriate statuary extend greeting, and a little further on a graceful arch supports a scroll upon which is blazoned the single word "Progress" brought into bold relief by the proper use of electric lights. The seal of the D. A. D. A. occupies space upon the hangings at the rear of the platform, and the effect from the art point of view is appropriately completed by a trellis-like arrangement of white ropes, scattered through which are mammoth roses and a myriad of electric lights.

Despite the Herculean task, the Garden was in excellent presence on Monday night, agreeable to the scheduled time of opening, and the committee in charge is to be congratulated for having thus disposed of the work in hand. Much of the credit for the excellent work done must necessarily be sub-divided, but Manager John Gillespie, who labored indefatigably from the instant he was chosen for the position, maintained unswerving interest, and displayed an adequate measure of ingenuity resulting in the mastery of each of the intricate problems.

President George E. Lane, Secretary Robert K. Davis, Treasurer J. H. Brady, and Directors George Grand and John P. Schneider, each in his own way worked untiringly in the cause, and as pioneers in the Detroit arena occupy positions of distinction. That the show will prove to be a fitting success, is now well assured, and in view of this splendid effort on the part of Detroit's most capable automobile enthusiasts, it may not be out of place to digress for a pace, and by some prosaic means at hand indicate in a fair measure the material backing which is behind the committee. As representative of the Detroit automobile industry alone, the Detroit show would be one of stupendous proportions. During the coming year it is estimated that Detroit will build half of the country's automobile product.

Some Exhibitors Were Shrewd Enough to Get In Early

Looking through the mist which obscures the real situation, rather than to be dazzled by the extreme splendor of the automobiles which are on parade at the Detroit Show, discloses a situation of the greatest magnitude, and makes comprehension play the part of a dwarf. If some one phase of the great main story is spread out, it may be that it will retain enough of simplicity to enable one to grasp it, and that it will glisten on the polished surfaces of the plate of imagination, and leave the individual in pleasant reverie, is the main expectation. In the building of 100,000 automobiles, which is Detroit's estimate, besides the structures, real estate on which to plant them, and the what-not demanded, there are machine tools—the last of them would span a mile if strung out, after the 90 per cent are disposed of.

REFLECTING THE MACHINE TOOL SITUATION

To build 100,000 automobiles in a single year, requires the dextrous use of the following list of machine tools during a period of 3,000 hours, which is 300 working days of ten hours each.

ROLL OF HONOR

Cars	Represented by
American	Montgomery Sales Company
American Simplex	Grant Brothers
Anhut	Anhut-Robinson Auto Sales Company
Babcock Electric	Seidler & Miner Auto Company
Baker Electric	J. P. Schneider
Brush	Brush Runabout Company
Buick	Buick Motor Company
Cadillac	Cadillac Motor Car Company
Cartercar	Cartercar Company
Chalmers-Detroit	Grant Brothers
Demot	Harper-Aldrich Auto Company
De Tamble	Neil-Kitchell Motor Sales Company
Detroit Electric	Anderson Carriage Company
Detroit-Dearborn	Detroit-Dearborn Motor Company
Elmore	Fee-Bock Auto Company
E-M-F	Cunningham Auto Company
Everitt	Security Auto Company
Flanders	Cunningham Auto Company
Ford	Ford Motor Company
Grabowsky	Auto Commercial Company
Haynes	Broadway Auto Company
Herreshoff	Herreshoff Motor Company
Hudson	J. H. Brady Auto Sales Company
Hupmobile	R. W. Keeler
Jackson	Seidler & Miner Auto Company
Keystone	Detroit Motor Sales Company
KisselKar	P. W. Schulte Garage Company
K-R-I-T	Gilmour & Fear Auto Company
Lambert	J. B. McIntosh Company
Lozier	Lozier-Detroit Sales Company
Maxwell	Maxwell-Briscoe-McLeod Company
Metz	Metz Plan Company

Number of Units	Types of Tools Required
333	28" Gisholt lathes.
666	24" Gisholt lathes.
666	21" Gisholt lathes.
9,990	14" x 6' engine lathes.
3,960	18" x 8' engine lathes.
1,332	20" x 10' engine lathes.
666	24" x 12' engine lathes.
333	28" x 14' engine lathes.
666	30" x 14' engine lathes.
333	36" x 18' engine lathes.
333	40" Bullard mills.
999	horizontal boring machines.
666	cylinder boring machines.
999	No. 5 Becker-Brainard vertical millers.
999	No. 6 Becker-Brainard vertical millers.
666	72" Becker-Brainard horizontal millers.
3,996	No. 2 Cincinnati millers.
666	No. 2 Cincinnati millers.
1,998	Cincinnati hand millers.

666	Special crankshaft machines.
2,664	30" radial drills.
1,334	48" radial drills.
3,996	vertical drill presses.
3,333	sensitive drills.
1,998	12" x 40" universal grinders.
2,664	Pratt & Whitney screw machines (1-2 x 18).
1,998	Pratt & Whitney screw machines (1 x 12).
1,332	Pratt & Whitney screw machines (5-8 x 6).
1,322	Brown & Sharpe automatic screw machines (1 x 10).
1,332	Jones & Lamson L. H. screw machines.
666	flexible grinders.
1,998	14" flexible grinders.
100	sand blast equipments.
666	compressed air riveters.
1,332	compressed air riveters.
1,000	miscellaneous small and special tools.
60,355	Machine tools of all kinds.

POWER REQUIRED AND COST PER ANNUM

Considering 60,000 machine tools as being the requirement in the process of making 100,000 automobiles, this means that a power plant will have to be available, capable of delivering 120,000 horsepower, which, per year, is worth, or better yet, will cost $3,600,000, the same to be divisioned off in labor, coal, oil, waste and supplies. This power plant will be at an enormous first cost for buildings, boilers, engines, auxiliaries and dynamos. In the distribution of the power to the machine tools, if an electrical system is utilized, the motors will foot up to $10,800,000, which valuation does not include fittings and installing.

ROLL OF HONOR

Cars	Represented by
Michigan	Michigan Steam Motor Company
Mitchell	Gilmour & Fear Auto Company
Oakland	Michigan Motor Sales Company
Oldsmobile	Olds Motor Works
Overland	Fee-Bock Auto Company
Packard	Standard Auto Company
Paige-Detroit	Detroit Motor Sales Company
Palmer-Singer	Bemb Auto Sales Company
Parry	Neil-Kitchell Motor Sales Company
Paterson	W. A. Paterson Company
Peerless	J. H. Brady Auto Sales Company
Pierce-Arrow	J. P. Schneider
Pope-Hartford	J. H. Brady Auto Sales Company
Rapid	Rapid Motor Vehicle Company
Rauch & Lang	W. F. V. Neumann
Regal	Regal Auto Sales Company
Reo	Gillespie Auto Sales Company
Stanley	Auto Commercial Company
Stearns	Palmer Auto Company
Stevens-Duryea	J. P. Schneider
Stoddard-Dayton	W. F. V. Neumann
Studebaker	Cunningham Auto Company
Templeton-Dubrie	Templeton-Dubrie Auto Company
Thomas	Gillespie Auto Sales Company
Van Dyke	Van Dyke Construction Company
Warren-Detroit	Detroit Motor Sales Company
Welch-Detroit	Welch-Detroit Auto Company
Welch-Pontiac	Michigan Motor Sales Company
White	Postal & Doherty Company
Whiting	Flint Wagon Works
Winton	Winton Motor Carriage Company
Woods Electric	Fee-Bock Auto Company

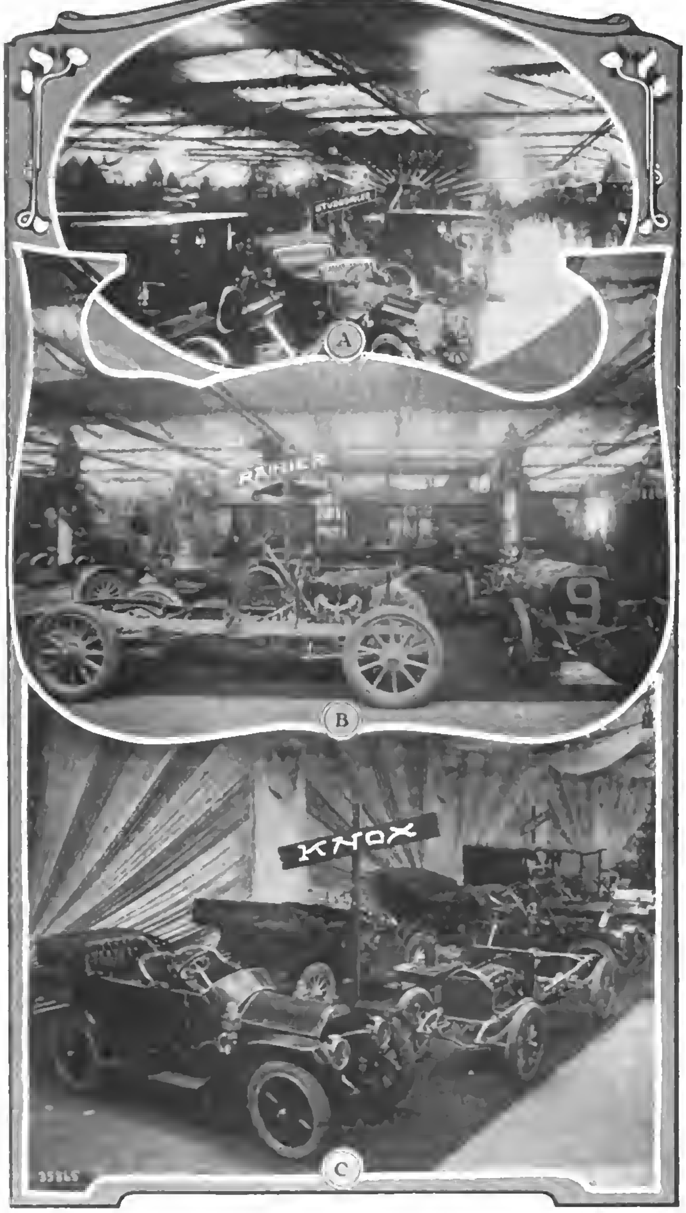
In a general way, not counting pennies, the summary of this cost including machine tools, shafting, belting, electric motors, power plant, and the one hundred and one things which were not mentioned, will foot up to the enormous sum of $84,755,000. Real estate, buildings and kindred costs are not included. This total includes the cost of running the power plant for the year, and, adding depreciation to this, which will be 10 per cent. of the cost of the equipment less the cost of operation, the amount which will have to be charged against the automobiles as "overhead" on account of machine tools, power, depreciation and like factors, will be $11,715,500, or $117 per automobile.

That this view is far from the whole story, is proven by the mere statement that interest on the investment has not been referred to. This item alone, on a 6 per cent. basis, would be $4,866,930, which is $48.66 per automobile produced. Let us not pursue this trend further; as it stands, it is an insight into the vastness of the automobile industry as it obtains in Detroit. In reading about, or glancing over the automobiles at the show, it will add some to the interest, it is believed, to realize that the coming of the automobile has brought prosperity into a host of homes, for, as will be readily appreciated, labor enters into the machine tools, power plant, electrical equipment and the many other things, as well as into the production of the automobiles while they are being made. Let us end by saying that the man who buys an automobile puts bread into the mouths of the children of the men who work in the mines, railroad the materials, and build the machine tools as well as those who make the automobiles, and in this way, according to competent estimates, $500,000,000 in round numbers, change hands per year, and that, too, on the puny basis on which the automobile now rests, puny, it is said, which is in the light of a future of which the show at Detroit is as a cuckoo egg in a robin's nest.

Fixing Up the Exhibit of One of Detroit's Finest

In Detroit the natives claim that it is to be the dominant center in the building of automobiles in the future as it seems to be at the present time. The city offers every inducement to trade, and from the details of the latest acquisition it looks as if Detroit is to have another million dollar automobile plant, as a result of negotiations that were completed to-day. Official confirmation of the announcement in these columns some weeks ago that the Lozier Motor Company would establish a plant in Detroit is made by President Harry Lozier, who is there to attend the local show and also for the purpose of arranging the final details in what will mean the addition of another immense plant to the local motor colony.

A Partial Vista of the Complete Interior Shows Beauty



A—View of the second week of the Philadelphia automobile show, with the Studebaker exhibit occupying the foreground

B—Rainier exhibit, with a chassis and the No. 9 racer which scored at Brighton Beach last Summer in the 24-hour races

C—Knox chassis, also showing the latest idea in body work of this veteran Bay Stater, following the torpedo style

EXHIBITORS AT PHILADELPHIA, SECOND WEEK

Gasoline Pleasure Vehicle Section

Autocar	Autocar Company.
Cole	Stoyle-Vogel Auto Company.
E-M-F	E-M-F and Flanders Agency.
Empire	Motor Supplies Company.
Flanders	E-M-F and Flanders Agency.
Halladay	Krause Motor Car Company.
Haynes	Haynes Automobile Company.
Imperial	Imperial Auto Company.
Kline Kar	B. C. K. Motor Car Company.
Knox	North Philadelphia Auto Station.
Otto	Otto Gas Engine Works.
Pullman	Longstreth Motor Car Company.
Rainier	Collings Carriage Company.
Springfield	Springfield Motor Car Company.
Studebaker	Studebaker Brothers Company.

Quaker City Show

PHILADELPHIA, Jan. 26—The double-show idea certainly works wonders in providing adequate space for an excessive number of exhibitors, but it also makes trouble for the unfortunate showmen who are forced to clear out one set of cars and install another in the 36-hour interval. Hardly had the first week come to an end at 11 o'clock Saturday night when a hundred khaki-clad laborers entered upon the scene and began their task. First it was necessary to move out the original exhibits; then the spaces must be rearranged and the signs changed, and finally the gathering of pleasure cars, commercials, electrics, and accessories which make up the last half had to be installed.

Fourteen exhibitors of pleasure cars form the nucleus of the second installment. Four electric pleasure cars will be on hand, and eight commercial cars, part gasoline and some electric. Three motorcycle exhibits and twenty-five or so of tires, oil and other accessories will fill up the gaps. This week will witness the official debut here of the Flanders, Halladay, Empire, Otto, Springfield and Cole, Detroit electric, Crane & Breed, Martin, and Packard commercial vehicles, not to mention the reappearance of the Rainier, after two years' absence.

Last week's show was greatly handicapped by the weather, which could not have been worse if it had been especially prepared with a view to keeping everyone indoors. Snow, rain, sleet and slush were supreme for four of the six days. On Wednesday there was a temporary let-up, and then the crowd poured into the Armory in such numbers as to create a new attendance record. Thursday was a "dollar day," which fact, with a few more exhibitions of assorted bad weather, kept the crowd down; but that was the best business day of the week.

It is from a business standpoint that the first week will go down in the records of the Trade Association, whatever the box office figures may be. All of the thirty exhibitors who were doing business last week scored liberally in the matter of sales. Maxwell, Ford, Locomobile, Mitchell, Studebaker and other concerns which use Philadelphia as a distributing center reported a surprisingly large number of cars actually sold, as well as cars placed with the agents. The present week promises to be equally good in this respect.

Of the several local productions which naturally occupy the center of the stage, the only one to make its appearance at the first week was the Bergdoll "30," built by the Bergdoll Motor Car Company. This is a light four-cylinder car fitted, on order, with either touring, baby tonneau or runabout bodies. The motor cylinders are in a block casting, and are 4 inches bore by 4 1-2 inches stroke. Inlet valves, of generous dimensions, are in the centers of the cylinder heads, with exhaust valves in pockets at the left side. The crankshaft, very short and stiff, is carried on two ball bearings.

Motor, clutch and change-gear are all united in a single unit, the crankshaft being formed with a rear extension which surrounds the flywheel and meets a similar extension from the gear case. The clutch is a multiple disc, and the change-gear a three-speed selective, in which a good feature is the milling of the main shaft to form four splines. This motor unit is mounted on a running gear of 112 inches wheelbase, with 34 by 3 1-2-inch tires. Final drive is by a shaft enclosed in a torsion tube, with a single universal joint. A taxicab will be built on the same chassis, the only change of note being the use of 32 by 4-inch tires.

Two more native sons will come in for their share of attention this week, these being the Kline Kar and the Otto. The

Opened Second Section

Kline Kar, which, to be accurate, hails from York, Pa., made its appearance sufficiently early in the season to become quite well known. Two models of pleasure cars are made, a four and a six. Both have cylinders of 4 3-32 inches bore by 5-inch stroke, cast separately. The individual castings, however, are made with large core openings in the front and back of the water-jackets, and are bolted together with these openings registering, to form a continuous chamber for the water. The front of the first and the rear of the last cylinder are, of course, closed by plates. The appearance of the whole is that of a block casting.

For the rest the cars follow standard design. A cone clutch, three-speed selective gear, with annular ball bearings and an enclosed shaft with a single universal joint, complete the transmission of power. The rear axle is semi-floating, also with ball bearings, and the front axle is an I-beam.

The four-cylinder model, rated at 26.8 horsepower by the A. L. A. M. formula, has a 109-inch wheelbase with 34 by 3 1-2-inch tires. The six-cylinder, rated at 40.2 horsepower, is mounted on a 122-inch wheelbase, with 36 by 4-inch tires. For those who desire a speed car, a model known as the "Meteor" has been brought out, in which the six-cylinder motor is mounted on a shorter chassis, with a racing body.

This company also has a light commercial car, which can be fitted with either a stake truck, an express, delivery or wagonette body. The motor is a two-cylinder horizontal opposed, water-cooled by thermo-siphon circulation, and drives through a two-speed planetary gear and side chains. The standard wheelbase is 86 inches, and the tires are 36 by 3-inch solid.

The Otto Gas Engine Works, a firm known all over the country for the excellence of its stationary engines, has entered the automobile field with a four-cylinder car of medium size, which seems likely to still further increase its reputation. The motor follows the very latest practice in having a slightly longer bore in proportion to its stroke than is customary, the figures being 4 3-8 by 5 1-4 inches. Cylinders are cast in pairs, with all valves on the left side. A true honeycomb radiator, with fan, and a centrifugal pump mounted on the right side of the motor, take care of the cooling. The Bosch dual ignition system is used, the magneto being driven from the rear end of the pump shaft. The motor and its accessories are mounted on a sub-frame hung from the front and middle cross-pieces of the main frame.

The change-gear, a three-speed selective, is made a unit with the rear axle. The torsion tube which encloses the drive shaft is supported from the frame cross-member at its forward end by an original linkage, which has the effect of a ball or universal joint, allowing it to swing in any direction, while at the same time it is positively held, and all strains are taken off the drive shaft. In addition the rear axle is provided with two radius rods.

The Otto is made in three styles, a full tonneau, baby tonneau and runabout, with tires 34 by 4, 32 by 3 1-2 and 34 by 3 1-2, respectively. The weights average about 2,000 pounds. The wheelbase on all is 123 inches. The cars are all hung low, and this, combined with their long wheelbase, gives them a rakish appearance whicb many autoists find attractive.

Although Philadelphia has never claimed to be in the front rank as an automobile building city, especially now that outputs are rated in the thousands and tens of thousands, nevertheless, the old Quaker City has no reason to be ashamed of its product. With the addition of these newcomers it will attain still further prominence in the automobile world.

D—Novel rear axle construction of the Waverley electric, in which the drive is by a shaft parallel to the axle itself

E—Haynes stand, with a stripped chassis in the foreground, and touring models disposed about as a scenic setting

F—Commercial car brought out by Crane & Breed, a newcomer to the trade; a Curtiss aeroplane appears overhead

EXHIBITORS AT PHILADELPHIA, SECOND WEEK

Commercial Vehicle Section

Autocar	Autocar Company.
Commercial	Commercial Truck Company
Crane & Breed	Collings Carriage Company.
Kline Kar	B. C. K. Motor Car Company.
Knox	North Philadelphia Auto Station.
Manhattan	Mack Bros. Motor Car Company.
Martin	Martin Carriage Company.
Packard	Packard Motor Car Company.
Studebaker	Studebaker Brothers Company.

Electric Vehicle Section

Detroit	J. C. Parker & Son Company.
Studebaker	Studebaker Brothers Company
Waverley	Collings Carriage Company.
Woods	J. C. Bartlett.

LICENSED ASSOCIATION FAST ASSUMING DUE PROPORTIONS

FOREIGNERS TAKING OUT LICENSES UNDER SELDEN PATENT

MANY MAKERS STRUGGLING WITH A COMPLICATED SITUATION

THE latest understanding in relation to licensed relations of the various companies is reflected in the licensing of the Lancia Import Company, under a special form of contract, to import and sell automobiles in the United States.

From present appearances, considering the most authentic information available, it seems that the A. L. A. M. proposes to be liberal in its dealings with companies which can show that they are responsible, and especially if they have vested rights. The newcomers, however, seem to be anxious to know just where they are at, and, from all that can be learned, this is the question of the hour.

To sum up, taking the situation as it can reasonably stand discussion of, the makers of automobiles in America who were actually engaged in the manufacture of cars when the court decision was rendered, have nothing to fear for the future, excepting that they have to make terms; that the terms will be liberal and just is assured. Importers, if they were actually engaged in the trade before the date of the decision, will be able to make terms just as the Lancia concern has succeeded in doing.

Those who are shivering on the outside, and are likely to have a little trouble in getting near the stove, are, according to the evidences, makers of automobiles who went into the business after the famous court decision was handed down, disregarding all the attending facts. This will be especially true, unless they can show that they are in for the good of the automobile business as a whole.

GLIDDEN TROPHY MAY NOT BE ABANDONED

NEW YORK, Jan. 27—These are busy times for Chairman S. M. Butler of the A. A. A., due to the shower of protests which are reaching the Contest Board, following some preliminary discussion having for its purport the elimination of the Glidden Trophy from the acreage of contest. The meeting of the Board on the 25th instant, which numbers in its membership David Beecroft of Chicago, F. B. Stevens of Rome, N. Y., T. A. Wright of Wilkes-Barre, Pa., and Joseph H. Woods of Newark, collaborating with Chairman Butler.

The meeting of the Board seems to have been rather protracted, and the principal matter of discussion was, first, as to the expediency of any further effort involved in the Glidden Trophy. The consensus of opinion being that it would be ill advised to abandon the trophy at this time in view of the wide interest which is taken in it by the makers, the public at large and automobile drivers and owners in general.

Conceding that the trophy will be contested for, the next matter of great importance and knotty characteristics lies in the selection of the route. While this is a matter which cannot well be settled off hand, and which may demand the sending out of a "path finder," it is nevertheless likely to fall to a Southwestern orbid. The meeting adjourned without having taken definite action on either of the questions, but the sentiment seems to be in favor of a run of a reliability tone which will start from Cincinnati and take in Memphis, Tenn., Dallas, Tex., and Oklahoma, ending at Chicago. The fear has been expressed that many of the roads which might be included in this circuit are quite impossible to any sort of vehicles, and a pathfinder may have a stout task in front of it in the process of surveying the boundaries of the route.

NEW CONCERN FORMED OUT OF BROWN-LIPE

The Brown-Lipe-Chapin Company, with a capitalization of $1,500,000, has been organized in Syracuse, N. Y., to take over the differential gear department of the Brown-Lipe Gear Company. C. S. Mott, of the Weston-Mott Company, Flint, Mich., is the only stockholder not in the parent corporation. During the past two years the present plant of the Brown-Lipe Gear Company has been worked day and night with 825 employees. The increasing demand made it necessary to separate the differential gear department from the transmission and steering gear department to provide sufficient room for the latter.

The business of the new company will be managed by H. W. Chapin, who for the past fifteen years has been general manager of the Brown-Lipe Gear Company. He will retain this position in addition to his new one. The new company will assume all of the differential gear contracts of the parent, and all the machinery and equipment used by the latter in this branch will be turned over.

REDUCED R. R. RATES TO CHICAGO

The Central Passenger Association will grant the rate of one-and-a-half fare to visitors to the Chicago show on account of the A. A. A. Convention. Ticket agents will issue certificates for this purpose, which will be validated at the headquarters of the A. A. A. in Chicago. They will be good only provided one thousand or more are presented. Membership in the association is not essential.

CLEVELAND ALSO BOOKS TWO SHOWS

CLEVELAND, Jan. 25—With the exception of a small amount of gallery space, the entire floor of Central Armory has been allotted to prospective exhibitors at the show to be held during the week of February 19 by the Cleveland Automobile Show Company. A great demand has also been manifested for space in the second show, to be held during the week of March 5. This exhibition will be conducted by the Cleveland Automobile Club, also in Central Armory.

SUBSCRIPTIONS — NATIONAL CONVENTION

The latest revised list of the paid-in subscriptions to the National Convention fund of the A. A. A. as reported by Charles Thaddeus Terry, chairman, shows a keen interest on the part of the clubs, as the following list indicates:

Name of subscriber.	Amount of subscription.
Automobile Club of Buffalo	$500.00
Quaker City Motor Club	100.00
Pennsylvania Motor Federation	250.00
Springfield Automobile Club	200.00
Automobile Club of Southern California	125.00
Albany Automobile Club	50.00
Oliver Crosby (individual subscription)	25.00
Automobile Club of Pittsburg	50.00
Automobile Club of Hudson County (N. J.)	100.00
Automobile Club of Auburn	150.00
New Jersey Automobile and Motor Club	200.00
Atlanta Automobile Association	200.00
Associated Automobile Clubs of New Jersey	100.00
Denver Motor Club	50.00
Long Island Motor Club	300.00
Automobile Club of Philadelphia	250.00
Delaware Automobile Association	50.00

AUTHENTIC FIGURES OF AUTOMOBILE PRODUCTION

INTEREST seems to center in forecasts of the automobile production for the season of 1909-1910, partly because of the general interest which is taken in the industry, and for the rest—in view of the known facts—automobiles are undoubtedly being turned out at an enormous rate. The chart here given was made under the direction of Alfred Reeves, General Manager of the A. L. A. M., and it is the net result of a very careful canvass of the whole situation within the confines of the licensed association. Just what number of cars should be added, considering unlicensed builders, is a matter which will have to be left to conjecture.

At all events, a brief statement of facts, based on this chart, is extremely interesting, the figures being as follows:

PERCENTAGE PRODUCTION OF AUTOMOBILES SINCE 1905

Years.	Percentage.
1904 over 1903	80
1905 over 1904	51
1906 over 1905	41
1907 over 1906	18
1908 over 1907	17
1909 over 1908	139

Authentic figures on the production of motor cars during 1909 have been compiled by the Association of Licensed Automobile Manufacturers, and show a startling increase over the production of 1908. The figures indicate that the licensees under the Selden patent alone made 94,891 cars. This is believed to be about 85 per cent. of the cars made. The compilers have added to these figures 20,000 cars as the product of the outsiders, making a total production for 1909 of 114,891 cars—far in excess of what was indicated six months ago, when it was declared that 80,000 cars would be made.

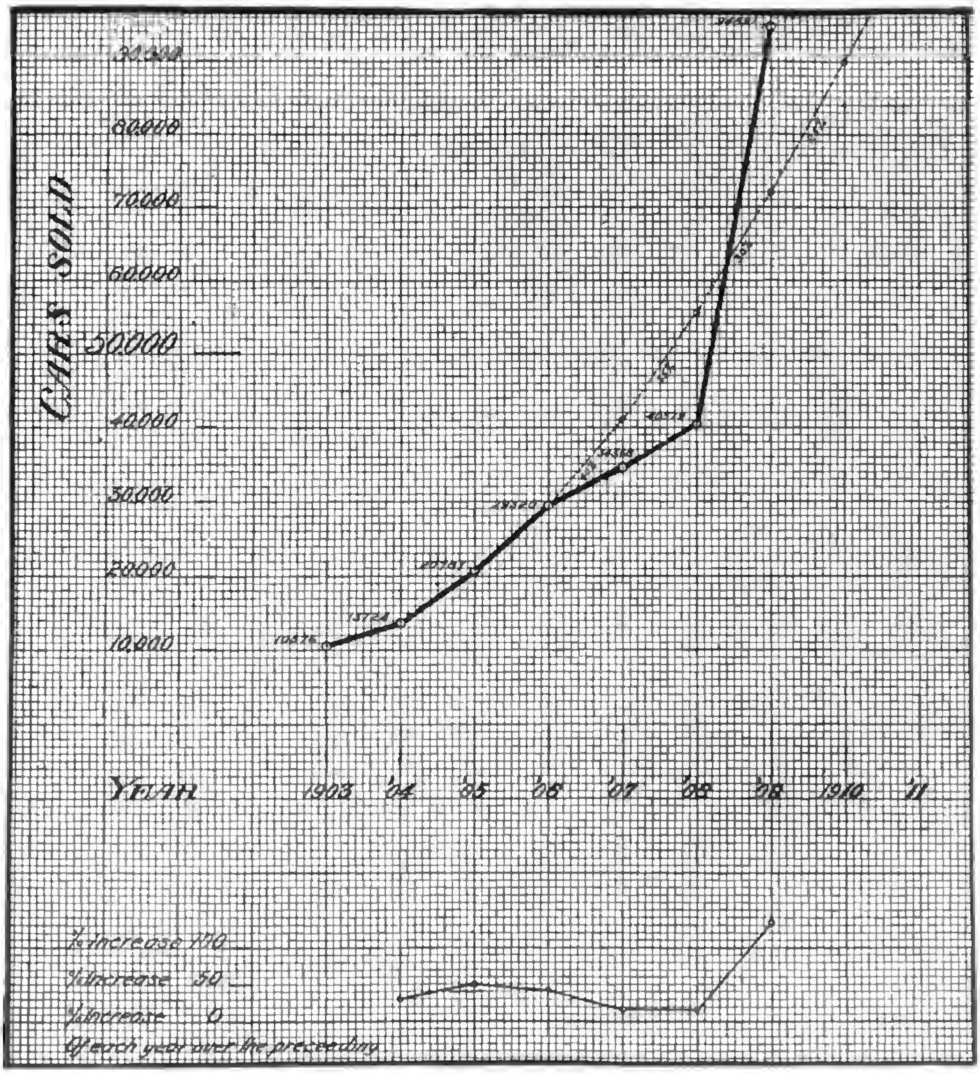
The figures indicate very clearly that production has reached a point that warrants at least a careful look into the future by the makers. There is nothing on the business horizon now to indicate that the present year will be anything but a prosperous one for the motor-car builders; yet the figures shown on the accompanying chart, prepared and issued by the A. L. A. M., are worthy of the deepest thought.

Prior to the decision sustaining the Selden patent last September, the business of the motor-car builders was divided about half in the Selden camp and half among the outsiders; but since the decision and the application and granting of licenses to a score or more additional makers the licensed product amounts to not less than 85 per cent. of the total business, and includes the cars of almost every concern of standing. All the Selden patent licensees conduct their business independently of the others and in strict competition.

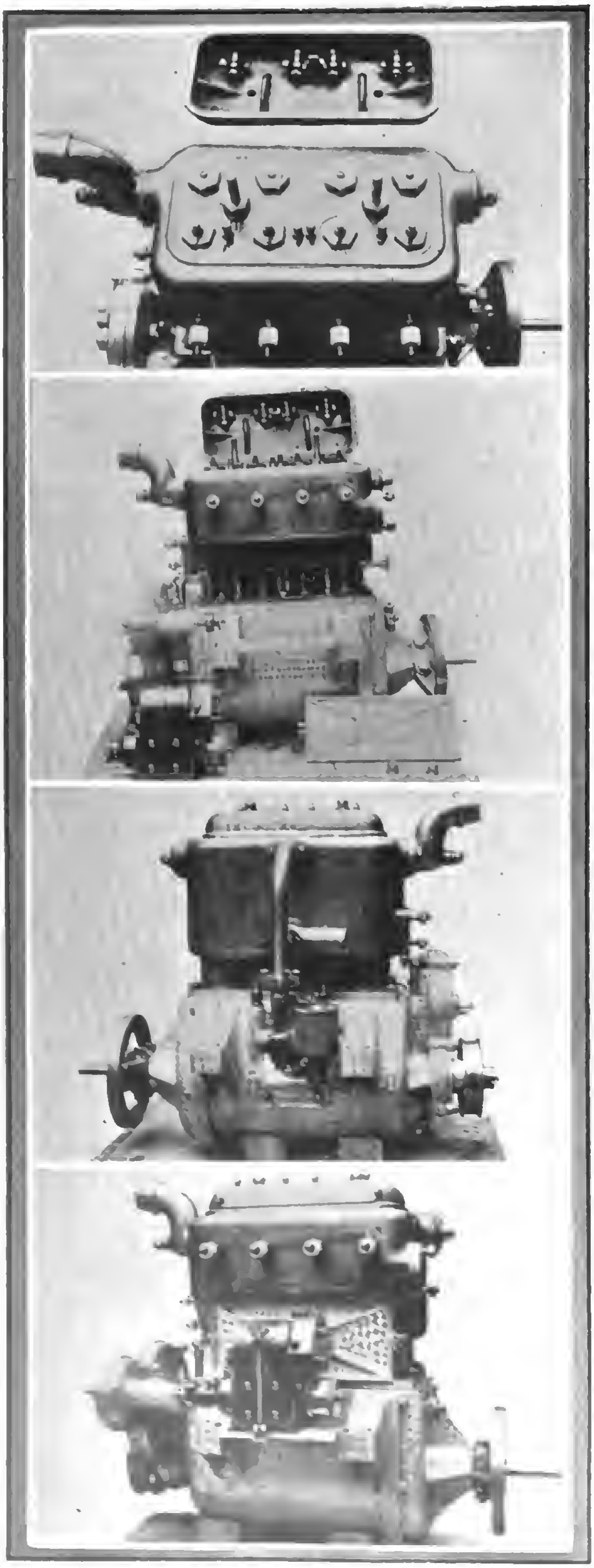
All attempts thus far to arrive at anything like accurate statistics which would reflect the magnitude of the automobile industry were rendered futile by the competition which was in evidence when partisans, in the interest of their cars, made bold to proclaim the number which they would build. Watering stock has been reduced to a science, but watering the figures of some of the estimators became so troublesome as to be rendered impotent. To illustrate how uncertain some of these guesses really are, it is pointed out that in an estimate which was made last year one well-known company said it would build 1,500 automobiles and another well-known company said it would turn out 5,000 cars. The company which said it would build 1,500 automobiles made good, and had a little margin to spare, but the company which said it would build 5,000 cars reached the magnificent figure of 80 cars by dint of hard labor.

This uncertainty is present in all estimates of the number of automobiles which will be turned out, to a sufficient extent when the situation is carefully canvassed by a competent statistician, provided he is in touch with the source of information and is perfectly familiar with the character of the work in hand. One way which has been tried with some success is to check all the statements of the makers of cars against all the statements of the makers of accessories and thereby strike a balance.

This method of arriving at an approximation of the extent of the industry has been tried out at some length, and it served very well to bolster up the contention that this year is a large one in the automobile business, and that most conservative estimates are just a little conservative. The chart here produced reflects the whole situation with much accuracy.



Number of Cars Made by Selden Patent Licensees During 1903-1909, as Estimated by A. L. A. M.



Showing How the Overhead Inlet Valves Are Operated
Details of the Monobloc Engine Valve Mechanism
Illustrates the Compactness of This Form of Engine
Magneto and Valve Side of the New Engine

A GOOD EXAMPLE OF MODERN TENDENCY

PARIS, Jan. 18—A good example of modern tendency in motor construction is to be found in a monobloc production by Chapuis & Dornier, a French firm building motors exclusively for the trade. The greatest demand in Europe at the present moment is for low-powered four-cylinder motors, as small, as light, and as silent as possible. The overall length of motors has been cut down in a remarkable degree since the introduction of the monobloc method of casting, and the limit appeared to be in the valves. With a single camshaft and eight valves in a pocket all on one side it was not the size of the engine bearings which proved an obstacle, but the valves, if these were to be of sufficient size to allow of adequate feeding of the motor. It was possible to superimpose them, by working the inlets from rocker arms, and maintaining a single camshaft, but this is not a solution that appealed to the constructor, for the user desires a motor that has no visible working parts, that looks, indeed, like a metal box with a few pipes and four plugs attached.

The Chapuis & Dornier solution is to employ a single camshaft, with exhausts operated from below and intakes immediately above operated by a special type of overhead mechanism. This design allows the cylinders to be placed as close together as possible compatible with a safe amount of metal in the walls. The thickness of the wall between the cylinders is 5 millimeters, and as a central bearing is not employed the overall cylinder length of a motor of 2 9-10 inches bore is only 15 inches. The four cylinders being responsible for almost 12 inches of this, the remaining 3 inches give the necessary amount for metal in the walls and for water jacketing at each end. The total overall length—from tip to tip of the crankshaft—is practically twenty-eight inches.

With good castings the makers declare that an engine of these dimensions will furnish adequate power without any danger of warping. The short length of the crankshaft makes a central bearing unnecessary, thus doing away with the difficulty of lining up a three-bearing crankshaft, and at the same time leaving an ample bearing for the connecting rod ends. By superimposing the valves it is possible to obtain a very large area, the diameter of the valves on this motor being a little more than half the bore of the cylinders. On of the disadvantages of the many monobloc motors has been the small area of the valves, resulting in a perpetual starving of the cylinders. There is nothing of particular note about the exhaust valve mechanism. The intake is operated from above, but instead of the vertical push rods being external, they pass through the pocket, in which they are guided at two points, and project above the cylinder head. The rocker arms are mounted on the inner face of an aluminum housing secured to the cylinder head by nuts fitting on two projecting bolts. One end of the rocker receives the pushrod, while the other fits on the extremity of the projecting inlet valve stem. The vertical push rod is provided with means for taking up any play which may be produced.

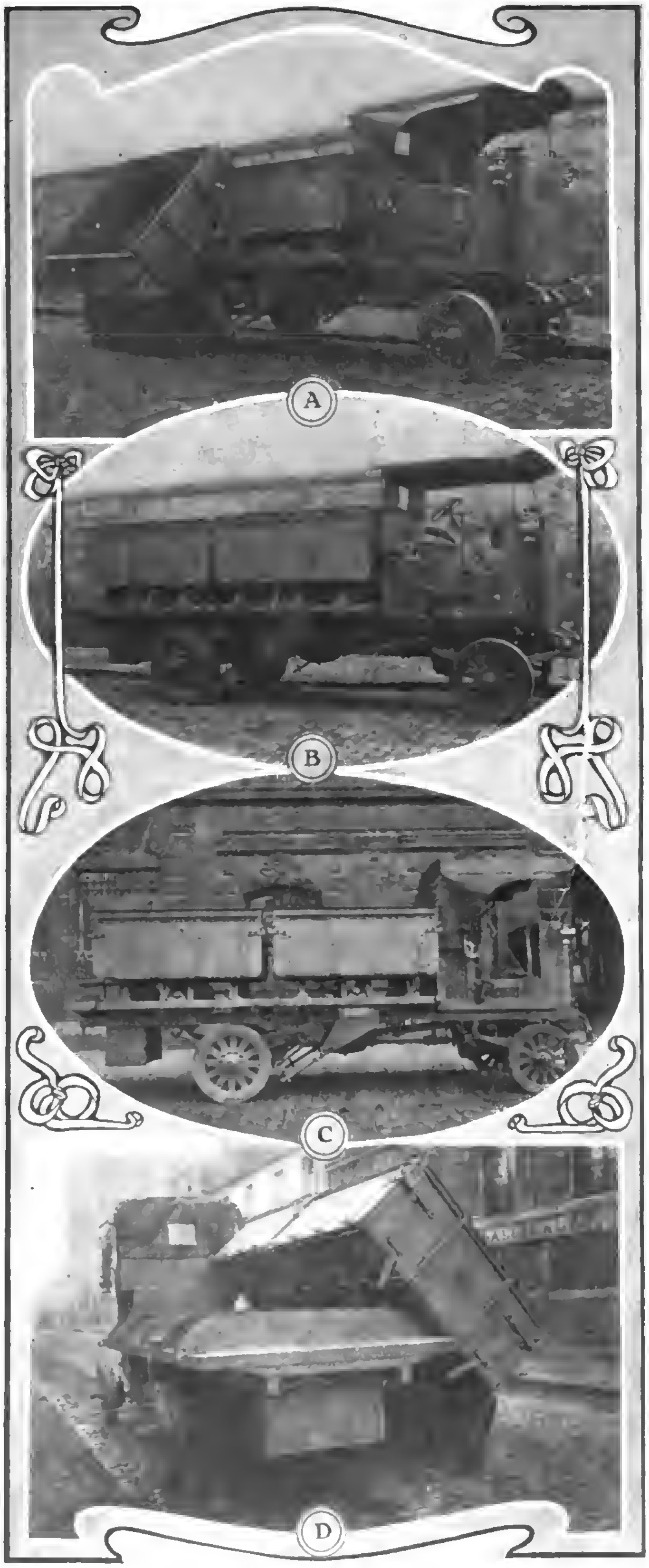
In addition to carrying the rocker arms, the cover completely encloses the cylinder head and hides from view all moving parts. As the valve stems are enclosed by an aluminum plate secured by a couple of thumb screws, there is no moving part visible excepting the extremities of the mainshaft. The plugs are carried in the side of the engine, between the inlet and exhaust valves, and on the same side as the magneto, thus necessitating very short leads. Water cooling is by thermo-siphon circulation, the space around the cylinders being adequate and inlet and outlet pipes of very large diameter.

The feature of the crankcase is that it is entirely of one piece with the exception of the end plate stoutly bolted in position. It is claimed for this design that there is an increase of strength compared with the usual type of base split longitudinally. Naturally it prevents leakage of oil, for it is easy to make the single joint oil tight, but it is not possible to inspect the connecting rod ends without taking down the motor. Timing gears are enclosed in an aluminum housing at the forward end, and merely consist of three pinions, the main one, on the crankshaft, having an elastic mounting to prevent "chattering" of the pinions on quick changes in the speed of the motor. The gudgeon pin also is mounted with a couple of special spring washers giving the necessary slight lateral play but without any objectionable metal-to-metal rattle. The carbureter. is carried on the right-hand side of the motor, with a single lead to the intake manifold cast with the cylinders and warmed by the circulating water. Normally lubrication is by splash, and with this object in view as much metal as possible has been left on the upper face of the crankcase, and the opening is further closed by a baffle plate allowing the connecting rod to pass with an easy fit, but preventing the passing of an excessive quantity of oil. The end of the crankshaft is provided for the fitting of a lubricating pump if desired. Three models are built of respectively 2 9-10 by 4 7-10 bore and stroke; 2 7-10 by 4 7-10, and 2 1-2 by 4 3-10. It will be noticed that in all cases the ratio of stroke to bore is high.

After nearly two years' exhaustive tests, the Panhard-Levassor Company has decided that the sliding valve motor invented by Charles Y. Knight, of Chicago, has made good its claims and can be produced with the guarantee of the Avenue d'Ivry factory. During the past six months several of these motors have been on the road fitted to cars owned by private members of the firm. The first series will be produced, in all probability, about June next, and will be of a very limited nature. Unless the motor acts quite differently in the hands of private owners from what it has done when driven by the experts, a large series will be built for the 1911 season. The cars at present on the road are declared to have a rating of 15 horsepower, but as they are capable of averaging 45 miles an hour on French roads, with a closed body and four passengers, this rating can certainly be taken as extremely conservative. It is very improbable that the Panhard-Levassor Company will build all their models with the Knight engine, as has been done by the Daimler Company in England, but will fit it to the larger models of respectively 15 and 25 horsepower, both with shaft drive. The only other Continental firm at present building the Knight motor is Minerva, in Belgium. Mercedes has secured the rights in Germany, but does not yet appear to have made a move.

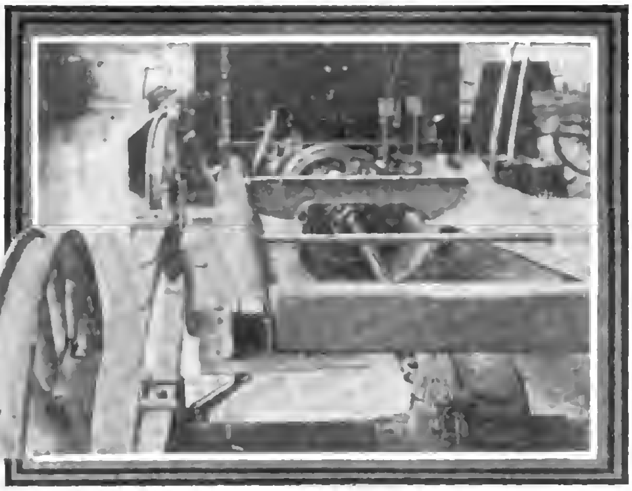
Power vehicles have played an important part in the construction of the Paris underground electric railway, but up to the present have always been of the steam variety. The latest type, to be adopted for this work is a tip wagon driven by a Cohendet, a two-cylinder vertical motor of 5 3-5 inches bore and stroke. The power plant seems small in comparison with the work that has to be done, but as the vehicles constantly deliver 5-ton loads from the boring in the city to the suburbs or the river wharf, it would appear to be sufficient. The motor is carried forward, under the driver's feet, and low down to secure a perfectly horizontal drive to the gear box and countershaft. Four speeds and reverse are provided, and final drive is by side chains.

As a truck of this nature can never expect to receive tender treatment, there is a big margin of safety in all the organs. Solid rubber tires have had to be discarded for reasons of economy, in favor of metal bands, with springs, however, made specially long, and shock absorbers fitted in order to protect the mechanical organs as much as possible. Even the radiator has been abolished as too fragile an organ for this class of work, and its place taken by a very large water tank with condenser. The tip wagons are all metal, mounted on rails, and capable of being tipped either left or right by hand-operated gearing. These vehicles show the great care with which the French constructors design and build specially for every class of work.



Cohendet Double Tip Wagon Operated in Paris
The Two Hoppers Easily Accommodate Five Tons of Earth
Showing Substantial Construction of Steel-Shod Wheels
Hoppers May Be Tipped Either Together or Singly

As so much of the labor in their factories is hand work, which is relatively cheap here, they can do this to much better advantage than the American constructors. In cases like the present instance, the system of individual construction produces vehicles of remarkable efficiency in service.

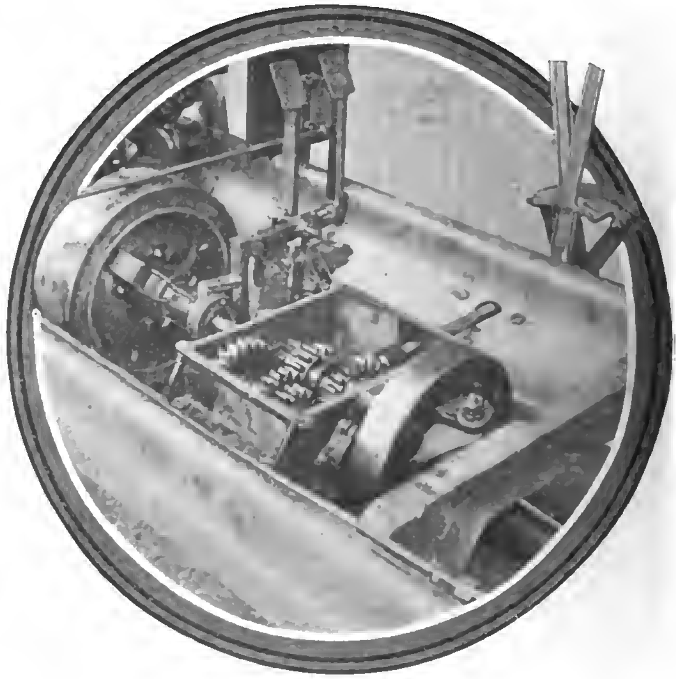


Appearance of the New Darracq from the Rear.

EXTREME SIMPLICITY FEATURE *of* DARRACQ

PARIS, Jan. 19—At a time when good automobiles are far from being the exclusive production of any one firm, more than ordinary interest attaches to a car which even causes constructors to sit up and take note. The new Darracq can claim to have created more than a mild sensation on the European market, for it is a four-cylinder car of 14 nominal and 19 actual horsepower, sold complete with touring body at only a fraction over a thousand dollars. The secret of the low price lies in a simplified and labor saving design, rather than in an unusually large series, though, of course, it is believed that the new production will figure well on the sales lists. Its first success has been on the English market, where the requirements are a medium-powered touring car as simple, silent, speedy and cheap as it is possible to make it.

Extreme simplicity is indeed the outstanding feature of the Darracq chassis. It is so clean cut, indeed, in comparison with the average chassis, that the first impression is that the vehicle is not complete. But if organs have been suppressed it is only because they are useless, and their abolition would entail a decrease in weight, the use of less material, a saving of labor in fitting, and a cheapening of the cost of maintenance. For instance, the frame members have been redesigned to lessen labor in assembling. The section is an inverted U, stamped out complete with dumb irons and an inswept portion forming an integral subframe for the motor and gear box, or, in other words, allowing the motor and gear box to be mounted direct to the frame without the use of side arms. All the labor necessary on the chassis proper is the placing in position and riveting of three cross members, also of inverted U section, one at each end and one in the center. Add to this a sheet-metal underpan, rivetted to the extremities of the inswept frame members, and the constructor has, in addition to a rigid frame, a structure on which all the mechanical organs are fully protected from dust and mud. The pan is pierced in one place only, for the passage of the oil plug in the base of the crank chamber. The inswept portions of the side members are pierced in three places only, for the passage of the drag link on the steering gear, the change speed and brake connections and the exhaust pipe. In passing it is worth mentioning that the exhaust pipe is the shortest ever fitted to a touring car. From the exhaust manifold cast with the cylinders, a short straight length of pipe passes directly into the exhaust box immediately below on the underside of the frame. It is only a detail, but it is sufficient to show how everything has been worked out with a view to simplicity. An additional advantage of this type of frame, which is a production of the well-known Arbel establishment, is that the body work is brought fully four inches lower than would otherwise be possible. It does not rest on the highest portion of the frame member, but on the two flanges.



Central Part of Chassis, Showing Transmission and Control.

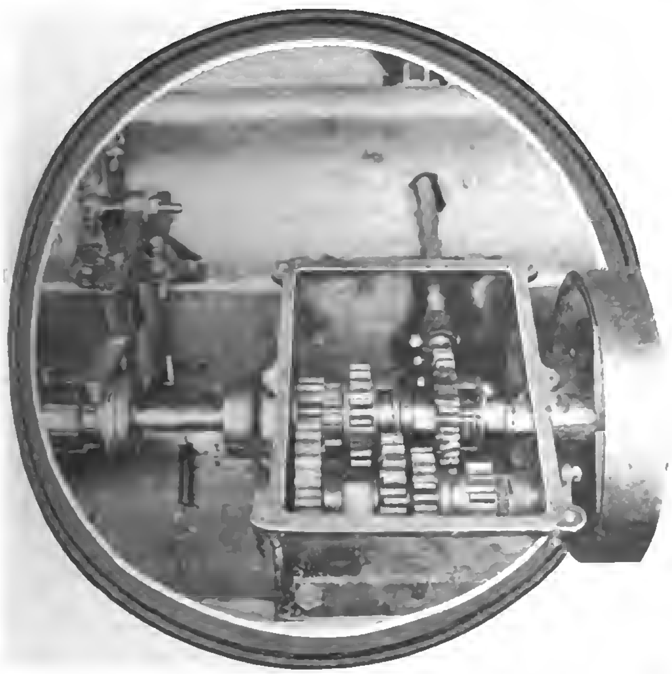
Valve Side of Engine, Showing Exhaust and Carbureter.

The motor is a four-cylinder in one casting, valves all on one side, intake and exhaust manifolds cast integral with the cylinders, and the latter ribbed for cooling. Cylinder dimensions are 3.3 bore by 3.9 stroke. Piping is reduced to a minimum. The exhaust, as already explained, is a twelve-inch length without a bend in it. The intake is just as simple, consisting of a short vertical tube, the upper end of which screws into the intake manifold and the lower end fits round the vertical jet. Throttling is done at the upper end of the tube, and at the same point is an automatic additional air inlet. The feature is one that first made its appearance on the 1908 Charron, but has since been adopted with detail modifications by a number of leading makers.

The water pump is retained, contrary to the more general tendency on medium powered European cars, the constructors being of the opinion that the slightly increased complication is more than paid for by the decrease in the size of the radiator and the weight of water carried. The pump is of the centrifugal type worked off the same pinion as the high-tension Bosch magneto. The timing gears thus resolve themselves into three pinions only, all enclosed at the forward end of the motor. A ventilator fan is carried, driven by flat belt off the main shaft.

The feature of the motor is undoubtedly the lubrication, which is of the forced feed type, but without any visible pipes, and without any dashboard fitting suggestive of oiling. The lower portion of the crankcase forms an oil reservoir, the filler—and at the same time breather—which is on the right-hand side of the motor, the driver's only care is to keep a sufficient quantity of oil in this tank. This is made easy by placing in the oil reservoir a balanced wood float, to which is attached a vertical rod projecting through the cap of the breather and filler. The length of spindle showing above the filler cap is indicative of the amount of oil in the case.

The oil pump is contained within the crankcase, and is operated by an eccentric on the camshaft, the lubricant being forced to all the main bearings, while the connecting rod ends are lubricated by splash from a shallow trough in which a constant level is maintained, the overflow returning to the oil well in the base of the chamber. The working of the pump can be verified by a tap



Closer View of Transmission, Showing Gear Sizes.

on the upper portion of the crankcase, and the piston of the pump can be withdrawn through the plug in the chamber.

The clutch is of the cone type, with springs behind the leather, and is in no way distinctive except by reason of the ease of dismounting. The gear box gives three speeds and reverse through a gate change. Owing to the form of the chassis only very short arms are necessary to attach the gear box to the frame members. An interesting detail is that the gear shifter is mounted on the shaft operating the foot brake at the rear of the gear box. The feature of the rear axle is the entire absence of a torque stay, this work being performed by the three-quarter elliptic springs, the seatings of which are made stronger in view of this work. Control is entirely on the throttle, through a foot accelerator, the sparking point being fixed. The dashboard is perfectly clear. There being no lubricator or pressure indicators to verify, the car is a remarkably easy one to handle. The first series of vehicles now being produced consists of open touring cars with five-passenger body. It is declared that the same model will be used for taxicab service, and that an order for 3,000 of these vehicles is now in hand to be sent to India.

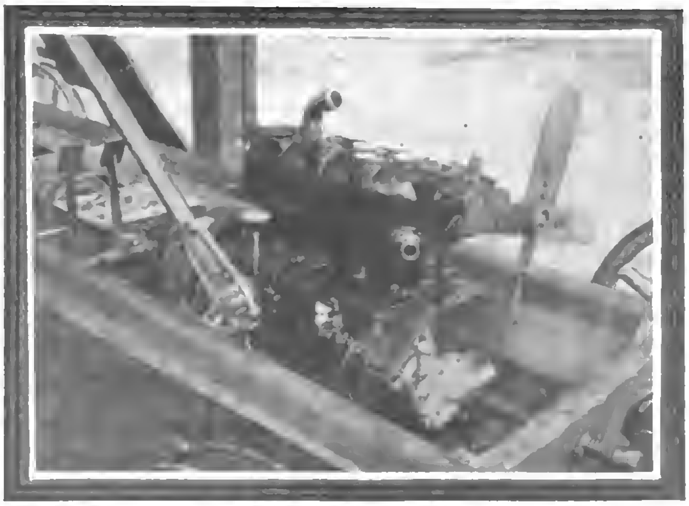
Complete Chassis, As Viewed from the Front.

SHIPMENT BY TRUCK—LONDON TO PARIS

Paris, Jan. 20—The first attempt to compete with railroads in the matter of international transportation of goods has been made by the firm of Waring & Gillow, furniture dealers having establishments in London and Paris. The ordinary method is to ship goods by rail and steamer, closed vans, capable of being slung from truck to train and from train to steamer, always being employed when a full load is available. As there was a considerable amount of traffic between the London and the Paris houses, and it frequently fell to the firm to make large removals, the experiment was tried of shipping by auto.

After loading at the London house the driver of the three-ton truck covered the 80 miles separating the British capital from New Haven, and there ran the vehicle on board the cross-Channel steamer under its own power. On landing at Dieppe there were custom formalities, naturally, but with the aid of the triptyque system and the facilities which can be established when a regular service has been organized, this should not occasion any delay.

In the matter of time the automobile service is a distinct advance on the railway, for it is possible to leave London with a full load in the morning and deliver in Paris on the evening of the following day. By the ordinary method three days would certainly be necessary. At present it costs a little more to transfer goods by automobile instead of by rail. With a well-developed service, however, the cost can be brought down so low as to compete very favorably with the railway, while if account is taken of the lessened risk of breakage, there is a decided advantage in favor of the automobile. Although the present service is only between London and Paris, it is planned to extend it later to include all good roads radiating from London.

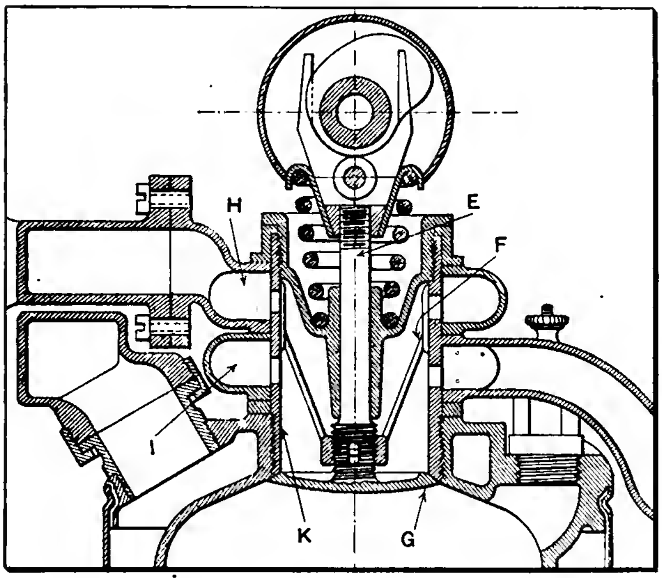


Magneto Side of New Darracq Block Engine.

NOTES OF UP-TO-DATE PRACTICE IN EUROPE

FOREIGN practice, in a way the progenitor of the American. offers many suggestions to the wide-awake engineer. However, as the perusal of the representative English, French and German magazines consumes more time than a busy man would devote to this subject, THE AUTOMOBILE will endeavor to summarize in each issue a number of examples taken from foreign exchanges. Care will be taken to give the name and date of the magazine quoted, in order that it may be possible to refer to the original source for additional information.

Combined Inlet and Exhaust Valve—Palous & Beuse have brought out an extremely simple four-cylinder aeronautic motor, which is described in *Der Motorwagen,* December 10. The most distinguishing feature is the use of a single valve for the inlet and exhaust in each cylinder, driven by an overhead camshaft.



Palous & Beuse Combined Inlet and Exhaust Valve

In the head of each cylinder is a single valve port, normally closed by the valve G. The valve cage K, screwed into the cylinder head, has two circumferential rows of holes, the lower for the exhaust and the upper for the inlet. These holes are opened or closed by a sleeve F attached to the valve stem. The camshaft has for each cylinder a single cam of an unusual profile. The upper end of the valve stem has threaded directly on it a yoke encircling the shaft, to prevent rotation of the stem, and also carrying the roller upon which the cam bears. For the exhaust the cam presses the valve down about 6 mm., opening the valve proper and bringing the lower edge of the sleeve F down to the row of holes for the exhaust. At the end of the exhaust stroke a further downward movement causes the sleeve to cover the exhaust holes and open those of the inlet. Finally, the valve returns sharply to its seat.

Objections to this valve are easy to find; the sudden return to its seat from a lift of three-quarters of an inch must make a noisy engine and at the same time have a destructive effect on the valve itself. It will be noted that during this return, at the end of the inlet stroke, the exhaust valve is momentarily opened.

Comparison of Worm and Bevel Drives—In view of the widespread use of the worm gear for final drive in place of the bevel on English cars, a comparison of the two systems in *The Automotor Journal* of January 1 has much of interest.

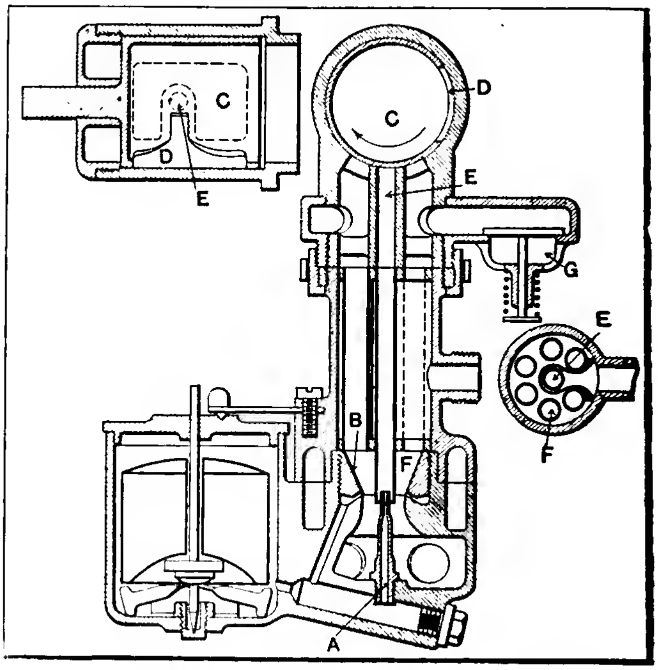
According to this paper, most manufacturers who have adopted the worm drive have done so because of its inherent quality of silence. The worm drive is by nature a more silent mechanism than the toothed bevel, because its method of transmitting power is absolutely continuous and of a sliding wedge-like kind. The bevel depends for its continuity of action on the accuracy of its manufacture, since, by nature, its operation consists of a sequence of blows. To an extent the worm and bevel may be compared, respectively, to the propeller and paddle-wheel in steamship propulsion.

From the purchaser's point of view, the relative efficiencies of the worm and tbe bevel are largely associated with the practical differences that are likely to be noticeable on the road. It is a common opinion expressed among those who have had experience with both types of car that the only noticeable difference between the two is to be observed under conditions of starting and coasting. A car fitted with a worm-driven axle would seem, in general, to convey the impression of a slight sluggishness, more particularly in not getting away so quickly from a standing start.

Proper lubrication is the secret of success with the worm drive. The worm, with its wedge-like sliding action, seems to have an especial propensity for squeezing the oil out from between the surfaces in contact.

English Multiple-Jet Carbureter—On the 12-16-horsepower F. L. car, recently introduced to the English market, there is incorporated a novel multiple-jet carbureter. A description of this device appears in the January 8 issue of *The Autocar.*

There are two carbureting chambers: the one formed by the tube E, which encircles the jet A and supplies the mixture at low speed; the other concentric with the first tube, and taking the form of a series of tubes F (sbown in plan in the small drawing), which draw gasoline from the auxiliary jets B. A rotary throttle C, formed with a carefully designed aperture D, uncovers the central tube E or the auxiliary tubes F in increasing proportion. An additional air valve G operates in correspondence with the motor speed. Wben the motor runs slowly, the whole of the mixture used passes up the central tube E, and it is therefore necessary that this tube be kept hot; this is accomplished by the admission of the exhaust gases to the spaces surrounding the jet chamber between the ring of tubes. The starting of the motor is made very easy, by the fact that, with the throttle in starting position, tbe central tube alone is open, and a strong suction is produced around the central jet.



Novel Design of F. L. Multiple-Jet Carbureter

FARMAN BROTHERS LEAD ALL FRANCE IN AVIATION

By W. F. Bradley.

PARIS, Jan. 20—When the old year rang out the Farman brothers remained the leaders in the aviation world, for Henry had definitely secured the Michelin trophy, and his younger brother, Maurice, had made the longest cross-country flight. The last week of the old year, however, was an anxious time for the holder of the Michelin record. On November 3 he had put up a distance of 138 miles in 4 hours 6 minutes 25 seconds, compared with 2 hours 20 minutes, by Wilbur Wright in 1908.

The most dangerous rivals were Edouard Chateau and G. Legagneux, both connected with the Voisin Company, and Hubert Latham, the managing director of the Antoinette factory. Fearing that they might snatch the trophy from him at the last moment, Farman had a machine specially prepared, carrying a load of nearly 30 gallons of gasoline, and ready to be taken out at a moment's notice.

Chateau was the first to make an attempt on a new type of Voisin, driven by a four-cylinder Voisin motor. On account of the large supply of gasoline carried it had been necessary to fix the tank low and secure a flow by means of pressure. After covering a short distance the tank burst and Chateau had to abandon. Legagneux, who was similarly equipped, had a backfire to the carbureter, which set his whole machine ablaze while in the air on a trial flight. As there were 25 gallons of gasoline on board the situation looked dangerous for a few moments, but Legagneaux managed to come to earth and have the flames extinguished without any serious damage to his person. Most of the lower plane was burned away, and the woodwork suffered so much that it was impossible to make another attempt on the last day of the year.

Latham remained as a menace to Henry Farman, and when he brought out his Antoinette on the last day of the year, the biplane champion gave orders also for his machine to be pushed onto the plain. The two started almost at the same time over the military ground near Mourmelon, Latham with the intention of beating the Farman record of 138 miles, and Farman with the determination to fly further and faster than his rival. It was a speed as well as an endurance test, for account is taken of distance covered round a triangular course, and not of the total time in the air. Farman employed all his skill, taking the turns short and in a masterly manner, while Latham, higher and more impressive, was in danger of being lapped by his opponent. The duel lasted for an hour, at the end of which time Latham was obliged to descend owing to his motor overheating.

Fearing that another attempt would be made to break the record, Farman continued to fly around the course alone. When he had been in the air 2 hours 24 minutes, and covered a distance of about 100 miles, he made a voluntary landing, for it was then too late in the day for any other aviator to beat the November record before the official hour of sunset.

Maurice Farman Flies to Orleans—While Henry Farman was flying at Mourmelon to retain the Michelin trophy, his brother Maurice was making an aerial trip from the town of Chartres, on the Beauce plains, to Orleans, in the Chateau country. The voyage was the continuation of one commenced at Buc, in the suburbs of Paris, a couple of weeks before. Farman had originally intended, after his descent on the town of Chartres, to continue by stages to Bordeaux, some 300 miles away. In view of the wintry weather, however, this was abandoned in favor of a trip to Orleans only.

The distance is about 47 miles, over fairly open country. The task was rendered difficult, however, by the start, which had to be made from very heavy ground. It was not until the frost had dried out the rain that a start could be made on the last day of the year. Rising to a height of 200 feet, Farman soon left in the rear his mechanics and friends endeavoring to follow him in fast automobiles. Fifty minutes later he had landed without a broken spar in an open field chosen in advance on the outskirts of the town of Orleans. The trip so successfully accomplished is a record for cross-country travel. The aeroplane employed by Farman is a biplane of his own design, but having a certain resemblance in its general features to the machine employed by his brother. The motor, which has always been used on this aeroplane, is an eight-cylinder, air-cooled Renault, on the camshaft of which is mounted a two-bladed wooden propeller, having a diameter of nearly 8 feet. Naturally the camshaft is specially strengthened, its diameter being equal to that of the crankshaft, while the timing gears have more resemblance to those employed in the gear box of a powerful touring car than to the usual fine construction.

Maurice Clement, the brother of the better-known Albert, killed a few years ago on a racing car at Dieppe, is now giving lessons in flying to Mlle. Helene Dutrieux, one of the first lady areonauts in France. The machine employed is the first of the "Demoiselle" monoplanes built in the Clement factory, under the supervision of Santos-Dumont. Although the general design has been retained, the new "Demoiselle" is a much more comfortable machine for its occupants than the model with which Santos-Dumont made his first flights. It has been raised higher from the ground by the use of larger wheels, and the pilot is comfortably housed below the wings in an automobile type of light aluminum bucket seat. The motor, too, is more powerful, being a four-cylinder Clement-Bayard of 40 horsepower.

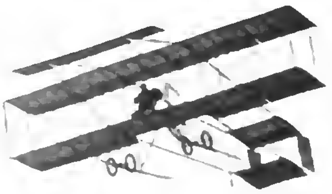
PARIS PLANS AERO AND AUTO SHOWS

Paris, Jan. 20—Paris has decided to hold its second annual aeronautical Salon in the Grand Palais in the Champs-Elysees, from Saturday, October 15, to Wednesday, November 2. The event will practically be a repetition on an enlarged scale of the first aero show, held in 1909. Uniform stands will be adopted, and although the event will be made as artistic as possible, money will not be wasted on mere decorations. The hall is so large that about one-third had to be boarded up for the first exhibition. Aeronautics, however, are developing at such a rate that doubtless the whole building will be occupied for the 1910 event.

Unlike the aero manufacturers, the automobile constructors are far from advanced in their preparations for the next automobile show. It is generally understood that an exhibition will be held, and that the Grand Palais will be occupied as on previous occasions, but absolutely nothing has yet been decided officially. The hall having been secured by the aero manufacturers until the first week in November, it will be necessary for the automobile men to hold their event later in the year, either towards the end of November, or, more likely, during the month of December.

TEN 'PLANES FOR PYRAMID AERO MEET

Paris, Jan. 20—One American and nine French aeroplanes will take part in the Egyptian races to be organized by the Aero Club of France from February 6 to 13. The American machine is a Curtiss biplane to be piloted by De Riemsdyk. Mortimer Singer, an American sportsman, will pilot a Farman biplane, with Arthur Duray, the well-known race driver, as his companion. Hubert Latham and Hanvette will have Antoinette monoplanes; Rougier, for a long time team-mate with Duray, will pilot a Voisin biplane together with Metrot and Mme. Delaroche, providing the latter recovers from an accident sufficiently early to earn her pilot's certificate; Le Blon and Jacques Balsan will each have a Bleriot monoplane. The races, the first of the year, are to be held on a specially prepared aerodrome established on the edge of the desert in the vicinity of Cairo.



PICTURE STORY OF THE LOS ANGELES MEET

Paulhan's First American Flight

Paulhen Inspecting His Seven-Cylinder Motor

LOS ANGELES, Jan. 22—Aviation week was concluded Thursday by a remarkable race between Paulhan and Curtiss, which, like the meet itself, resulted in divided honors. Paulhan went up at 3:25 in his Farman biplane for an endurance flight. After he had done two or three laps of the course, Curtiss started a ten-lap speed trial, half a lap, or more than three-quarters of a mile behind him. The two aeroplanes came over the grandstand at a fifty-mile clip, with Curtiss gaining rapidly. On the third lap the little American machine, high in the air, caught up with the big French one. For a few seconds Paulhan held even. Then Curtiss went over his head, at first for a single length, finally half a lap. Curtiss came down after a thirty-mile trip, but Paulhan continued flying for an hour and a half, covering 64.4 miles.

This one race summarizes the whole story of the meet. The Curtiss machines won all the prizes for speed, quick starts and perfect landings; Paulhan, on the other hand, won the cross-country, passenger-carrying and endurance tests. The latter broke world's records for altitude and cross country flights, both alone and with passengers. He will receive more than $15,000 in prizes. Curtiss made no records, and took about $5,000. Charles K. Hamilton and Charles H. Willard, of the Curtiss team, took second and third prizes in most of the events, never equalling the two masters.

Wednesday Paulhan took his wife for a twenty-mile spin out over the ocean. At 2:27, after helping Mrs. Paulhan into her seat behind him, he flew out in front of the grandstand, made his bow, at it were, and then set off toward the Pacific. In ten minutes he was out of sight among the sun-lit clouds. At an altitude of from 500 to 1,000 feet he passed over Redondo Beach, Venice-by-the-Sea and other resorts toward Point Firmin, for half a mile being directly over the ocean. At 2:50 he came in sight of the waiting crowd at the grandstand, and at 3 o'clock made his landing, whereupon he was carried in triumph down the lanes of frantic spectators.

Returning to his machine he began to run a sort of aerial omnibus, and within a short time took up five other passengers, the lucky ones being Mrs. Cortlandt F. Bishop, William Randolph Hearst, Clifford B. Harmon, Lieut. Paul Beck of the United States Army Signal Corps, and a newspaper reporter. Mr. Harmon got a twelve-mile trip, but the others had to content with shorter distances. Lieut. Beck on his trip tried to drop a dummy bomb from a considerable height into a measured square on the ground. He was not successful, but did not miss his mark by a very great margin.

Paulhan, with Maisson and Miscarol, his assistants, is now in San Francisco. It is probable that they will fly at Salt Lake City, Denver and New Orleans, at the last city during Mardi Gras. Beyond that they have no definite plans.

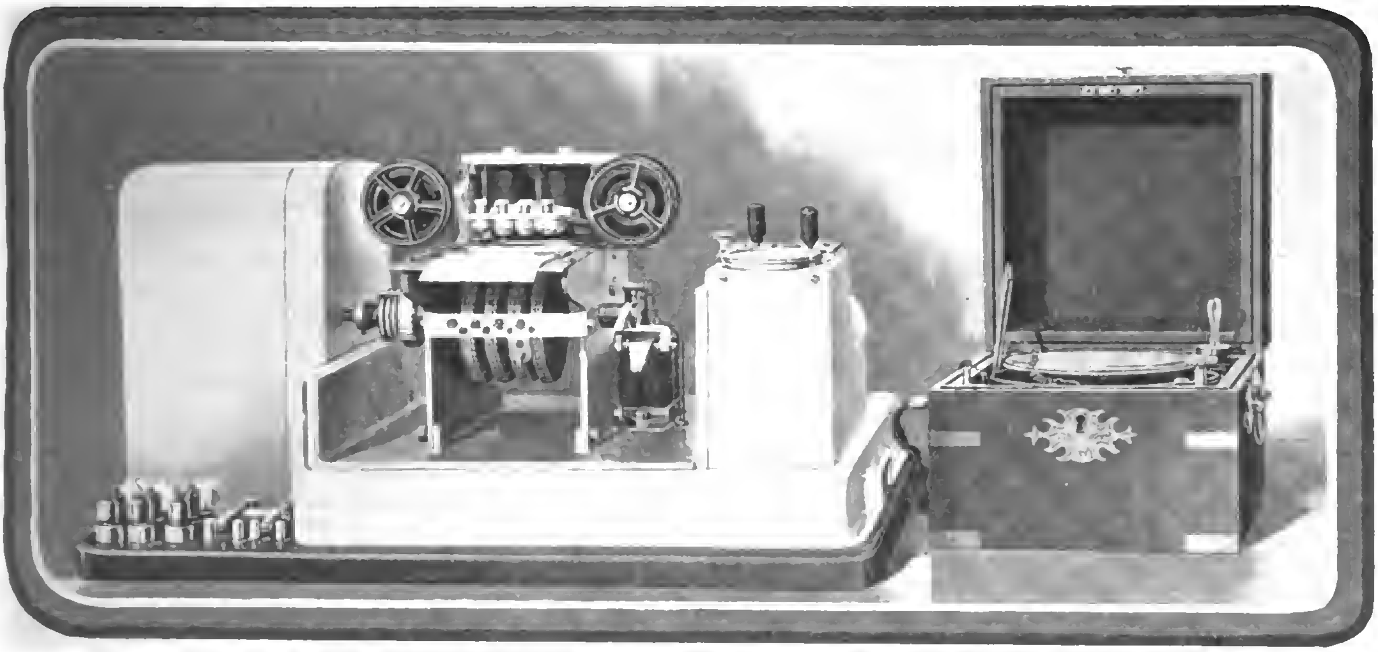
About to Leave the Ground, with Mrs. Paulhan as Passenger

Curtiss Passing the Grandstand Trying for Speed Record

HOW 1910 AUTOMOBILE RACES WILL BE TIMED

RACE-GOERS of the past season will be interested in the 1910 Warner timing instrument, which did such good service at all the principal race meets. The "horograph," as it is called by the maker, the Warner Instrument Company, has been redesigned and put in a more compact and workmanlike form, although the principles of its operation remain the same. In its original form the instrument recorded the times in tenths of seconds, which at the time was thought to be wonderful accuracy. The new "horograph," however, is far ahead of its predecessor, for it records the time in hundredths of a second.

The improved machine was given its tryout at Atlanta last November, and satisfied the most exacting critics. It makes dead heats almost impossible, as even when racers cross the line so close together that the eye alone cannot distinguish any difference, the machine will still find that one or two hundredths of a second separated them. One such case actually took place at Atlanta, where a ten-mile race was decided by 1-100 second at the finish. Some idea of the accuracy obtained may be gained from the fact that a car going a mile a minute goes 10 1-2 inches in 1-100 second.



Warner "Horogrsph," Which Distinguished Itself at Atlanta, Timing Racers to the Hundredth of a Second

THE AUTOMOBILE CALENDAR

Jan. 24-29........Detroit, Wayne Hotel Gardens, Third Annual Automobile Show, Detroit Auto Dealers' Association. John Gillispie, Manager, Hotel Tuller.

Jan. 24-31........Washington, D. C., Convention Hall, Automobile and Aeronautical Show, Automobile Dealers of Washington. B. R. Johnson, Manager, 1313 New York avenue, N. W.

Feb. 5-12.........Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.

Feb. 14-19........Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dai H. Lewis, Manager, 760 Main street.

Feb. 14-19........St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington avenue.

Feb. 14-19........Rochester, N. Y., Convention Hall. Third Annual Show, Rochester Automobile Dealers' Association. Captain C. A. Simmons, Manager.

Feb. 19-26........Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.

Feb. 19-26........Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 19-26........Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South street.

Feb. 19-26........Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.

Feb. 21-26........Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.

Feb. 22-26........Baltimore, Second Annual Automobile Show of the Automobile Club of Maryland, Fifth Regiment Armory.

Feb. 22-27........Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.

Feb. 24-26........Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 24-Mar. 3....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Sec.

Mar. 5-12.........Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.

Mar. 12-19........Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 26-Apr. 2....Pittsburg, Pa., Duquesne Garden,, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

April 23-29.......Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

Races, Hill Climbs, Etc.

Feb. 4-6..........New Orleans, Annual Mardi Gras Speed Carnival, New Orleans Automobile Club.

THE AUTOMOBILE

Vol. XXII Thursday, January 27, 1910 No. 4

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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Long Distance Telephone - - - - - - - - - - - 2046 Bryant, New York

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Other Countries in Postal Union, including Canada - - - - One Year, 5.00
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FOREIGN SUBSCRIPTION AGENTS
ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

DETROIT ENJOYING A GENERAL REVIEW

The Detroit show is interesting from two points of view. It is convened in the city of the West which supports 25 makers of automobiles, and the car production in Detroit for this year is estimated at 20,000 more automobiles than were made in all the world last year. Measured in automobiles, last year the world was large, ever so large, but the City of Detroit, where the "natives" say, "life is worth living," has lifted itself by its bootstraps, as it were, and in the doing made it possible to say, as a figure of speech, "a part is larger than the whole." Of the 43 makers of automobiles in Michigan, many of the balance, after deducting 25 in Detroit, are within a short trolley ride of the Pontchartrain, and counting this number of plants as substantially in, or clustered around Detroit, it is something to say that 50 per cent. of all the automobiles made come from this district within a trolley ride of Detroit.

This phase of the automobile industry is probably a little more than half of the whole, but by no means all. Besides the 43 makers of automobiles which center around Detroit, there are accessory plants, tire makers, and body manufacturers, which concerns, while they supply parts to Detroit makers of automobiles, also have a vast trade in 24 States of the Union in which automobiles are made, ranging from a valuation of $200,000,000 per annum in Michigan down to $5,000 in Georgia. It would be a little unfair to Flint, Michigan, to thus give to Detroit the palm—Flint produces nearly $80,000,000 of value in automobiles per annum, taking this year as the basis, and more than $30,000,000 in value comes from Lansing, Pontiac, Jackson and nearby towns. Were this the end it might be worth while to comment on the growth of the industry, but it is scarcely a good beginning and none will dare attempt to fix the boundaries.

ENGLAND GAINING FOREIGN LEAD

Students of the foreign automobile situation cannot fail to be impressed by the remarkable progress made during the past few years by England, as compared with France, Germany and Italy. If the present rate of advance is maintained, another twelvemonth will find the "tight little isle" comfortably in control of the foreign trade. English makers, long submissive to the dictates of Continental fashion, have of late developed an aggressiveness of spirit which has reacted both in the up-to-the-minute design of their cars and in their organizations.

The adoption of the Knight slide-valve system was the first important move. Although this has failed to "revolutionize the industry," it has been retained by all the companies originally using it. But as though this were not sufficient to prove the emancipation, several makers brought out other forms of slide and rotary valves.

The location of the radiator on the dashboard has also found many new adherents. This is logical in view of the spread of thermo-siphon cooling. The dashboard position allows the radiator to be set higher, consequently with a better head of water for the circulation, without marring the looks of the car.

In running gears there have been three important developments: worm drive, front-wheel brakes, and wire wheels. The last are now well-nigh universal in England, and are rapidly being taken up on the Continent.

GOVERNING DEVICES INCREASE SAFETY

While not perhaps as applicable to pleasure cars as to the more prosaic motor trucks, which are fast taking up the horse's burden, the use of any device in the nature of a governor is highly commendable.

As used today in this country these take many forms; one type utilizes the centrifugal action of balls at the outer end of rotating arms to decrease the volume of mixture, or retard the spark; another uses water or other fluid pressure upon a flexible diaphragm, which acts upon the throttle or spark, as the case may be; still others employ other principles of tried and proven merit to restrict the speed of the engine, and thus the speed of the vehicle, to a certain predetermined maximum. This is a quantity which the manufacturer is able to fix, and in so doing, serve the best interests of his clients, as well as himself.

However, many a purchaser loses sight of the fact that this very problem of maximum speed may have been carried throughout the entire design, and that in so altering the machine as to render the governing device futile and useless for the sake of a mile or two more per hour, he is really only paving the way for the quicker destruction of his vehicle. The net result will be a saving throughout the vehicle in upkeep and repair costs, as well as a marked decrease in the fuel and oil bills.

M. C. B. AND THE AUTOMOBILE INDUSTRY

It is well within the memory of many who are now in the automobile business, when railroads were absolutely free from any restraint from the point of view of standard methods. Master car builders (M. C. B.) if they met at all, failed to appreciate the advantages of a standard gauge, crystallized methods of design, and materials of a known desirable composition.

Those of our citizens who object to combinations, as they say, in restraint of trade, have but to slip back to the old and heterogeneous methods of non-standard work, and law will be wholly unnecessary, a combination will be impossible. As a matter of fact all the law in the universe would fail in the face of a 60-inch tread of car wheels on a 54-inch track, nor is this a far-fetched illustration of the variations which obtained but a few years back in railroad work.

History, if it repeats itself, is retarded in its march by the inertia of intelligence, or better yet, by lack of appreciation of known facts. It is a known fact that a standardized method of doing anything is better than a haphazard jump in the dark. Christopher Columbus discovered America against his inclinations; he was looking for India. Had he followed the standarized methods of to-day he would not have been disappointed.

Napoleon Bonaparte, at Waterloo, lost to Wellington, as history relates, because he departed from a standard. The peasant guide who affirmed that the way was level and the going good, did not represent the standard of military intelligence which Napoleon usually relied upon.

I-sections in structural shapes were long ago standardized—why should they not be brought under the same mantle of intelligence when they are employed in automobiles for front axles? The distance between supports is the same in all; roads are no better for one than another; shock is the same for all; a given grade of material is not improved by a difference in the color of the paint, and, when the last word is said, the desire of a designer to be different does not make him right.

Life of tires must be the desire of every autoist. This life is scarcely to be measured in terms depending upon a given size of tire, of a given make, for a given weight of automobiles. Weight alone is not the criterion. If two automobiles weigh the same and one of them is capable of traveling faster than the other, it is morally certain that the tires (of the same size) placed upon the more speedy automobile, will give out much the sooner.

Horsepower rating of a motor is not merely dependent upon the piston displacement under given conditions of compression, considering a given fuel. Rule-of-thumb formula is like "dog French"; were one to inquire for bread in dog French from passersby in Paris he would probably have to fast—adapt the standard and all will be well.

Radiators, of a given make and size, are not likely to work equally well on two different designs of motors. This is due to an entire absence of any standard method of fixing the flame-swept surface in proportion to the compression, piston displacement, etc. A steaming radiator is a most pronounced indication of the lack of a standard.

LICENSED AUTOMOBILE DEALERS ORGANIZE

While nothing was said to so indicate, it was generally understood that the new management of the Association of Licensed Automobile Manufacturers was responsible for the meeting of the New York dealers in licensed cars, held at the Hotel Astor last Thursday afternoon.

Over 20 local dealers responded to the invitation which had been sent out. The meeting was called to order by Sidney B. Bowman, who explained the objects and purposes of the proposed organization. Mr. Bowman's remarks met with the hearty approval of those present and it was decided that an organization should be perfected to include only such dealers as handle cars licensed under the Selden patent.

Percy Owen, of the Carl Page Company, agent for the Chalmers-Detroit, was elected temporary chairman and Mr. Bowman was made temporary secretary. It was decided to form an organization committee to consist of five members, who would also act as nominating committee. The chairman was given power to name this committee and stated that he would do so in the course of two or three days.

The new organization practically means the end of the New York Automobile Trade Association, which has been in existence for several years, as all of the members of the latter body were represented at the Hotel Astor meeting with the exception of four firms. One of the officers of the New York Automobile Trade Association practically admitted that the new organization will undoubtedly replace the older body.

If, as it is said, the A. L. A. M. was responsible for the calling of this meeting, it indicates an entire change of policy from that which was adopted by George Day, the organizer of the Licensed Association. During his connection with that organization Mr. Day discouraged in every possible way the formation of local bodies of licensed dealers undoubtedly under the belief that the individuals would be more easily controlled than organized bodies.

It is understood that one of the purposes of the new organization will be to conduct a campaign of education among the prospective buyers of cars, drawing attention to the Selden patent and the alleged liability of suit to those who purchased unlicensed cars.

Among those present at the Hotel Astor meeting were:

Sidney B. Bowman, George Johns, Col. K. C. Pardee, C. A. Duerr, Gen. John T. Cutting, J. Joyce, Carl Page, Percy Owen, Charles A. Singer, Jr., George W. Bennett, John F. Plummer, Fred Titus, W. H. Hurlburt, I. N. Uppercue, C. W. Wurster, E. Day, Robert Slusser, Ferdinand Cimiotti.

INTRICATE PROBLEMS INVOLVED IN SELLING

With an increase of 130 per cent. in the production of cars during 1909 over 1908, taking the licensed situation alone, it is necessary to seriously consider one or two of the phases among which the question of the future disposition of second-hand (used) automobiles is bound to float to the top. It has long been the practice of the selling representatives for the various makers, to take in trade used cars of their own make and allow something for them on account of the new purchase. That they will continue to do something of this kind is very likely, and it is even possible to foresee that it may be advantageous to any maker of automobiles to father the used cars of his brand rather than to allow them to become as "flotsam and jetsam," kicking about under the heels of the buying public, offering false ear marks which will reflect seriously upon the quality of all automobiles of the same make.

One way which has been suggested by a very fair-minded builder of automobiles is to organize a series of repair shops and more or less supervise their operation, placing the used automobiles in hand for repair and permitting the repair shops to realize a profit consistent with the troublesome work.

Waverley Electric Roadster

Fig. 1—Knife edge revolving controller as used on Waverley electrics in conjunction with Type H motor

GRADUALLY the general appearance of all mechanical modes of transportation verges towards a common standard, and the chances are that in the long run they will all look very much alike, if, indeed, agreeably to locomotive practice, they may not all be substantially the same, unless, perchance, there may be some four or five separate schools of design, each one persisting in some one method.

The new Waverley electric roadster, as it is offered this year, is interesting from the point of view of standardization, as well as to the patrons who prefer an electric vehicle to a gasoline automobile. That there should be just such preferences is to be readily taken for granted, due to the splendid utility of electrics, despite the greater radius of action of gasoline equipment.

BATTERY IN FRONT UNDER THE BONNET

The Exide battery, of 32 cells, each with 11 plates, is placed under the bonnet in front, just as the motor is there placed in gasoline work. It is something of an advantage, according to the maker, to thus have the battery in a perfectly accessible position, due to the facility with which the cells may be examined, the specific gravity of the electrolyte taken, and if necessary, remove the battery for the purpose of making repairs.

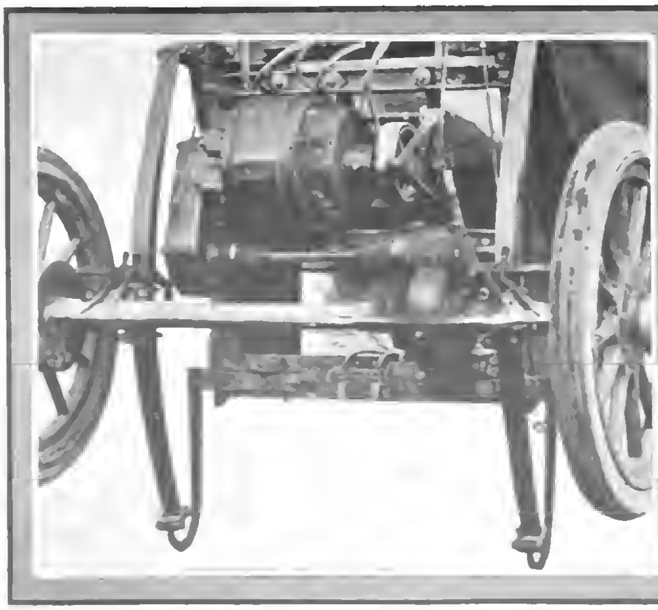


Fig. 2—Detecting relations in the swing of the power plant to the rear axle

The body of the chassis is 108 inches long, with a wheelbase of 94 inches, and the tread is 54 inches. The body is commodious, with inside measurement of the seat of 38 inches; the color is gray. A tilted steering wheel of the irreversible type, brings this part of the vehicle up to standard automobile practice, while the motor suspension is that usual in Waverley practice, as depicted in Fig. 2. This suspension has served for some time in the several types of vehicles of this make, and, besides being noiseless it has the faculty of delivering the power with a minimum loss as the characteristic Fig. 3 adequately indicates.

TYPE "D" CONTROLLER FOR CONTINUOUS TORQUE

In order to limit "drop" in the controller, thus safeguarding the commercial efficiency of the whole equipment to a considerable extent, the controller is so made that the "wipe" principle of contact assures high electrical conductivity across the joints. This is accomplished by having a central revolving core upon which is mounted a series of properly contoured knife-blade members which press between contact pieces which, in turn, are formed out of suitable grades of copper in sheet or strip form, securely fastened and held in rigid relation so that the knife blades pass between each pair of the fixed members and pry them apart sufficiently far to enable the core to rotate and make the respective combinations.

The "make and break" system of control is adopted in this system; the idea represented is to maintain a constant state of torque during the period of acceleration of the vehicle—just when torque is most in need. The controller is contrived to give four forward, and as many speeds in reverse, but in order to assure safety in the hands of the least experienced, an interlocking device is applied with advantages as follows:

(a) Direction cannot be changed while the power is on.
(b) The vehicle cannot be started in either direction, unless the lever is at the neutral point.

The controller is compact, well designed to stand the continuous working, and the connections of the wires from the motor and battery are so securely made that they will neither come loose or impose a high resistance to the electrical current. The wiring system is also most carefully executed, large sizes of wire are used to limit "drop," that is, the loss of voltage in the wiring is reduced to a nominal point by the proper grading of the sizes of wires used in the several branches. The wiring is also accessible, which is a point of importance, and too, the insulation is acid resisting, and so placed that the fumes from the battery cannot contact with the wiring.

TEST SHOWS ECONOMICAL CONDITIONS

It is of the greatest importance to conserve the energy in the battery for two reasons:

(a) The radius of travel of the automobile will be so much the greater.

(b) Life of the battery will be augmented: the life of any battery is in direct proportion to the number of discharges to which it will be subjected under a fixed set of conditions.

The curve, Fig. 3, was taken expressly for THE AUTOMOBILE in order to permit of a definite statement of the relating facts, it being the idea to display a proper regard for truth in discussing a matter of such great importance. In this chart the current in amperes is written as ordinates, and abscissa are given in four figures in order to express all the conditions.

A careful study of this chart will disclose divers points well worth knowing in relation to electric motors as they are applied to automobile work, as for illustration, it will be seen that the curve of efficiency is almost flat top between 20 and 120 amperes of current; it raises from 20 to a maximum at 35 amperes, but at 120 amperes the efficiency is no lower than at 20 amperes of current intake of the motor.

The speed of the motor is maximum at minimum load, which is to be expected since the motor is series wound, and, as to the speed variations, they range from 1,640 at 33 amperes, which is the point of maximum efficiency of the motor, down to 400 revolutions per minute when the load is such as to draw 120 amperes of current from the battery.

Referring to the torque, it is 74 at 120 amperes and 22 at 60 amperes of current, this curve of torque proves to be particularly desirable for work of this character, it being true, as a rule, that power of electric motors is a rapidly falling quantity as the load increases beyond a certain point.

The speed of the car in miles per hour, changes as the load increases, which is true when a car is required to make a grade or if the road is not hard and level. All motors do not perform in like manner in this regard, and, as to this particular motor the performance is plotted in the curve to show result as follows:

RELATION OF SPEED TO CURRENT IN AMPERES

Current in amperes.	Speed in miles per hour.
20	30.8
30	23.8
40	18.6
50	15.0
60	12.6
70	11.0
80	9.8
90	7.8
100	5.9

This interpretation of the chart as it tells about speed of the car for current consumption, is the real story of the efficiency of the whole, and, as an inspection will disclose, the speed falls to about 1-6 of the initial speed while the current in amperes increases in the ratio of 1:5. There is one other point which will tell of the mechanical efficiency of the whole; the curve of speed in miles per hour, while it shows a falling off as the load is increased for any cause, sustains to a remarkable degree, and fails to recede enough under increasing load to allow criticism.

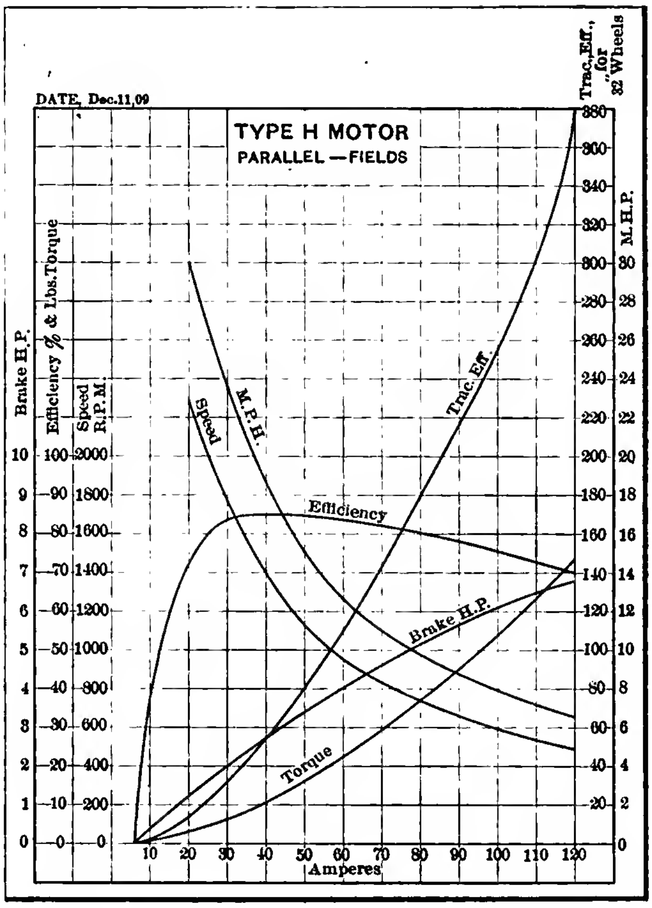


Fig. 3—Curve of performance of Type H Waverley motor, depicting a fine relation of torque to current in amperes

Were the motor inefficient at all speeds, which does not happen to be true, one would be inclined to look for high fixed losses. These fixed losses would be due to friction, hysteresis losses in the armature core, focault currents, possible in the polar horns, and to heat losses from all possible causes. A well-balanced motor is what is desired, in which the I^2R losses must also be carefully limited—this characteristic, as presented in the curve, is of just such a well-balanced motor.

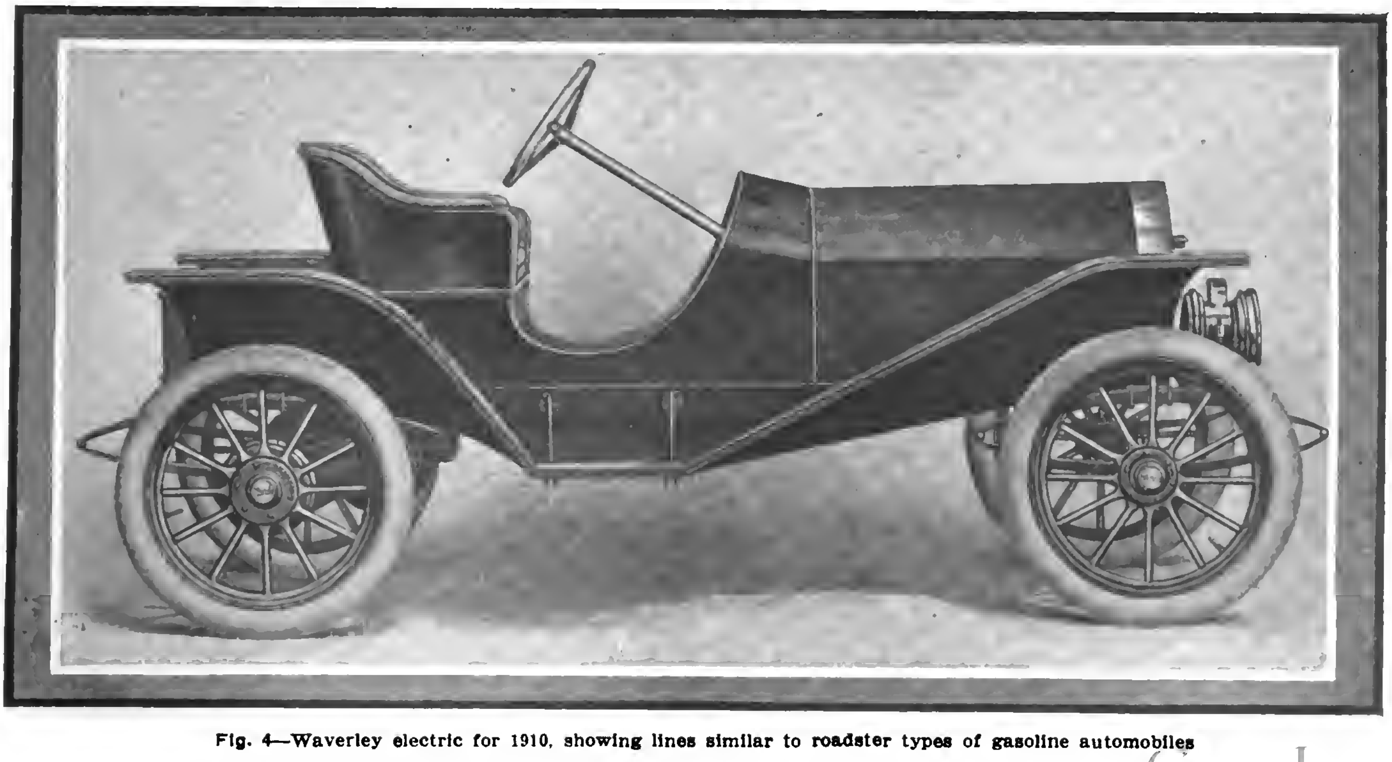
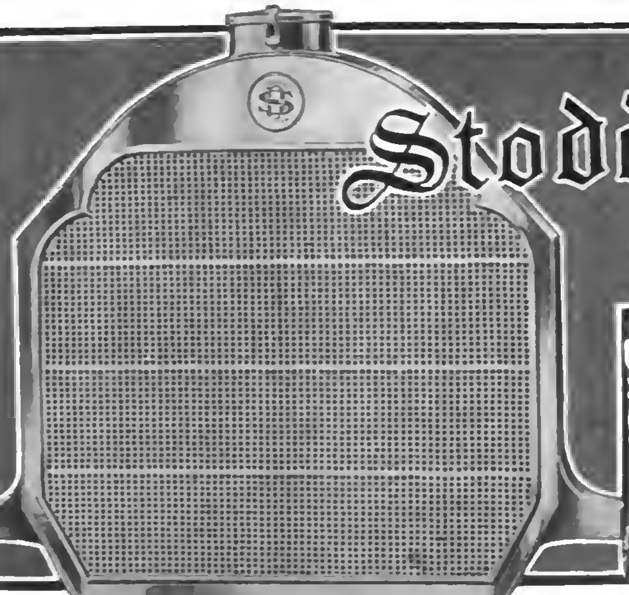


Fig. 4—Waverley electric for 1910, showing lines similar to roadster types of gasoline automobiles

Stoddard-Dayton 1910 Construction



Appearance of 1910 Stoddard-Dayton Radiators

INFINITESIMAL would characterize the changes which have been made in the Stoddard-Dayton cars by the makers, the Dayton Motor Car Company, Dayton, Ohio, to fit them for the season of 1910. All told the line includes seven different chassis, which are powered by three distinct sizes of engine. Throughout the 1910 line, compared with the same cars as they were equipped in the past season, a longer wheelbase and more power are found to affect each and every model. To be specific, the three engines are rated by the makers at 30, 40 and 50 horsepower, respectively. The wheelbase of the 30 horsepower car is 108 inches in all models. The 40 horsepower types, on the other hand, all have a wheelbase of 116 inches. Then, with the still higher powered engine, a further increase is noted to 120 inches except in the 7-passenger touring body, the limousine, and landaulet enclosed cars, where the figure reached becomes 128 inches. The latest addition to the line is a speed car of 60 horsepower, which chassis has a short wheelbase of 106 inches. In addition to these, a town car will be put out, using the 30-horsepower chassis with 108-inch wheelbase.

Overhead Valve Arrangement Retained—Noticeable first in looking at the engine views is the retention of the overhead valves. This position, in combination with a spherical combustion chamber, is said by the makers to give a superior power output from any given size of cylinder. The valve marked A is the inlet valve, while B shows the exhaust. The position of the pipes gives a clue to the identity of the various valves, although the same could not be said of the push rods, for, with this motor, the exhaust camshaft is located on the inlet side, and the inlet camshaft on the exhaust side. So, it is that C, which is apparently the inlet push rod, is actually the push rod mechanism for the exhaust valve on the opposite side of the engine. An end view would show this construction, the rocker arms above, which operate the valves, and which are themselves operated by the push rods, cross one another above the cylinders.

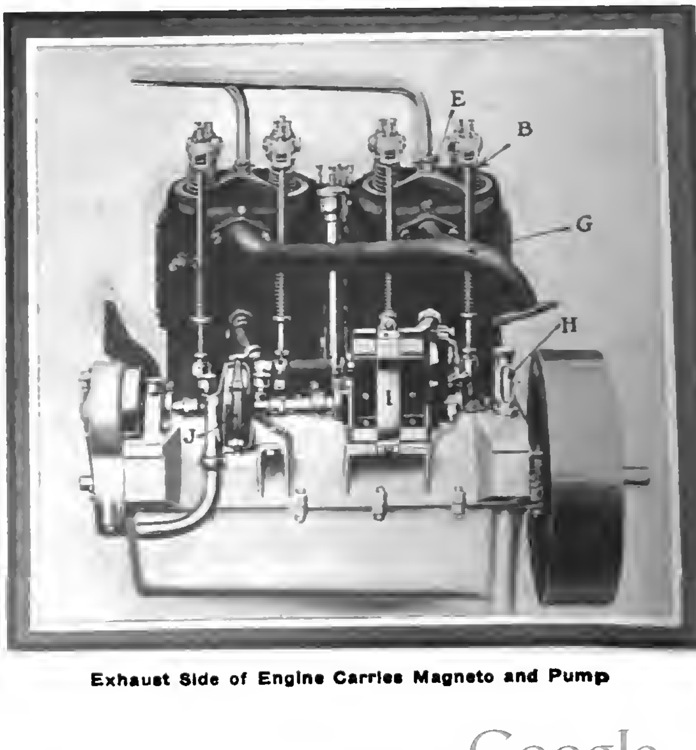
In looking at these two views of the engine, the method of fastening the valve cages in place will be noticed. This is a screwed-in fitting for the cooler and less liable to distort inlet valve cap, while the other, the exhaust valve cage, is held in place by a yoke. These yokes, marked E, hold each, a pair of valve cages, the loosening of a single nut sufficing to loosen and allow removal of a pair of cages. Since the exhaust valve requires grinding in more often than the inlet, this feature is one that will appeal to the experienced motorist.

In position, the valves are neither vertical nor at the more usual angle of 90 deg., being set at a very slight angle approximating 35 deg The use of the two valves in separate cages overhead, makes it necessary to place the spark plugs in the side of the cylinder casting. While not the exact center of the combustion chamber, this position is a very accessible one. One of these will be noted at D. The priming cups, and compression relief cocks are also placed in the side of the cylinder casting, and are visible in the same view, being located in pairs very close together, which is very convenient in priming, as two can be operated with practically one motion of the hand.

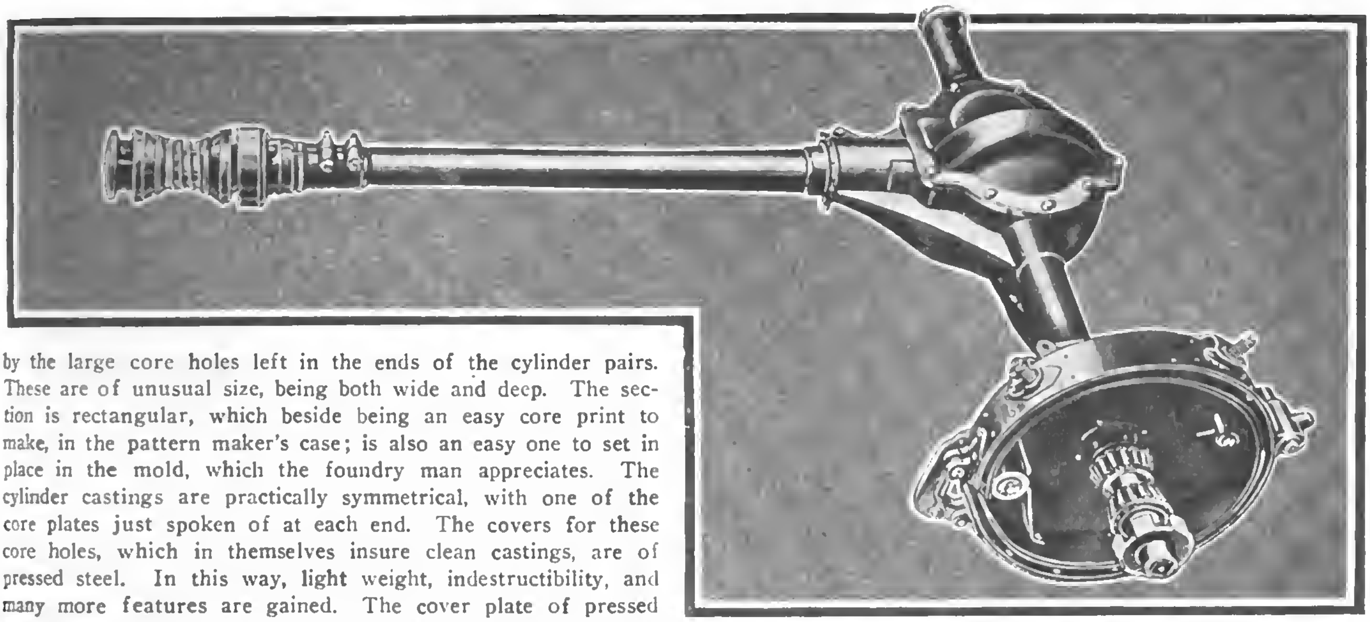
Tapering Pipes Make for Easy Gas and Water Flow—It is in the attention paid to little, but important, details, which shows the desire of a maker to improve his product, and in this particular case, several tendencies of this sort may be remarked about without harm. Thus, a glance at the exhaust side of the motor will suffice to show the tapered water pipe, which allows the two converging streams of outflowing water plenty of room. This is effected by an expansion of the diameter of the pipe just before the point of convergence of the two streams, that is, just before the first cylinder is reached, as shown at F.

This same side of the motor shows a similar scheme carried out on the exhaust pipe, which is exhibited at G. Without a doubt, the latter is of equal importance with the former, for the quicker the cylinders are cleared of the burned and thus, useless gases, the greater will be the power development. The pipe expands to a larger diameter just ahead of the second cylinder pairs—for this is the way they are cast. The short length of expanded diameter ahead of the second pair should have a muffling effect on the waste gases from cylinders one and two. This exhaust pipe is bolted up in place by means of a flanged connection, two bolts per flange being used. This allows of removing the pipe in its entirety without touching anything else, and with very little work or fuss.

Cylinders Cast in Pairs with Large Core Plates—The convenience of the foundry is taken care of in a suitable manner,



Exhaust Side of Engine Carries Magneto and Pump

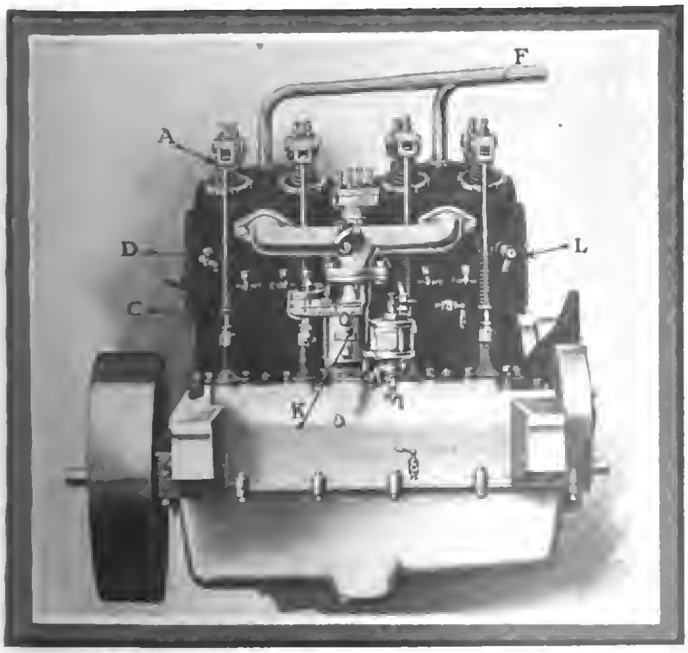


Construction of Stoddard-Dayton Rear Axle and Torque Rod

by the large core holes left in the ends of the cylinder pairs. These are of unusual size, being both wide and deep. The section is rectangular, which beside being an easy core print to make, in the pattern maker's case; is also an easy one to set in place in the mold, which the foundry man appreciates. The cylinder castings are practically symmetrical, with one of the core plates just spoken of at each end. The covers for these core holes, which in themselves insure clean castings, are of pressed steel. In this way, light weight, indestructibility, and many more features are gained. The cover plate of pressed steel is marked L in the picture, and is held in place by a goodly number of small diameter button-head cap screws, with a gasket below for water-tightness.

Aluminum is the material of the crankcase and covers. The case is parted laterally along the center line, forming an upper and a lower half, which are bolted together. The lower carries the oil well (variously called sump, compartment, and oil pan), and is of simple yet rigid shape. The upper half, on the other hand, supporting as it does all of the accessories, is necessarily more work for the foundry. The supporting arms, four in number, two on each side, are of a box shape, a small internal opening being left for lightness' sake. A pad for the pump support, and a small shelf for the magneto's resting place are found on the left side of the upper half, while the front end carries the inner, deeper half of the gear case. This reduces the cover for the gears to a simple plate, of nearly clypeate form held by eleven bolts. The single projection through this plate is the starting crank, which is surrounded by a packing nut or gland, threaded into the case. There is, then, nothing to oppose the work of removing the cover, for inspection or repair.

Carbureter Very Accessible, Too—The gears, valves, pipes and other parts, which have been described are not alone in possessing the desirable quality of accessibility, for the carbureter is a part which has had a maximum of consideration in this line. It is of the separate float chamber, Venturi tube type, with an auxiliary air adjustment. The float chamber has a glass body, which permits one to watch the action within and ascertain if the vaporization is proceeding properly. One innovation is the location of the throttle valve. This, instead of being an integral part of the carbureter, is carried up higher and fills the space at the parting of the inlet pipes, the nearest to the cylinders, which it would be possible to have it. After passing through the throttle, then, the carburetted air has a straight passage to the cylinder pairs. Moreover, the inlet pipe, is as short and compact as possible. The removal of two bolts, and the severance of the gasoline line—fitted with a union for this purpose—allows of the whole vaporizer being picked out bodily.

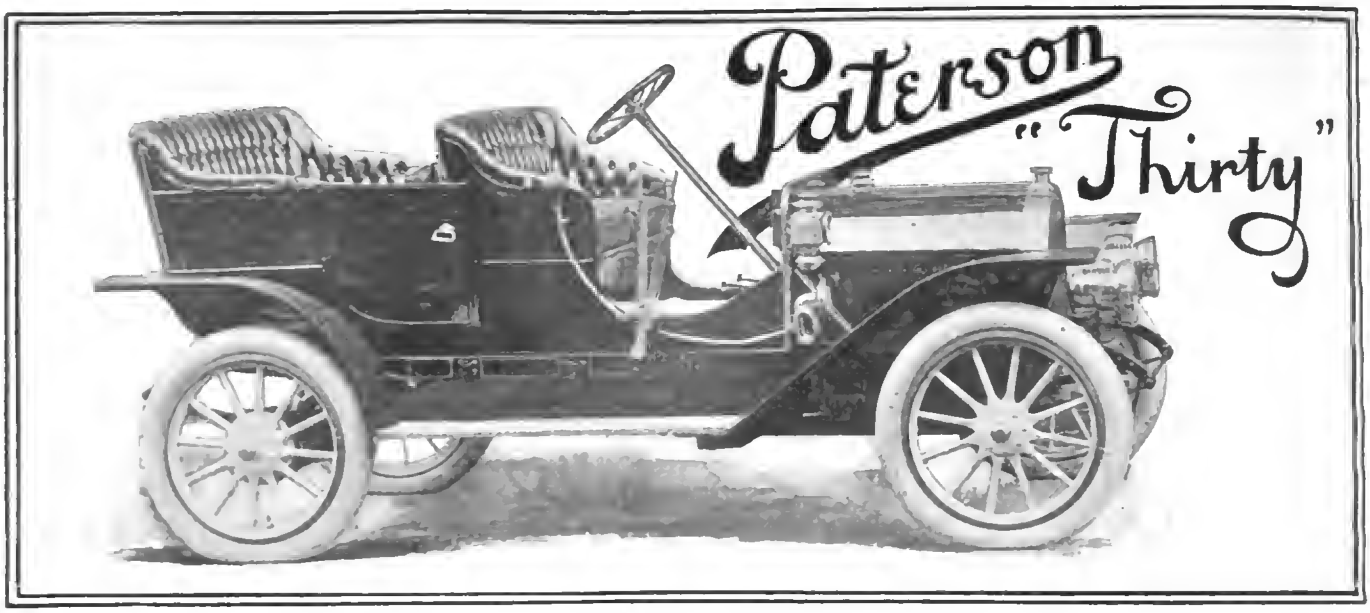


Inlet Side of Engine Reveals Carbureter

The magneto, too, is fixed up in a similar manner. The drive is through an universal coupling (with a shearing member, by the way), and is held to the case by a strap. Loosening this strap, disconnecting the wires, and pulling the magneto out backward, so as to separate the two component parts of the universal coupling, and the current system is ready for inspection.

Forward of this, and on the same side of the engine, is the pump of the centrifugal type. This, too, is driven by a shaft in which is located a universal coupling to allow ready removal. The water piping might be accurately described as "short and sweet," for there is but one straight, short horizontal pipe from radiator to pump intake. From the outlet above and on the cylinder side the discharge flows through a Y-shaped pipe with one branch somewhat elongated. Hose connections are used freely, but this is desirable as it makes for removability. The pipe from the radiator is free from the bends which set up much internal surface friction, hence the water flows easily. the friction component being small.

Speaking of radiator, this shows one of the few changes of the whole car. Whereas formerly of the tubular type, it now has the more popular cellular form. The shape, however, is unchanged, while the same might be said of the filling cap. The latter with characteristic Stoddard-Dayton accessibility written all over it, has been freely copied, being of a long, narrow, common-sense shape, which allows one to pour into it directly from any kind of a pail, without first hunting up a funnel. The fastening for the radiator cap is good, also. Being hinged at the back, it is only necessary to hold the front edge down. This is done by means of a crooked lever, which is spring held in an upright position. To open, the lever is pulled forward past the center of the spring-holding device, when the force of the spring acts to hold it down.



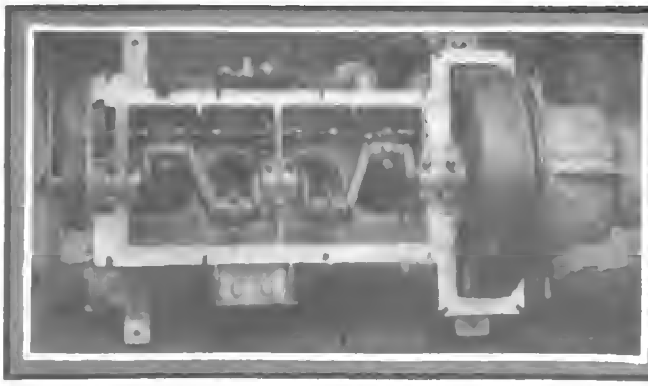
Full Side View of the Moderate-Priced Paterson Thirty Shows Excellent Proportioning of Parts

SPECIALIZATION marks the attack upon the present automobile situation of the W. A. Paterson Company, Flint, Mich., which concern is bringing out for the approval of America's shrewdest buyers, a machine which will be in the so-called $1,500 class. A single thought will suffice to show that this specialization is wise, for the class entered is well filled with a representative lot of cars from a very active group of manufacturers. At the price set, $1,400, and in view of the worth of the car, as it will be described herewith, it is apparent that the proper share of the business will come the way of the makers of the Paterson "30."

In specializing upon this one chassis, the maker is able to give his undivided attention and that of his entire factory personnel to this one unit, its perfection, refinement, production on specified time, and many other items which, small at first glance, loom up large in the long run. For the differing tastes of differing personalities, three distinct bodies will be fitted to the one chassis, a five-passenger touring car, demi-tonneau and tourabout. The price of this model with either the touring car or demi-tonneau body is $1,400, while the tourabout sells for $1,285. The equipment includes the full set of lamps with generator, magneto, robe and foot rails.

From the cuts of the power plant and chassis herewith shown, one will at once see that the aim of the Paterson Company in designing this car was simplicity, compactness, and at the same time, to make this car one of high efficiency.

Details of the Unit Power Plant—The motor, clutch and transmission form a single unit, and all working parts are enclosed in a single case which thoroughly protects it from dust. This construction is the best and most up to date for small and medium-sized power plants. It eliminates all possibility of parts getting out of alignment through road shocks, etc. This entire power plant rests on a pressed steel subframe and can be removed by simply taking out four bolts.



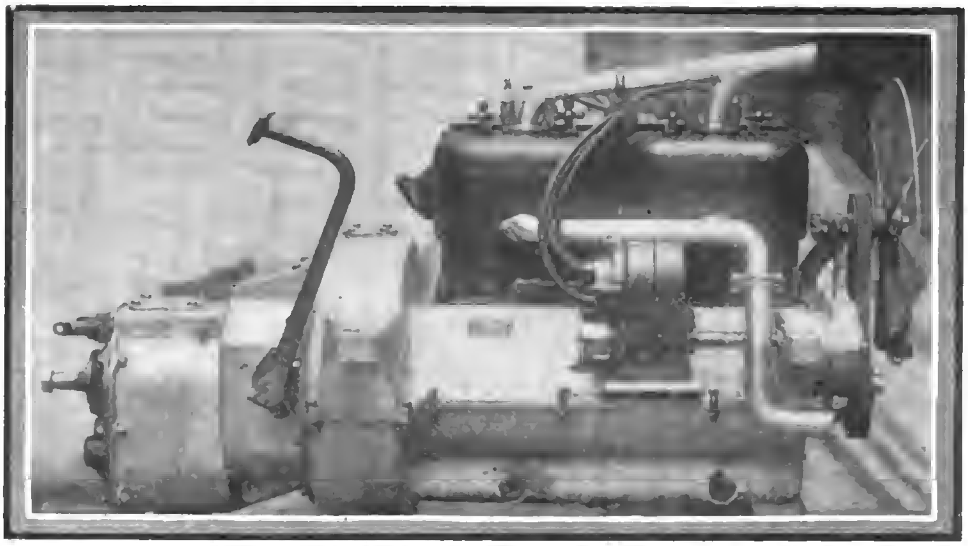
Crankcase Viewed from Below with Cover Removed

What the Motor Shows—The cylinders are cast in pairs made of close gray iron and finished by grinding to assure accuracy. The pistons are ground to size and fitted with three rings ground on sides to fit the grooves in the pistons. Valve heads are of nickel steel with carbon steel stems and ground to size; valves, which are adjustable, are large and located all on one side. Valve ports, through which the valves are removable for grinding, are closed by screwed-in plugs, those over the inlet valves being threaded internally for the spark plugs. The connecting rods are drop forgings, crankshaft bearings and connecting rod bearings are made in two halves and are easy to adjust. The crankshaft is a heat-treated, open-hearth carbon steel drop-forging; bearing surfaces are ground. Both the crankshaft and the camshaft are carried in three bearings and are supported by the upper half of the case.

Elsewhere on this page will be found a picture showing this. It is a view of the engine from below, with the lower half of the crankcase removed. The shape and comparative size of the crankshaft parts are to be clearly seen, as are also the length of the three bearings provided. This view reveals, in addition, the shape of the crankcase at the line of division of the upper and lower halves, which is, as usual, at the center line, and in a horizontal plane. The gears are set into the part of the gear cover which is integral with the front of the case. This makes an accessible and convenient arrangement, for the cover is then but a flat plate, easily and quickly removed.

The housing for the flywheel, too, may be discerned, as well as the four bolt holes, the occupants of which retain the upper and lower halves of the same in juxtaposition, and retain the lubricant within where it is useful, instead of allowing it to slowly leak out, where it is of no use. Each of the three crankshaft bearings is provided with four bolts of large diameter, which bolts are removable and, the reverse, insertable, without the lower cover. Any automobilist who has ever struggled to line up the bearings of a crankcase which had the two end caps an integral part of the lower half of the case will at once appreciate that this is a big improvement. Not that it was put in there with the idea that the bearings would soon need scraping; far from it, the material used being a hard, die-cast babbitt.

In operation, the motor is exceedingly quiet and free from vibration. The magneto is located on the right-hand side of the motor and is driven by enclosed gearing.



Unit Power Plant Viewed from Magneto and Water Piping Side

Lubrication is of the "constant level splash system." The oil reservoir at the bottom of the crankcase is filled with oil, this oil is forced from this reservoir to the crankcase by a plunger oil pump of large capacity. The amount of oil in the reservoir is observed through a single float oil level gauge.

Water circulating is by thermo-siphon circulating system, all pipes and passages are large to assure a quick and easy passage of water, the inlet and overflow wäter pipes are of polished aluminum. Large water jackets are provided and the radiator is of large capacity. The cooling fan, which is large and well designed, is driven from the crankshaft by a flat belt. From the view of the magneto side of the engine the simple and convenient belt tightener is clearly shown as well as the fan.

Points of Worth in the Transmission Mechanism—The clutch is of the cone type. It is positive, but engages gently. The face of the cone is fitted with renewable leather lining, with springs under the surface of the leather to insure easy engagement. This clutch transmits directly to the main shaft of the transmission. The transmission is the selective type, with three speeds forward and one reverse, gear, shafts run on annular ball bearings. Power is transmitted from here to the rear wheels through two universal joints, a carbon steel propeller shaft, and the usual differential. The rear axle housing is composed of heavy steel castings and tubing, with axle shafts running on Hyatt roller bearings. The two sets of brakes are large and act directly on the rear wheels, one set are external contracting, and one set internal expanding.

Tubular describes the front axle, a tube of large diameter, and of heavy gauge, having the drop-forged yokes riveted and welded to it at the two ends. The cross rod is placed at the rear of the axle out of the way of road obstructions, while the connecting link to the steering gear is above the knuckles. The axle is dropped at the center slightly for look's sake, but the cross connection is left straight, the straight form being better in that it is better able to withstand tension than would be a false shape, such as a long radius curve. Since this member is one which is essential to the safety of the occupants of the car, and since it is always under more or less tension, the idea is an excellent one. In addition to the yoke ends of the axle, the steering knuckles and all connections are drop-forgings. The front axle runs on annular type ball bearings.

Pertinent Facts About Spring Suspension—Comfort is assured by the use of good springs, well selected for length and type of spring, as well as the material entering into their composition. The front springs are semi-elliptic, and rather flat. They are fixed at the front end, while the rear end is shackled. Side sway due to unusual flexibility of the front springs is reduced to a minimum quantity by a cross rod joining the two front spring hangers. This serves a double purpose in that the frame there is stiffened also.

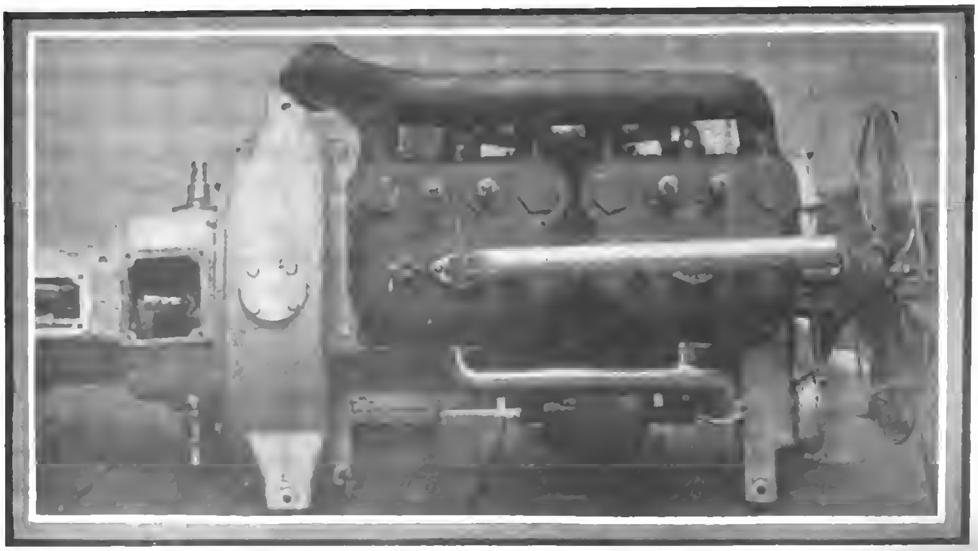
Rear springs are of the full-elliptic type, fixed to the upper side of the axle. All spring eyes are provided with grease cups, which lubricate the moving surfaces, a simple twist with the fingers each day serving to conserve the life of these important members and to eliminate noise.

A pressed steel frame of channel section is used with a sub-frame of the same material, the latter being reinforced, however, by means of a filler strip of ash. The open side of the frame is turned in, while at the front it is narrowed to permit of a much extended turning radius.

The usual tread is used, 104 in. wheelbase, 32 by 3½ in. tires all around, and the weight is given as 2,000 lbs. The tire equipment is worthy of more mention, in that the universal size reduces the extra tires to be carried on a long run to one, since this one will fit any one of the four wheels.

At the A. L. A. M. rating, this motor, which is of 4-in. bore by 4-in. stroke, rates at 25.6 horsepower, but the makers state that every engine sent out from the factory develops actually about 30 horsepower.

At the rating power development, the ratio of power to weight, that is the weight per horsepower is but 78 pounds, which is a comparatively low figure. But, even this is materially lowered when the actual amount of power developed is taken into account. Then the figure becomes 66 pounds, which even with the full rated load of passengers, would not possibly increase to over 75 pounds per horsepower. When this ratio is low, as in this case, high speed, hill-climbing ability, and other useful features are assured.



How the 25-Horsepower Engine and Unit Power Plant Look from Above

IN THE GARAGE REPAIR SHOP

By Thos. J. Fay

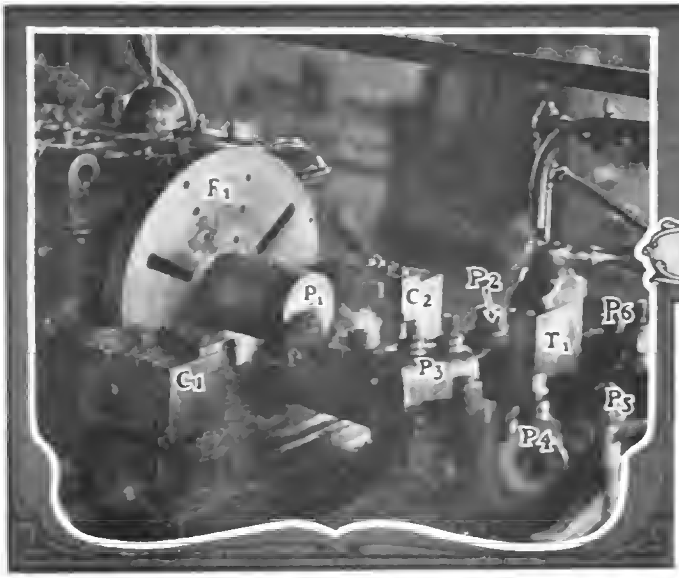


Fig. 1—Turret lathe working on pistons, many different operations being done at once

IT is very likely true that few of the relatively small garage repair shops will be fitted out with a large turret lathe, as shown in Fig. 1 (title illustration). New shops just fitting out might very well consider the excellent advantage of tools of this character, if they are large and substantially constructed.

In garage repair work new pistons have to be made quite frequently, and the figure is an illustration of a piston being finished on a turret lathe, in which F1 is the face plate of the lathe, P1 is the piston, C1 and C2 are side cutting tool holders, and P2, P3, P4, P5, P6, etc., are tool posts on the turret T1. The piston, prior to the present operation, was chucked, utilizing an accommodation piece which was cast on to the head. It was then bored inside to a definite dimension to a point approaching the bosses of the cross-head pin.

The next operation as here illustrated; after the piston was pressed over a mandrel, which is not shown because it is covered up, the work of exterior finishing was started. A turret lathe being capable of doing all the operations from a single setting, results in more accurate work because errors are liable to creep in during the setting up operations. As the work is here presented, the exterior of the piston is turned off, the grooves are completed and the finishing operation of the surface of the head is shown nearly completed.

In the normal course the next operation would be to drill for the cross-head pin, which is also capable of being performed in the same turret tool, which would bring the repair man up to the question of the hardened cross-head pin, which would have to be a press fit in the piston. This question of hardening is of sufficient importance to merit some discussion and will be taken up here, while the opportunity affords, with the hope, perchance, that chameleon methods involving cyanide of potassium will not be inflicted upon the owner of the automobile.

Nearly every workman who has had to do with repair work is imbued with the idea that he has a secret process which, if used, will make the parts everlasting. Against this is the avowed declaration of every metallurgist in the world whose reputation is worth considering, that there is no quick and simple method by which case-hardening can be accomplished with any degree of certainty excepting under conditions as follows:

(A) The material must be of a cementing character.
(B) Time is essential to the success of the process.
(C) The "cement" must be efficient for the purpose.

THE PRINCIPAL CHARACTERISTICS OF CEMENTING STEEL

When steel is cemented (case-hardened) the process has for its purpose the carbonization of the exterior, leaving the core as originally constituted. The reason why it is desired to carbonize the surface is because if the carbon is not in sufficient presence the surface will not be rendered hard in the quenching process. The reason for desiring a soft core is to eliminate the ills which are always present if high carbon obtains throughout the section. Were it not for this latter consideration it would not be necessary to case-harden at all, since the steel might be purchased of a character holding high carbon, and it would be rendered hard by the simple process of heating it to the desired temperature and thereafter quenching it in a suitable quenching bath, of which there are a number of choices as follows:

QUENCHING BATHS IN ORDER OF MERIT

(A) Mercury
(B) Acidulated water, ice cold
(C) Salt water, ice cold
(D) Salt water
(E) Solution of water and skimmed milk
(F) Lime water
(G) Fish oil
(H) Cod liver oil.

These solutions are in order of merit as respects their respective actions on the steel, but not in the order of merit from the point of view of general utility. Mercury for illustration, is


Fig. 2—Workmen dipping cylinder and other castings in pickling vat, previous to machining operations.

a most dangerous metal (in liquid form) to utilize in any heat-treating process, because mercurial fumes are frightfully poisonous and no matter how good the equipment used may be, even if it includes a well-installed exhaust fan, mercurial poison will ultimately affect the operator. For very small parts which are to be intensely hard a bath of mercury properly regulated may be occasionally used with impunity and the degrees of hardness of the quenched small parts will be in keeping with the most exacting needs. When the parts are of considerable mass, thus holding a high value of the heat units to be dissipated, it becomes necessary to utilize a safer quenching bath, and if the steel is of a water-quenching variety it is then possible to resort to the use of water either acidulated or saline.

Ice will go a long way toward maintaining a constant temperature of the water, particularly if the water is agitated during the quenching operation, but taking it as a whole, it is not quite up to the standard which is set in manufacturing plants, where heat-treatment processes have assumed all the proportions of a high art. In these large plants where the quenching operation is conducted with the utmost care, the baths are piped for air under pressure, and a nozzle is placed on the end of the submerged pipe so that when the air valve is opened which permits the air pressure to enter the bath, two ideas are satisfied:

(A) The liquid is refrigerated through the process which produces a lowering of the temperature when a gas (as air) is expanded from a sufficiently high pressure down to the atmospheric pressure.

(B) The exuding air agitates the water or other liquid violently and the vapor globules which form on the surfaces of the parts undergoing treatment are brushed off, due to this agitation, so that the quenching process is completed with the utmost dispatch.

Air to serve as a refrigerant must be expanded from a temperature above 60 pounds per square inch, and it might be advantageous to have this temperature even as high as 100 pounds per square inch. There are very few garages which are not equipped with compressed-air machinery, it being used for the purpose of storing air under pressure in order that it will be available for pumping up tires. This pressure is generally 80 pounds per square inch, and a line leading from this tank to the quenching bath in the repair shop will scarcely have to be with a large diameter pipe, and the results which will be realized will be far beyond the average expectation.

TWO GRADES OF CEMENTING STEEL TO CONSIDER

If the parts to be hardened are to have dual characteristics as highly kinetic and what the German calls "tough hard" the quenching bath will naturally be oil; cotton seed oil is much used in this class of work. Quenching in oil, however, does not produce a glass-hard surface, and if such is desired, cold salt water will be more nearly right. On the other hand, if the steel is not suitable for water-quenching work, the results will be disastrous, particularly if the work includes intricate shapes.

The real difference between the cementing steel which is serviceable for water-quenching and that which might work satisfactorily under conditions of oil-quenching, lies in the purity and the process of fabrication of the steel. In other words, for water-quenching a better product is demanded.

The carbon content will be the same in either case, and it has been stated many times that a cementing steel from the carbon point of view should be so low in carbon that it will not take on perceptible hardness when it is quenched from a high temperature before it is case-hardened. The carbon content to satisfy this condition must be under 20 points, and some metallurgists claim that perceptible hardness will obtain when the carbon content equals 16 points. In some of the best grades of automobile steel, the carbon content to satisfy cementing conditions is limited to 10 points, in which event the steel will serve perfectly, under conditions of water quenching, particularly if it is an acid open-hearth variety, low in sulphur and phosphorus. As a matter of fact, for water-quenching, an acid steel should be used, and the carbon content should be below 16 points.

In garage repair work where it is utterly impossible to consider that the steel will be from special heats, or of a "jewelry" variety, the mistake is sometimes made of selecting fairly good brands of relatively high-carbon steel basic in character, and chemically low in the metalloids. This comes nearer to being a mistake than anything else in the absence of intelligent treatment. It is probably safer to purchase what is known as machinery steel, limiting carbon to less than 10 points, even with the full knowledge of sulphur up to 0.10 and phosphorus keeping it company. The low carbon, to a very considerable extent, masks the metalloids, and after cementation the products work out extremely well for the small parts to which reference is made.

SOME DETAILS IN THE CEMENTING PROCESS

Since in all fairness, it is not possible to grow a depth of carbon by heating the parts to a cherry red, and smearing cyanide of potassium over the surfaces, then re-heating to the previous color and quenching, it becomes desirable to follow some more skillful process, which may be briefly set down as follows:

Pack the parts to be cemented in a cast-iron box, or a length of wrought-iron tubing, utilizing such cement material as ground bone, leather, or other like material, in which a certain amount of the cyanide can be utilized to advantage if the operator will take the pains to definitely compound the material on each occasion, when a batch is being made, in order that he will always be able to judge as to the effectiveness in a given time.

FURNACE USED IN CEMENTING WORK

Fig. 3 shows a cement box C1 on the fire-brick floor F1 over a furnace, as used in the Premier plant, in which the heat is indirect, there being a fire-brick wall protecting the work at all points. The damper R1 regulates the intensity of the heat, and the door S1 is closed. The operator is enabled to observe as to the color due to heat by sliding back the cover of the spy-hole, S1.

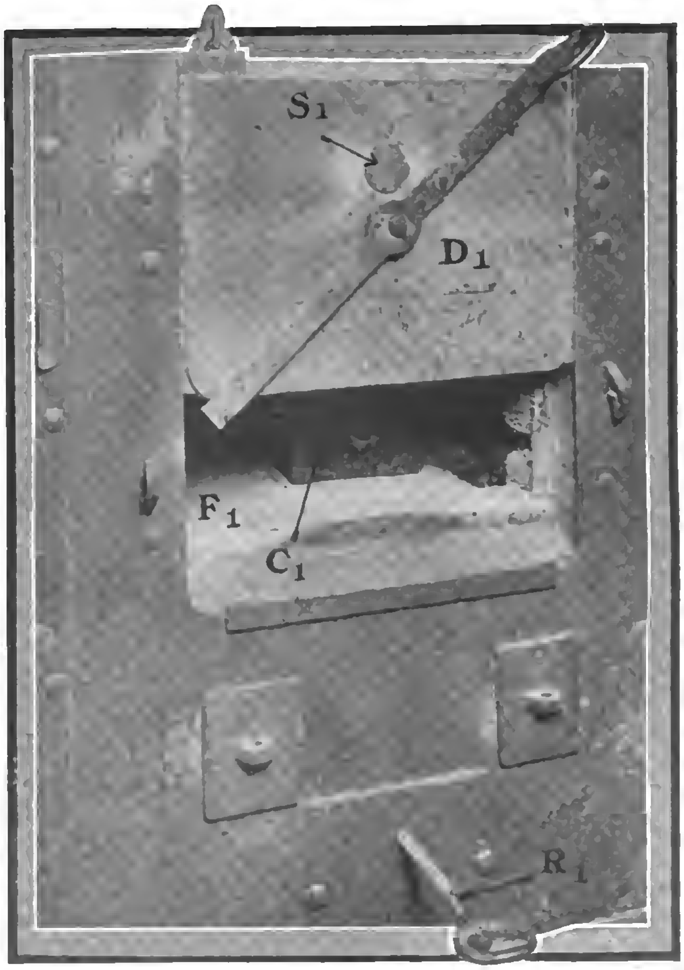


Fig. 3—Furnace in which gears, shafts, and similar parts are heat-treated

ACCIDENTS FOLLOW BLIND DRIVING ON THE ROAD

WINTER is the time when driving is the more difficult due to the presence of slush and snow, the narrowness of the beaten roadway, and lack of tractive ability of the road wheels of the automobile. There are many reasons why Winter driving is only to be indulged in by the autoist who, if accidents are to be avoided, knows how to manage his automobile. In Summer time, when roads are good, it is not unusual to see touring cars of some ability, picking up the road, as the saying goes, with little regard for the distance in which the motion can be arrested, it being true, as will be shown, that it takes a certain distance to stop a car under the most favorable conditions of the roadbed, no matter how good the brakes may be.

This speeding during the Summer's season makes excellent practice towards a first-rate smash-up when snow flies and roads become difficult. The months of practice under favorable conditions make no hint of the hazards which will lie in this same dexterity under the worse conditions to follow. Practice would be advantageous were there any relation between the skill of the driver and the distance in which motion can be arrested, that is to say, the space required in which to stop a given automobile after the brakes are applied.

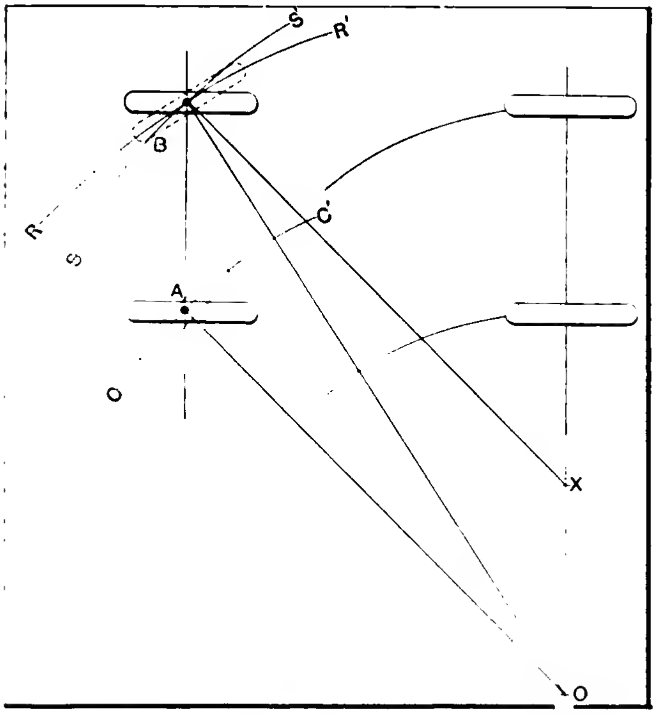


Fig. 1—Illustrating the lack of tracking of the front and rear wheels of an automobile on a curve

STATEMENT OF THE PROBLEM INVOLVING DISTANCE

According to Durand:

Let,

W = weight of the automobile;

F = energy which must be expended in bringing a car to rest, as measured in foot-pounds;

L = distance in feet over which the energy must be expended in the braking effort.

V = velocity in feet per second.

When,

$$\text{Energy} = \frac{W V^2}{2 \times g} = \frac{W V^2}{64.4} = \text{in the abstract.}$$

$$L = \frac{W V^2}{64.4 F}$$

$$F = \frac{W V^2}{64.4 L}$$

Without pursuing this phase of the problem further, granting that the expressions are based on fact, it is possible to make the point in view; the weight of the automobile will be constant,

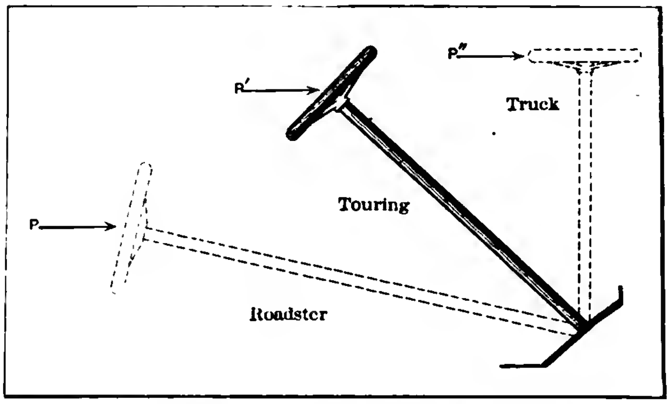


Fig. 2—Indicating different positions of steering wheels, and the increasing tilt with increasing speed

gravity will remain as ever, and the force F, which must be expended, will bring the automobile to rest when the value of the expended force is equal to the energy residing in the moving automobile, and not before.

Thus far there is no limit to the shortening of the time required to bring the car to rest, but it must be remembered that the tractive ability is limited, and, it has been found that traction, if it is exceeded by applying the brakes too hard, causing skidding, eliminates all possibility of stopping the automobile within the shortest possible time.

On a hard, level road it has been found that the tractive coefficient is about 0.60, and, on an iced incline, this coefficient reduces to about 0.10. There are all sorts of intervening possibilities, and it is on this account that autoists who practice up in the Summer time may, without half trying, end up in the Winter's snow-bank, or worse.

According to the accepted coefficient, if each rear wheel of an automobile sustains a weight of, say, 1,000 pounds, then the tractive effort (maximum) must be limited to 600 pounds, for the reason that:

$$0.60 \times 1{,}000 = 600.$$

BRAKES MUST BE IN GOOD WORKING ORDER

To equal 600 pounds on the periphery of a road wheel (at the point of road contact), if the brake-drum is one-third the diameter of the wheel, the pressure on the drum must produce an equivalent of:

$$3 \times 600 = 1{,}800 \text{ pounds.}$$

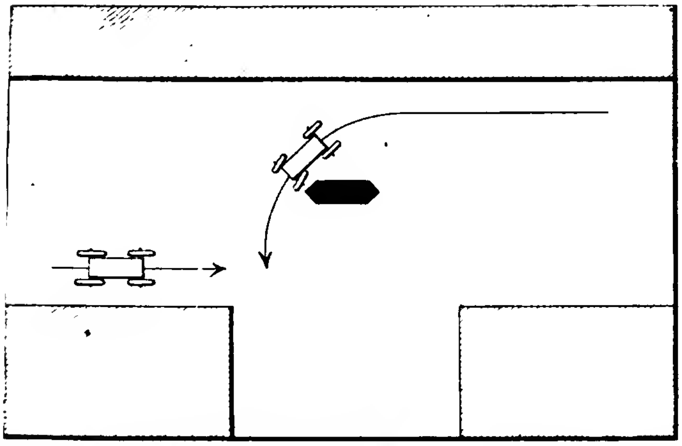


Fig. 3—Showing an approaching and a turning automobile under conditions of great danger

This drag on a brake drum of 12 inches in diameter would be:

$$P = \frac{1{,}800}{f} = \text{pressure applied by brakes.}$$

When

f = coefficient of friction of the brake shoes.

The coefficient depends upon the nature of the material used for facings on the shoes, and may be:

0.33 for cork inserts; 0.25 for asbestos fabric; 0.16 for dry leather; 0.08 for metal to metal.

Granting that the facings are so efficient as to afford 0.25 as the coefficient, the actual pressure will have to be:

$$P = \frac{1{,}800}{0.25} = 7{,}200 \text{ pounds.}$$

REAL DANGER LIES IN TURNING AT HIGH SPEED

Thus far it has been the aim to indicate briefly the possibilities, and it will now be in order to point out that all these limitations fail if the direction is not in a straight line. Just what it means to make turns at high speed is a matter to be treated at some

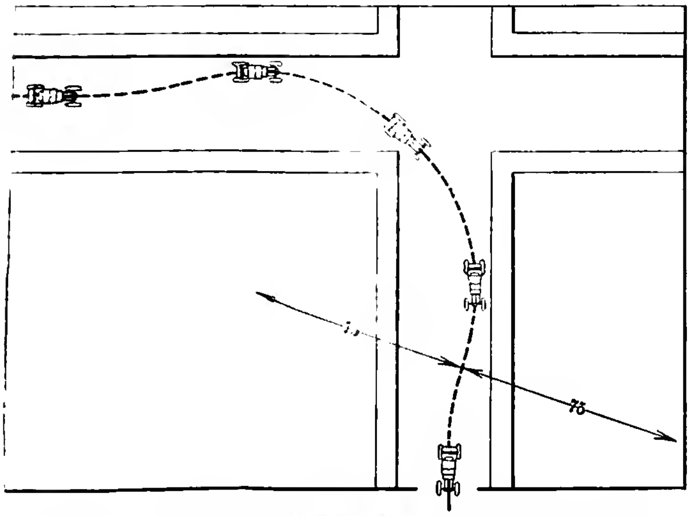


Fig. 4—How automobiles whisk around corners in high disregard of life, limb, and property

length, and, for the better understanding of the dangers, it will be taken up as a separate matter.

In driving, then, make speed on a hard, level road, when the line of vision is not intercepted by foliage, buildings, turns, etc. When it is necessary to turn out, slow down; if crossings are ahead, slow down anyway. Fig. 1 is offered to indicate that front and rear wheels do not "track" and that skidding is likely, even entirely beside the law of centrifugal force, because the rear wheels are very likely to find a bad spot in the road, even if the driver does guide the steering wheels in a good part of the road.

Fig. 2 is offered to illustrate another phase of the problem: If the location of the steering wheel is different from that which obtains in some car to which one may have become accustomed, it is dangerous to jump into the car and "hit it up" before becoming practiced and getting used to the new location. Standardization is one of the crying needs on this very account, and it is much to be hoped that the time will arrive when all automobiles will be exactly alike as to the steering gear and control.

Fig. 3 offers an opportunity to discuss the question of right away, and, with the "island," as shown in the middle of the road, it is easy enough to see that the automobile which is making the turn is in the right position, but this is no indication of the fact that this car should come to rest to enable the approaching car to go by. The driver of an approaching automobile would be justified in the belief that the turning car is going straight ahead, and it is the duty of the driver to see that the way is clear.

Fig. 4 illustrates the way turns are made when the guardians of the peace are out of sight, and, while there is no denying the

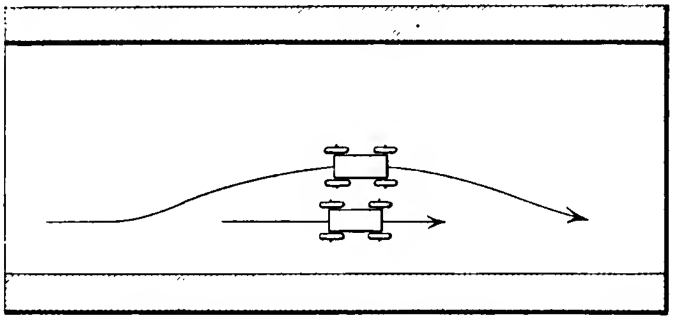


Fig. 5—Proper method of passing an overtaken vehicle, turning out to the left, which is then correct.

contention that it is the right way to do a curve at the highest possible speed without skidding, it is, nevertheless, wrong; the end will be an accident. This may be stated with certainty.

Fig. 6 shows how a turn should be made, but it must be remembered that a lookout must be kept for approaching automobiles, on the ground that the automobile which is about to make the turn has no right before the turn is actually made in safety to the car, other automobiles, and the public at large.

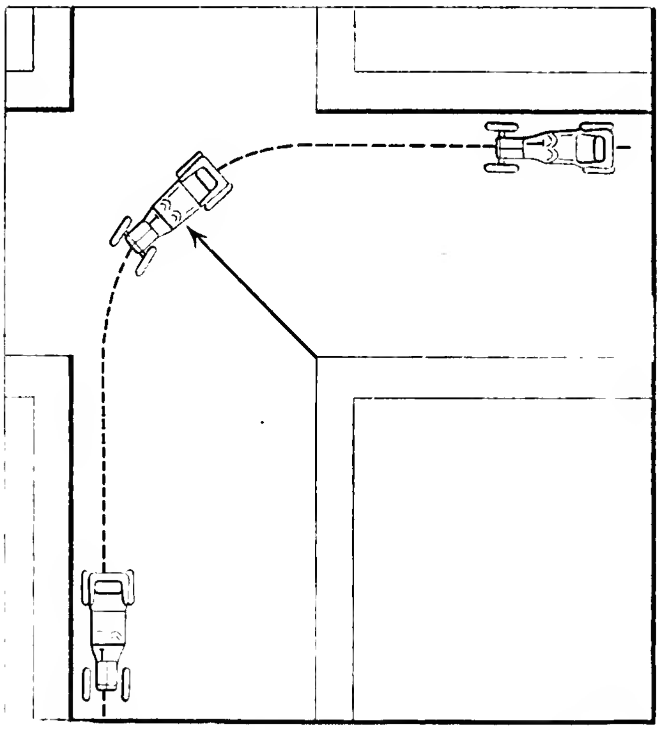


Fig. 6—How automobiles go around corners on a safe basis if the driver remembers his responsibility

GAS VELOCITY FORMULA

Editor THE AUTOMOBILE:

[2,149].—Will you please publish a formula under "Letters Interesting" for the velocity flow of gas through a 2 1-4 in. valve on a four-cylinder, four-cycle automobile engine of 4 1-2 in. bore by 5 in. stroke, 1,250 ft. piston travel, 78 pounds compression?

Racine, Wis. J. F. SLADKY.

The velocity flow depends upon the sizes of the pipes, as smaller pipes require a faster flow to supply the same amount of gas, while larger pipes would permit of a slower rate of flow. The size is usually formulated from the speed of gas flow. For exhaust gases 10,000 ft. per minute, and for inlet gas speed 6,000 ft. per minute are usual practice.

For the cylinders mentioned, the capacity is 79.52 cu. in. per cylinder every two revolutions. With the given piston speed and length of stroke, the rotary speed is 1,500 r. p. m. So the motor demands are

$$\frac{1,500}{2} \times 79.52, \text{ or } 59,610 \text{ cu. in. per min.}$$

This is equivalent to 34.5 cu. ft. per minute. Since the gas speed is known and the motor demands, also, dividing one by the other gives the area of the pipe which will allow that amount of gas to pass at that speed. Thus:

$$\frac{35.5}{6,000} = .00591 \text{ cu ft.} = 10.21 \text{ cu. in.}$$

Now, as the pipes are round, this area may be looked up in any table of area of circles, from which it is found that the diameter would be 3 5-8 in. Increasing the gas speed to 8,000 ft. decreases the diameter to 3 in., while a still further increase in speed to 10,000 ft. results in a pipe size of 2 1-2 in.

Put into formula form, this becomes:

$$\frac{ARL}{6,000 \times 12 \times 2} = \text{size of pipe.}$$

In which A is the area of the piston in square inches, L the stroke in inches, R the revolutions per minute, and the denominator is the allowable speed in feet per minute reduced to inches, while the factor 2 reduces the revolutions to one-half, on account of the gas being drawn in or exhausted but every other revolution. If the results do not suit, alter the first figure of the denominator to suit.

FIRING ORDER 8-CYLINDERS

Editor THE AUTOMOBILE:

[2,150].—Referring to the enclosed sheet, upon which I have given a number of firing orders, are these correct, and are there any more ways to fire an eight-cylinder, four-cycle, vertical engine with four-throw crankshaft, two cylinders to each throw, cranks set in pairs 180 deg. apart, pair groups 90 deg. apart? To make it clearer, I will say that the first and second cylinders are on one throw, third and fourth on another, each pair being 180 deg. apart; fifth and sixth and seventh and eighth are arranged in the same way 180 deg. apart, but the last two pairs are 90 deg. apart from the first two. Cylinders to fire 90 deg. apart. These are all of the different ways I could think of, and if there are any more I would like to have them. Please answer through "Letters Interesting, Answered and Discussed." A SUBSCRIBER.

On the enclosed sheet spoken of above are given all of the possible combinations of the eight numbers, 128 in all, some of them, in fact, being just the inversion of those previously given; that is, a number are given twice, the second being but an inversion of the first. The table is not reproduced for lack of space. Eliminating these, and also those in which the order as a whole is the same, but simply starts with a different number, the number of firing orders will be less—much less.

If the first and second cylinders are in the same pair, that is, in the same casting, while the third and fourth are also side by side and in the same casting, there must be an interval of 270 deg. after each 90-deg. interval. If, on the other hand, the first cylinder is in the same casting with number three, and number two with four, one and two being upon the same crankpin as described, while three and four are upon the next pin together, then, and then only, will it be possible to fire the cylinders so that there will be an exact and constantly recurring 90-deg. interval.

On page 117 of his work on "Balancing of Engines," Archibald Sharp discusses this subject in a very thorough manner.

COST OF COMFORT

Editor THE AUTOMOBILE:

[2,151].—Please give me some information as to tires without air—that is, solid tires, which have some sort of an interior air compartment, but which are not pumped up by means of air. READER.

Coldwater, O.

In the use of a tire of this sort, the majority of people taking them up are not only willing but glad to exchange the freedom from puncture for almost anything. With proper springing and semi-solid tires having a central, non-pumped-up air cushion, the riding qualities are all that can be desired, while the construction is such as to allow the driver to absolutely forget that such a thing as a puncture, air leak, etc., actually exists.

MAKERS OF AXLES

Editor THE AUTOMOBILE:

[2,152].—Will you please give me a little information? I have a rear axle, of which I would like the maker's name. The only mark on it is "H-D" or "O-D"; the stamp is not very plain, so I can not tell exactly which. The gear box is spherical in form.

Reading, Mich. C. A. BROWN.

We are unable to give you the name of the makers of this axle, as the mark (either of them) is one we have never heard of. The makers of this axle are invited to send in the name of their company, or, if preferred, may communicate direct with this party. Any one recognizing the make of axle is invited to help this party out of the dilemma.

FOND OF NICE BODIES

Editor THE AUTOMOBILE:

[2,153].—I beg to differ from you on the question of the automobile body as discussed in an editorial in The Automobile some time in December. The automobile is so unlike a carriage; you can have a magnificently finished carriage body and keep it fine; because of the large wheels and narrow tires it does not get all splashed up with mud and become spotted. It can be kept showy and for display. Not so with the automobile body; its speed, its small wheels with broad tires, which splash mud all over the body, likewise dust. It is more like a battleship in action, and hence the body should naturally, logically, and common-sense-like differ from the luxurious carriage body. The torpedo body refined is the body, and should be the new aluminum metal painted battleship, gray and not varnished. Nor should it be luxuriously rubbed down and recoated 18 or more times, just like a piece of parlor furniture. It soon gets all spotted up, and looks no better than a good job of painting. Then, if it were so made, it can be easily washed and wiped off, and, if marred, touched up and kept looking nice, yet have the look of utility, comfort and commonsense to it. The manufacturer who educates his clients to good practice along these lines, that the automobile is to use and not display, will win out by and by. W. P. LUCAS.

Oil City, Pa.

Little comment on the above seems necessary, except to say that instead of being a thing of the future, the body described is very much a thing of to-day, both of the Shows, just closed, showing a number of this kind. However, there will always be a very large class of people demanding and willing to pay for the highly finished body. This, too, in spite of the facts, so well brought out above, that the more highly finished the body, the greater the amount of work connected with keeping it in a condition commensurate with its finish.

ON HORSEPOWER RATINGS

Editor THE AUTOMOBILE:

[2,154].—Have you a chart or table for distribution showing rated horsepower of cylinders of various sizes? If you have not such a table, but the information has been given in your magazine, will you mention the date of issue? W. G. DUFFIELD.

Ottumwa, Ia.

The great majority of makers in this country use the A. L. A. M. formula, which is the bore of the cylinder squared times the number of cylinders, divided by two and a half. That is:

$$\text{Power} = \frac{2.5}{D^2 \times No.}$$

From this any sized engine will readily be computed, or by referring to the issue of The Automobile for January 14, 1909. page 100, you will find all of the common sizes, both in inches and millimeters, computed and listed in tabular form. In addition, you may obtain the same information from the handbook of the A. L. A. M., which is distributed gratuitously from the office at 7 West Forty-second street, New York City.

DIRECT FUEL INJECTION

Editor THE AUTOMOBILE:

[2,155].—Will you kindly answer the following questions through your column, "Letters Interesting, Answered and Discussed"? 1. I am designing a motor in which the fuel is to he injected hy means of a pump. The area of my cylinder is approximately 37.77 cu. in. and the clearance space 11.25 cu. in., giving a total area of 49.02 cu. in. What should he the diameter and stroke of my injecting plunger and the size and shape of the nozzle through which delivery is made into the cylinder? The design is such that at the time of fuel injection there can he nothing present in either cylinder or compression space save pure air.

2. In order to ohtain crankcase compression of 7 pounds per sq. in., what should he the crankcase volume as compared to the comhined volume of cylinder and compression space?

3. Assuming free air at 60 deg., what will be the temperature if compressed to 7 pounds pressure; also, what will he the drop in temperature due to instantaneous expansion of a given volume of air at this pressure, provided no moisture is present?

4. Is there any ohjection to the use of a steel casting for a motor cylinder where air cooling is contemplated, and, if not, what general reduction could he made in thickness of cylinder walls, as compared to cast iron?

5. If using inserted valve seats, what material would you recommend as capahle of standing up heat under high temperatures, also what would he the hest material for valves? LINCOLN A. LANG.

Castile, Wyo. Co., N. Y.

1. If the pump is so geared up as to deliver to each one of the cylinders in rotation, so that the size of the pump will be such as to equal the capacity of one cylinder per stroke, the bore and stroke should be so determined as to yield a weight of gasoline equal when vaporized to one-fifteenth of the total volume which you have given as 49.02 cu. in. That is, considering 15 to 1 as the proportion of air by weight, the pump should deliver its one-fifteenth. Delivery to the cylinders would best be made through an expanded nozzle to spread the spray around.

2. Compression follows approximately the law expressed as a formula in the form

$$\left(\frac{V_1}{V_2}\right)^{1.[illegible]} = \frac{P_2}{P_1}$$

in which V_1 is the original volume, P_1 the original pressure, V_2 the final volume, and P_2 the final pressure.

Taking 14 pounds per square inch as the original pressure and 14.7 pounds $+ 7 = 21.7$ as the final pressure, the volume is easily obtained by substitution, as:

$$\left(\frac{21.7}{14}\right)^{1.[illegible]} = \frac{49.01}{P_1}$$

Working this through, the answer is 88.8 cu. in. volume of crankcase to give 7 lbs. pressure, gage.

3. By substituting for V_1 T_2, and for V_2 T_1 in the above equation, the temperatures may be figured. The instantaneous drop cannot be figured in any simple manner.

4. Steel has been used for cylinder castings, and more particularly, for pistons. The principal objections to its use, if there can be said to be any, is the difficulty of casting it sufficiently thin for such parts as water jackets. If the cylinder in question was intended to have overhead valves and be air-cooled, there should be no trouble. The reduction in size or thickness should be made in the ratio of the strengths of the two metals. In this connection, Unwin gives cast iron an average tensile strength of 17,500 lbs. and cast steel 63,000 lbs. These figures would give a ratio of 1 to 3.6, or, say, 1 to 3. On this assumption it would be possible to make the steel cylinder walls one-third of the thickness which would be used for cast iron. However, do not take these figures as correct, and do not go below one-half of the usual thickness for iron.

5. Cast iron is considered very satisfactory for valve seats, while carbon-steel stems welded to a nickel-steel head makes an excellent valve.

CRYSTALLIZATION DANGER

Editor THE AUTOMOBILE:

[2,156].—At some cost of space, kindly permit me to recite a condition which confronts many autohomilists and for which they know of no remedy, hut which you may. I am still driving a 1907 car. It is a good one, stands up well, and answers my needs in every way. I am therefore reluctant to part with it, hecause of its present excellent service and for the further reason that the purchaser would he exposed to a hazard which I now feel is far from inconsiderahle. I refer to crystallization. The car has gone all of 10,000 miles, possibly 15,000, and I never get in it without the applehension that the axles or steering knuckles or rods or some part of the chassis may he crystallized through vihration and he no more than so much punk. It may go to pieces and run me and mine into ohlivion "without henefit of clergy" or other alleviatory circumstances. What thousands of owners wish to know is some method of detecting crystallization. There ought to he some process. Will you enlighten up, and thus enable many to add a needed sense of security to the joys of motoring?

HERVEY C. LIPPINCOTT.

Philadelphia.

Danger from this source is much exaggerated. If this were not so, would anyone be safe in riding in railroad trains, trolley cars, or other vehicles of a similar nature, in which a metal axle is used?

As for detecting such a remote possibility as partly crystallized axle or other piece of metal, there is no instrument known which will do this.

The crystallization of metals under repeated stress is an action which is not fully understood even to-day, some chemical engineers claiming that the allotropic changes in the constituents of the steel work out in a larger percentage of the softer alloys, in which manner the metal, as a whole, is weakened.

CORRECT PISTON CLEARANCE

Editor THE AUTOMOBILE:

[2,157].—Will you answer the following question? I have my car down and want to get it ready for another season. It has a high speed engine and not very much compression. My new set of piston rings help some in that line, hut the wear soon tells. The pistons are about nine one-thousandths (.009") small, the diameter of the cylinder 3 3-4 in. If I put in new pistons and allow ahout four one-thousandths (.004") clearance, will I get any bad effect, or will I have what the engine needs and should have had long ago? E. R. DAVIS.

Rockland, Me.

While the figures given differ from current practice, if the proper rings were used, the size of the piston should have no bearing upon the speed or compression. Usual practice in this respect is three-one-thousandths (.003) at the bottom and five-one-thousandths (.005) at the top, where the heat is greater, and consequently the expansion also. It is upon the rings that you depend for gas-tightness, and if you are not getting it, get new and stiffer rings. The change suggested might be tried, but stiffer rings would be better.

LEFT-HAND DRIVING

Editor THE AUTOMOBILE:

[2,158].—Will you state through "Letters" the so-called advantages of having the steering wheel and driver located on the left hand side of the car. C. M. LINGLE.

Graceton, Ind. Co., Pa.

Chief among the many advantages of left-hand driving is the fact that the driver is closest to all vehicles which he meets, and can thus avoid them most easily. Another reason is that a front seat passenger may be discharged at the curb without crawling over the driver or steering wheel. The weight of the driver balances the torque of the motor, and also, the inclination of the car due to the camber of the road.

GEAR-GRINDING NOISES

Editor THE AUTOMOBILE:

[2,159].—I have a Chalmers-Detroit type F car, made in 1909, which has always had the disagreeahle grating rattle at critical speeds, the same as your correspondent of the Decemher 9, 1909, issue. The manufacturers advance the theory that this is due to a vihration of the gears in the change speed transmission, and have agreed to replace these gears with others of a much tighter fit. Do you consider this change as one that would decrease the noise.

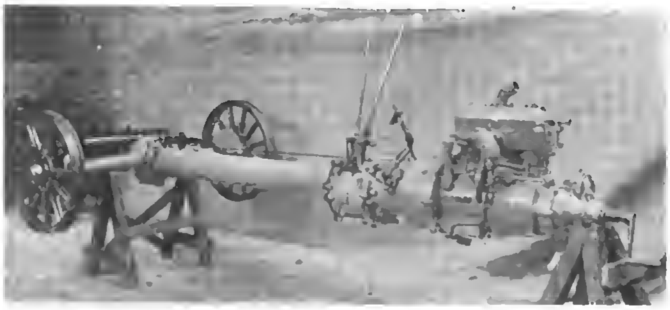
W. IRVING KIMBALL.

Philadelphia.

This change would very likely eliminate the noise entirely, else the makers would not have suggested it to you, since it is to their interest to have the car run as quietly as is possible. More than this they would hardly furnish you a new set of gears and a shaft free of charge, unless they were sure that it would help out in your present dilemma. In a letter from this firm, relating to the other correspondent to whom reference is made, the idea is advanced that much noise comes from an improper adjustment of the driving bevel gears in the rear axle. This is a matter which requires considerable experience in order to be sure that the gears are really meshing on their pitch lines.

A NEW FRENCH LIGHT CAR WITHOUT A CHASSIS

CARRYING along the tendency toward unit construction, of late an increased number of automobiles have been noted on which the whole effective mechanism is grouped in two parts. This construction takes two forms; in one the engine, clutch and transmission form the front unit, while the rear axle constitutes the rear or second unit. In the other, the engine and clutch form



Simplicia Chassis-Less Car as It Appears from Front

the front unit, while the gear box is an integral part of the rear axle a la Packard, this forming the second or rear unit.

In a recent French invention this process of combination and simplification is carried one step further, in that the engine, clutch, transmission, rear axle, torque tube and all operating levers are united into a single piece or unit. To the forward end of this the front cross-spring may be pivotally attached, the whole then constituting an automobile minus a body. This constitutes, then, the frameless car, or, as the French call it, the car *sans chassis.*

While the car has many advantages and disadvantages as compared with the ordinary car built up with a frame, it will be advisable to look into the construction first. With this idea in view, two pictures of the complete unit, as well as a constructional drawing, are herewith presented.

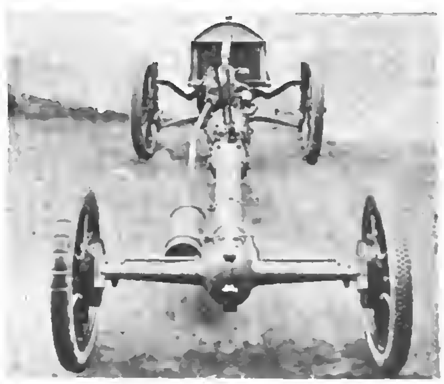
The engine is of the four-cylinder type, cast *en bloc*, the sizes being 75 mm. (2.95, almost 3 in.) bore by 100 mm. stroke, the English equivalent of the latter being 3 15-16 in. Roughly, then, the engine is 3 by 4, which would give a power rating of 14 horsepower. The makers, l'Aster, however, rate the engine unit at but 10-12 horsepower.

To the rear end of the crankcase, which is of the barrel type, with circular plates closing the ends and forming the end bearings, the clutch casing is bolted up, much on the style of the Chalmers-Detroit 30. The flywheel is of small diameter, as the design would seem to require, but this deficiency is made up by its length. At the rear end of the flywheel is carried the double cone clutch, close-coupled to the gear box, which furnishes three speeds and reverse, operating selectively.

To coact with the gear changing and facilitate the same, a shaft brake is furnished, which consists of an expanding band working in oil. To the rear end of the transmission case is fixed the torque tube, which in this case also acts as the connecting frame of the front and rear parts. This tube is apparently about 6 in. in diameter, with metal walls of a thickness between 5-16 and 3-8 in. It terminates at the rear end in a housing for the bevel gears and usual rear axle construction. The rear axle is of the full floating type, with the axles driving the wheels at the outer ends through the medium of jaw clutches.

Barring the engine, all rotating parts are mounted upon ball bearings. Motor cooling is by thermo-siphon, and the lubrication is force feed, with a gear-driven oil pump. In addition to the shaft spinning brake previously mentioned, a set of internal-expanding rear-wheel brakes are provided, these being operated through rods and levers mounted upon and carried by the large diameter main tube.

In the construction shown the tread is 53 1-2 in., and the wheelbase 98 3-4 in., but for larger car bodies—this one is for a taxicab—the tread may be increased as well as the wheelbase. Of course, with a longer wheelbase, as 101 1-4 in. for a double phaeton body, the tube becomes longer, all of the other parts remaining the same. Neither the construction nor the literature sent out by the makers, Lacoste & Battman, 15 Rue Danton, Levallois-Perret (Seine), France, show any change of diameter or thickness of metal for this elongation.

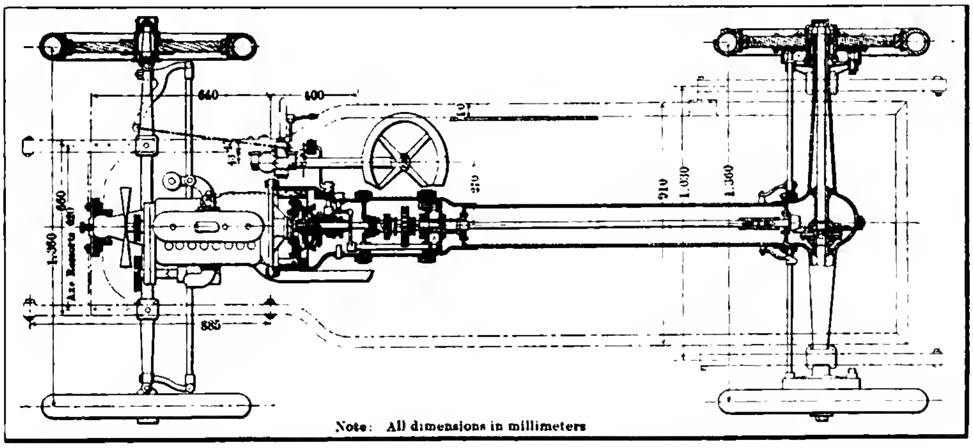


Simplicia Construction from Rear

Complete as shown, but without the front axle or steering gear, which appears to go with the axle as another unit, the weight is 400 kg., while the outfit with these items added, as well as the very necessary radiator, but without tires, weighs 550 kg. The former is equivalent to 882 pounds and the latter to 1,213 pounds. In the former condition the selling price is 4,400 fr., or $880, and for the latter 5,200 fr., or $1,040.

It might be pointed out that while this appears at first glance as simplicity simplified, when all things are considered, it is not. Thus, no provision is made for springs, radiator and water connections, lubricator telltale, ignition connection, steering gear, spark and throttle levers, gasoline tank and connections, etc. These would have to be added in part to the unit shown, while others would have to be carried by the body. Similarly, the whole rear weight appears to be unsprung, which, to put it mildly, would be hard on the wearing qualities of the parts.

More than this, the tube forming the main strength of the combination appears very light. Not every one likes the operating levers at the left, as this design locates them, with the driver at the right-hand side.



Working Drawing of Simplicia Construction, Showing Clutch, Transmission and Main Tube

NEW PEERLESS FRICTION SHOCK ABSORBER

IMPORTANT describes the position which is occupied by shock absorbers on automobiles. This was never better understood than it is at the present time, it now being realized that the life of the working components of an automobile is absolutely dependent upon:

(a) The dynamic characteristics of the material used.

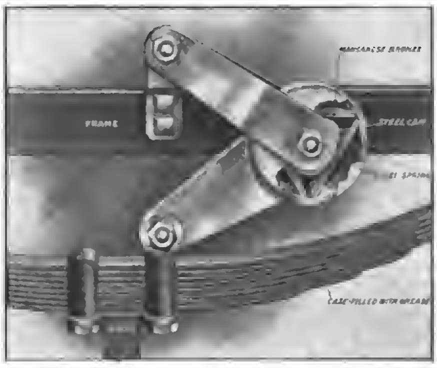
(b) The dampening of shock.

It makes no difference how good the material may be, its dynamic life is limited nevertheless, the only difference being that life will be longer if the material is better in a kinetic sense. Insurance statistics seem to prove more or less consistently that the life of a car increases enormously with its ability to travel fast, and high quality of material and construction does not apparently add sufficient to the life to satisfy the extra expenditure made to produce this quality.

It will be a matter of years, perhaps, before the law of the automobile as a road performer will be sufficiently understood to enable engineers to determine with absolute certainty as to the best way to definitely prolong life. As it is, even though engineers are working in the dark, to some extent, the fact remains that any method by which easy riding qualities may be induced into automobiles is the very one that is at the bottom of shock defeating conditions. Designers seem to be well along on the right road.

The extent to which all these conditions obtain depends upon the spring suspension of the automobile in so far as springs are capable and upon shock absorbers for the rest. The shock absorber situation has taken on an extremely important bearing in view of results obtained, but the accessories of this character, when they first put in an appearance, were scarcely equal to the character of the work which they were required to do. Improvement has been rapid, consistent, and it is now fairly understood that the shock absorber situation mechanically is on a sufficiently high plane to debar it from discussion in the haunts of incapacity.

The new Peerless shock absorber as here illustrated is so clearly presented that discussion would scarcely seem to add value unless to point out that the steel cam works against flat springs, placed in a triangular relation within the housing, and since the cam contour may be fashioned for any desired relation of resistance to action, it is possible to realize the most agreeable riding qualities, dampen the vertical bounce in the proportion which will eliminate shock, and adjustment of any kind becomes practically unnecessary, since all the faces are glass-hard and stability is the prime characteristic. This shock absorber is manufactured by the J. H. Sager Company, Rochester, N. Y.



New Peerless Shock Absorber

BALL AND SOCKET JOINTS WIDELY ADAPTED

THIS year there is a considerable migration in the direction of some of the earlier practices as they obtained in electric vehicle building a few years ago. Old-timers will remember that ball and socket joints were much used in some of the earlier vehicles, and it now seems that the fine qualities residing in this class of work are being missed. The illustration here offered is of the latest Pierce-Arrow practice, and, if cars of this make are examined, it will be found that there is a considerable addition of this type of joint, taking the place of "yoke" joints in several places. Last year the ball joint was limited to steering drag and cross rods, but now it is not uncommon to find that the ball joint is substituted. What is true of the cars already named is equally to be observed in Peerless, Packard and numerous of the other makes as well.

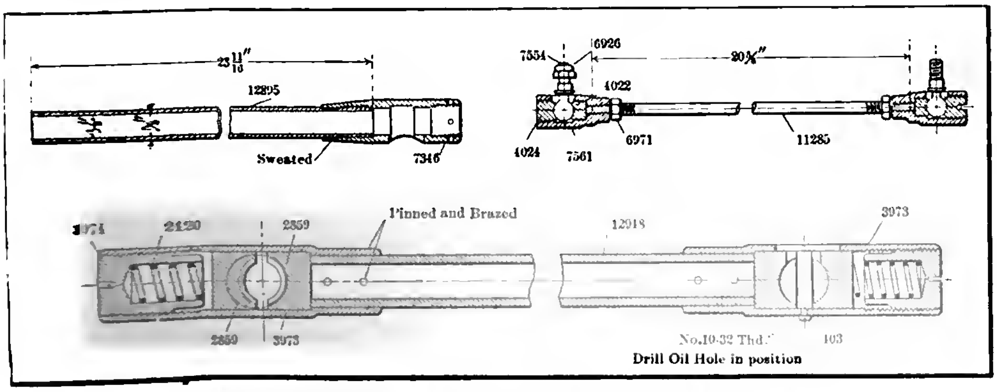
It is not always necessary to have the universal principle present in these links and levers, and in some of the cars this year a mixed system is employed. The ball and socket joint in these cases is limited to the members which have to be universal, and the yoke idea obtains for the balance. Fortunately when the universal joints are of good design the work imposed upon the remaining joints is very much reduced, and the final result is by way of a substantial improvement. That this reversion to an old idea is along permanent lines is more nearly true now that the methods of manufacturing ball and socket joints are so much refined as to eliminate the main reason for having abandoned them, some two or three years ago on the score of first cost, they are now cheaply made.

The advantages derived from the use of ball and socket joints are too well understood to require explaining, but the fact is sometimes lost sight of that a spherical bearing presents considerably more surface than that which will be available with a bolted yoke system. As an illustration of this point it is only necessary to make a single comparison:

(a) Pin bearing 1-2 x 1-2 inch affords 0.25 square inch of projected area provided the fit is within close limits of tolerance, which is not always true.

(b) Spherical bearing 1-2 inch in diameter, gives 0.7850 square inch, one-half of which would be 0.3925 square inch.

The advantage of adjustment is much in favor of spherical bearings in work of this character, and this is worth more, perhaps, than any other one point. The parts illustrated show evidences of much refinement, and it now looks as if the small parts around the carbureter and ignition systems of automobile motors will have parts of this character in the future to a considerable extent, they being preferred on account of quality.



Details of Component Parts of Pierce-Arrow Ball and Socket Joint

CONTROL SYSTEMS INVOLVING THE CARBURETER

DRIVERS, especially in trucking and delivery service, due to the high gear ratio of the "direct on high gear" system, usually the bevel drive, find it a little difficult to manipulate the control system in such a way as not to damage the motor when the desire is to slow down or stop. De-clutching is the first operation, but if, in performing this operation, the spark is not retarded, and the mixture throttled, the motor will "race."

The extent to which a motor will speed up (race) when the load is suddenly relieved as in de-clutching, depends upon the characteristic of the motor. To induce this undesirable racing, a motor should be designed as follows:

(a) The compression should be maximum possible within allowable limits from the point of view of pre-ignition.

(b) Valves should be as large as possible; half the bore of the cylinder being a good figure.

(c) Timing of the valves should be excellent; over-lapping and nice relations of inlet and exhaust valves with respect to the travel of the pistons would add.

(d) The valve motion should be as free from inertia as possible, in order to realize prompt closing.

(e) Springs, placed to close valves, should be of the right strength and alive.

(f) The carbureter should be with a sufficiently large opening, and wide enough in its range of good mixture to respond to sudden speed changes.

(g) The intake manifold should be relatively large in area; the suction depression should be limited.

(h) Exhaust manifold openings should be of large area, straight, and well balanced from the gas transfer point of view.

(i) Back pressure, due to inferior mufflers, should be avoided.

(j) Ignition should be thoroughly capable from the energy point of view, and well timed.

When all of the above conditions are properly cared for, the motor will accelerate at a terrific rate if load is suddenly relieved.

PUMPING LOSSES SHOULD NOT BE TAKEN ADVANTAGE OF

In an internal combustion motor of the types used in automobile work, the pumping losses, so called, are largely due to the very fact that the motor must pump the mixture into the cylinders, and pump the exhaust products out at the proper time, hence pumping losses. There are no pumping losses in a steam engine because the steam is generated under pressure and flows in inaided by suction of the engine; the exhaust flows out under pressure, and "clearance" is reduced to a minimum. In automobile motors the clearance is relatively very great—20 to 30 per cent.

If, in attempting to solve the control problem, pumping losses are taken advantage of, it is obvious that the ability of the power plant will be diminished accordingly, and it will then be right to state that, to prevent a motor from racing when the load is removed, it is necessary to fine it, so to speak, during all the time when it is doing its duty.

DISCUSSION OF THIS PROBLEM IS WHAT IS WANTED

If, in the near future, this matter could be "aired," it is more than likely that the accumulation of information which is bound to come from intelligent discussion, will result in much good to the industry. There are a great variety of conditions to be considered in a discussion of this sort, and, in all probability, some of the discussion would have to be revamped for special applications.

Fig. 1 shows how one truck builder went at it, preferring to employ a governor to control the speed of the motor when the clutch is removed, to obviate fusing the motor during its normal working periods, rather than have it run inefficiently on the one hand, or depreciate very rapidly, as it would, were no provision made to prevent excessive speeding. Inertia increases enormously with speed, as was shown in a discussion in THE AUTOMOBILE of December 23, page 1,096—Fig. 13.

The governor, Fig. 1, in this article, is of the horizontal flyball type, with a spring reaction, and it is connected to the auxiliary air valve of the Schebler carbureter in such a way that, when the motor is relieved of its load the governor throttles the mixture—at all other times the mixture is adjusted by the action of the governor for best results.

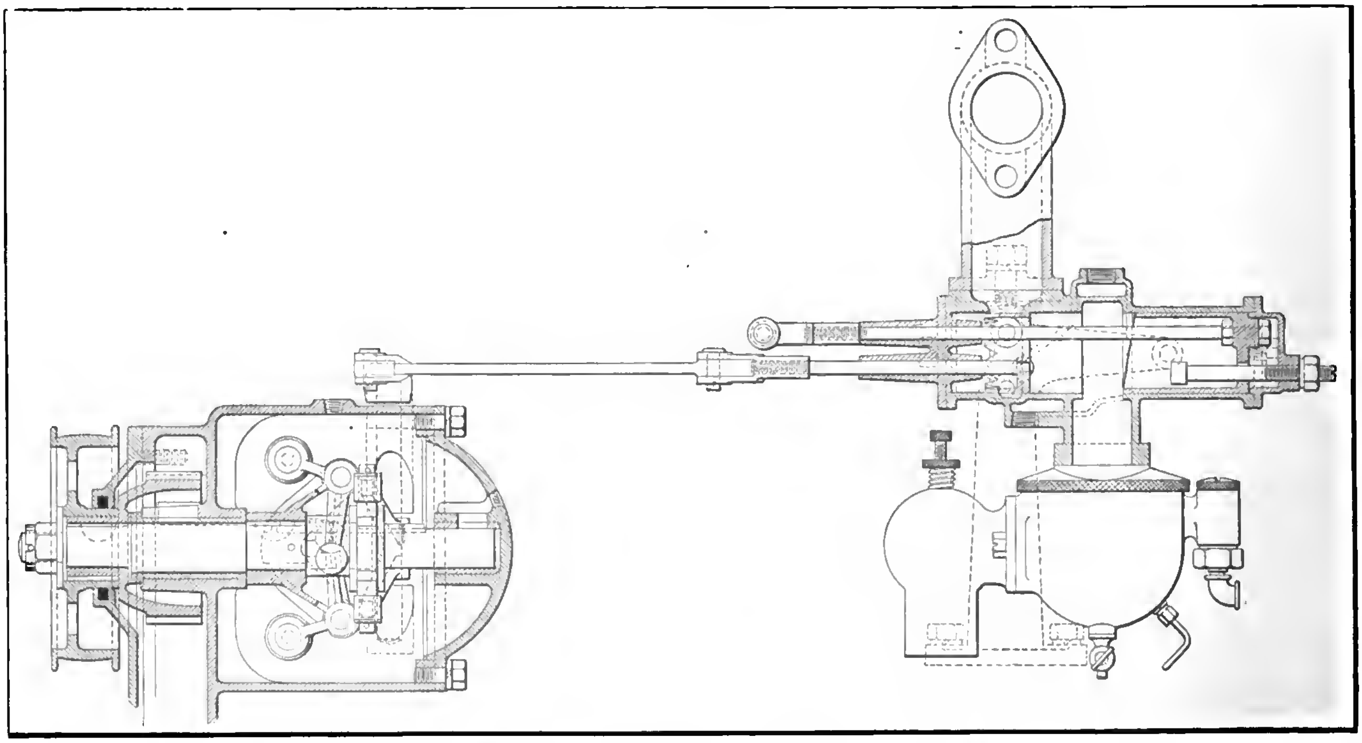


Fig. 1—Automatic control of carbureter, by means of a governor, as used on power plant of Alden-Sampson trucks

Homogeneousness of Mixtures Advantageous

Fig. 1—Ball bearing mounting of the shaft of Homo gasoline economizing device

AMONG the particularly interesting devices which came to public notice during the show period in New York this year, the Homo attracted a great deal of favorable comment, and in view of the importance which it occupies in the power plant part of automobiles, its priciples should be discussed.

This device is placed between the carbureter and the intake side of the motor, preferably close to the carbureter in the system, and it has for its purpose the function of splitting up the globule characteristics of the stream of gasoline which is entrained in the inrushing column of atmospheric air. The reason for desiring to destroy the globule formation of the atomized gasoline will be found if account is taken of several conditions, as follows:

(A) Liquid gasoline must be reduced to gas form, hence changed in its state of aggregation, requiring the exchange of heat in sufficient presence, before a mixture of an explosive character can be formed in the combustion chamber of the motor.

(B) The ability of the liquid in its atomized state to take up heat in a given time depends upon the surfaces of the sphere-like globules which form the atomized spray. The law of the surface of spheres must here be taken into account, in which the surface for mass is not in proportion.

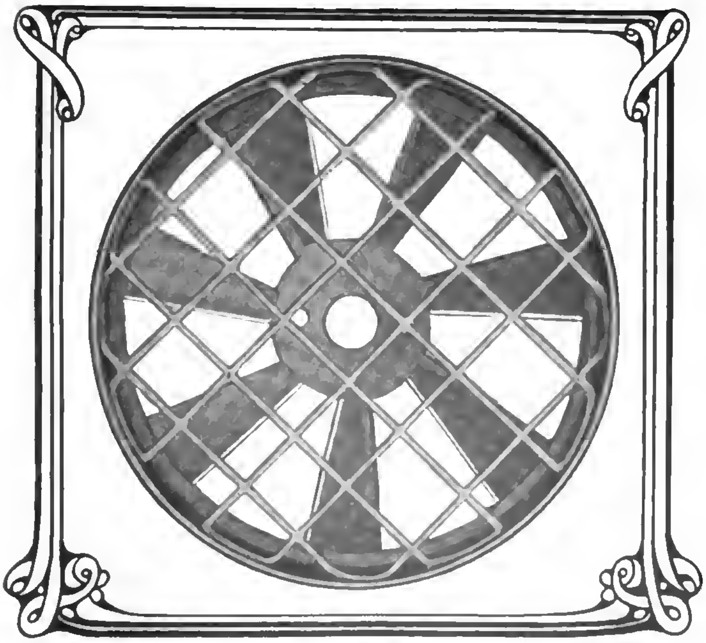


Fig. 2—Fan, which forms principal part of Homo device, and netting covering same

(C) Liquid gasoline if it is permitted to enter the combustion chamber of the motor will be broken down so rapidly after ignition that carbon will coke out.

(D) The exchange of heat which is necessary to form a gas out of a liquid depends upon the latent heat of evaporation of the liquid, and in gasoline like in other liquids, this latent heat has a definite value.

(E) The time factor depends upon (in addition to other factors) the difference in temperature between the liquid and the surrounding as well as upon the ratio of surface to mass.

There are divers other thermo-dynamic variations which will have to be reckoned with under the conditions obtaining, but the device which has been put upon the market under the trade name "Homo" by the Gasoline Motor Efficiency Company, of Jersey City, N. J., is contrived for the purpose of harmonizing the thermo-dynamic relations.

The device comprises a housing with an inlet and outlet orifice suitably flanged for ready insertion in the intake system, as shown in Fig. 1. The inlet orifice discloses a rather coarse wire mesh which will best be understood by examining Fig. 2. This wire mesh is fastened to the peripheral rim of a fan of the disc type.

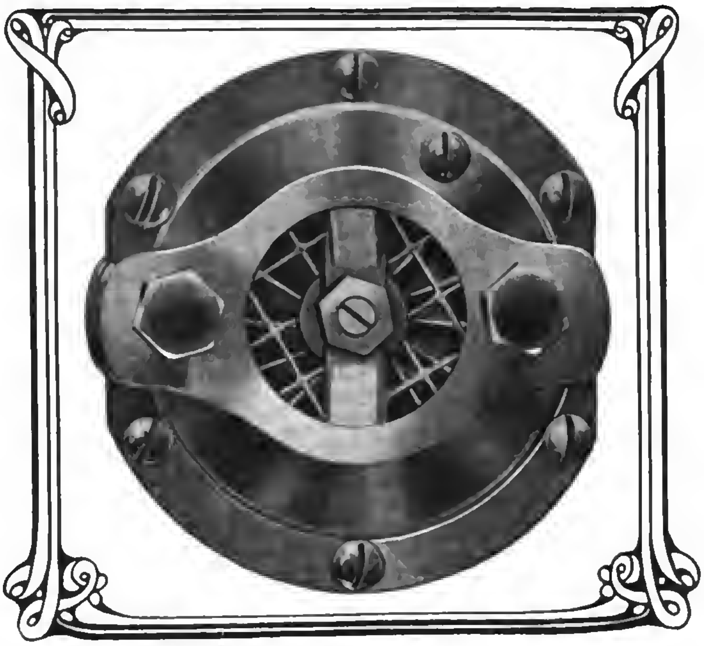


Fig. 3—General appearance of Homo mixer when assembled and ready to go in place

THE FAN IS ROTATED IN THE INRUSHING STREAM

The wire mesh which is attached to the fan rotates at the same speed and the stream of air with its entrained gasoline is intercepted by the wires of the mesh with the result that each globule of gasoline is shattered. This splitting up of the gasoline by mechanical contact takes on all the characteristics of a collision, the smaller particles of gasoline are in a much more receptive condition from the point of view of heat absorption because the surface for mass is greater.

The wire mesh performs an additional function in that it provides a series of paths through which heat is transferred from the region of higher temperature around the periphery and this heat is delivered to the relatively frigid particles of gasoline as they are broken up in the mechanical process. The instrument then performs in a more or less precise way the very functions which are necessary in order to produce a homogeneous mixture. The very process which promotes the change of the gasoline to its vapor state and mechanically mixes that vapor with the atmospheric air is that which aborts carbon precipitations.

IMPROVED TYPE HERZ HIGH-TENSION MAGNETO

IMPROVED just describes the 1910 line of magnetos of Herz & Co., New York City. This pioneer firm in ignition and electrical specialties has made several very important changes in the magnetos, but none of these is such as to be termed radical. That is to say, the magneto proper is the same old magneto but with 1910 improvements.

The whole line has been numbered along a systematic and regular method, which of itself identifies any one member of the series. Thus, the magnetos bear a symbol like this, 5 M 4. This means that it has five magnets, and is for igniting a four-cylinder engine.

All told, the line runs from 5 M 1 to 5 M 4 and 7 M 4. Then the larger sizes are from 5 M 6 to 7 M 6. This translated means that there are five-magnet machines for one, two, three and four cylinders, a seven-magnet machine for four cylinders, also five, six and seven-magnet machines for six-cylinders, making a total of eight different magnetos.

These magnetos have much larger magnet, the armature has been improved with a different winding, thus making the instrument stronger and increasing its efficiency. On the contact breaker the platinum points are larger in diameter and heavier than on the others, and the carbon-brush on the contact breaker is enclosed in a shell, while on last year's magnetos the same was pressed down with a flat spring.

On the four and six-cylinder type magnetos the secondary distributor carbon brushes are revolving against the plain surface, whereas the former types had the wipe principle on the inner circumference of the insulation.

In the line cut below, showing the construction of the 5 M 4 magneto, as well as the contact breaker and the driving end, the details may be remarked. Thus, it will be observed that the ball bearing has been adopted for exclusive use. Thus, the armature shaft runs on two ball bearings, while the distributor shaft is carried on two at the front end. In this same cut will be seen the unusual accessibility of the contact breaker, the cover of which is spring held in place. The spring is pivoted and a touch of the finger is sufficient to turn it aside, allowing the cover to be removed.

At the right, the view of the driving end shows the contact ring and the high-tension carbon brush binding post as well as the connection from there to the rear end of the high-tension distributor shaft. At the left, the details of the contact breaker are in evidence, among these being the increased size of platinum points, the large diameter of the same being plainly seen.

In this same view, the secondary distributor is shown in dotted lines above. The dotted lines also show the wiring to the various contacts from the binding posts. The ball-ended lever at the left is the spark advance lever, and is attached to the segments, which are rotated bodily to advance or retard the spark. In this same view, the component parts of the contact breaker are to be seen, with the much enlarged platinum tips.

The above are the principal points of improvement, although the entire magneto has undergone a general improvement on the minor parts. All parts are interchangeable and the magneto does not require any lubrication; the bearings are sufficiently lubricated to run for a year. Bearings and all other parts are dust-proof covered.

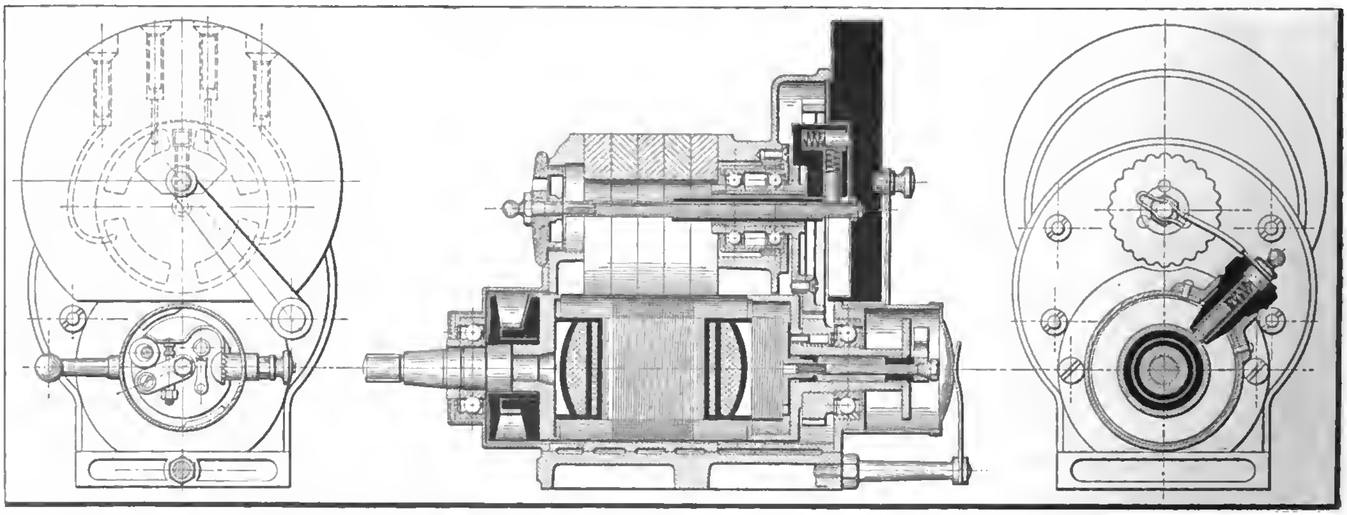
Finally, improvements have not only been made on the larger type magnetos, but also on all smaller types, whereon a much stronger magnet and better armature have been obtained, especially on the two-cylinder 45 degree V-shaped magnetos, on which the armature has been improved by reconstructing the same and changing the winding so that these magnetos are now superior to last year's type.

Below is given a table of the principal dimensions of several of the new Herz Magnetos, these allowing comparison with other makes. In this comparison, nothing very weighty will be found against the Herz product, for they are smaller and lighter than most of the makes now on the market. Service in the past has proved that this design affords an effcient and powerful ignition means. Reports from manufacturers and users have shown that the results are very satisfactory.

This, taken in conjunction with the present-chronicled improvements, bids fair to make the coming year a very prosperous one for the house of Herz, particularly in sales of magnetos.

Dimensions of 5 M 4 & 6 magnetos, also 7 M 4 & 6:

Base, 4 3-8 in. long by 3 1-8 in. wide	5 1-4 in. by 3 1-8 in.
Extreme length, 8 1-2 in.	9 1-4 in.
Base to end contact breaker cover, 1 3-8 in.	1 3-8 in.
Base to driving end shaft, 2 1-2 in.	2 1-2 in.
Base to end bearing box, 1 3-8 in.	1 3-8 in.
Length shaft taper, 5-8 in.	5-8 in.
Large diameter taper, .572 in.	.572 in.
Small end taper, .473 in.	.473 in.
Extreme width magneto, 4 3-8 in.	4 3-4 in.
Height base to top magneto, 5 1-4 in.	5 1-4 in.
Height base to top distributor and terminals, 8 3-4 in.	8 3-4 in.
Same, but without terminals, 7 1-4 in.	7 1-4 in.
Height base to center shaft, 1 3-4 in.	1 3-4 in.
Four hex. cap screws in base, 3-8 in. diam.	4 3-8 in.
End of base to center of screw holes, 11-16 in.	13-16 in.
Side of base to center of screw holes, 5-8 in.	9-16 in.



Three Views of the 1910 Type of Herz Magneto, Improved and Known as Model 5 M 4

VOLTA MAGNETO PRESENTS MUCH REFINEMENT

ARC-FLAME describes the type of the Volta magneto, generating the high-tension current in the armature, without the aid of an external coil. The field magnets, armature, interrupter and distributor, broadly follow standard lines. Other desirable features are the ability to adjust the contact points without stopping the engine; instant accessibility and replaceability of the condenser, and a distributor arrangement which practically obviates the tendency to spark across from one segment to the next. A simple dual system, using the same distributor and plugs, with separate coil for battery use only, completes the list of the more important features of this magneto.

A study of the illustrations, Figs. 1, 2 and 3, will show how the above results are accomplished. The first and most noticeable feature is the location of the condenser 68. Instead of being mounted on the armature shaft behind the interrupter, it is separately contained in a water-tight box, held by one screw and a pin where it may be withdrawn in a moment and replaced by a new condenser, should that be necessary. The cover plate over the armature is permanently sealed, and the armature is therefore enclosed water-tight. Removing the condenser from behind the interrupter permits the high-tension collector ring 65-6-7 to take its place directly under the hard rubber distributor housing 18. The high-tension current therefore goes directly up by the carbon collector brushes 24, 25, to the distributor. The housing fits the casing 29 beneath it so closely as to prevent water from entering and causing an incipient short-circuit.

Fig. 1—Front view of Volta magneto

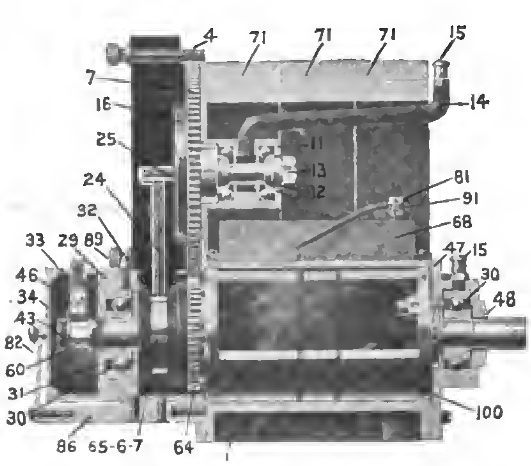


Fig. 2—Section on center line showing constructive details

ARMATURE SHAFT FLOATS ON BALL BEARINGS

Ball bearings 30 are of unusual size, and these bearings are separated by partitions from the rest of the mechanism. The oil cups 15, 32, deliver oil to the bearings, and drain outlets are provided underneath. Even that provision, however, would not be sufficient to prevent trouble from over-oiling were it not for the partitions just mentioned.

The interrupter, which is shown in Fig. 3, with the cover plate removed, differs from some other interrupters in that the cam itself rotates while the "breaker box" as a whole remains stationary. The cam, which is No. 60 in Fig. 2, is of hardened steel and runs against a steel roller 38. The contact screw 84 is stationary, and may be adjusted while the engine runs. The course of the primary current is through a central insulated wire passing through the armature shaft to the insulated button 43, through the flat spring 42 to the insulated mounting 36, thence from the contact arm to the grounded contact point 41. One of the binding posts 45 is connected to the condenser at 91, and the other connects with the ground switch.

The hard rubber housing 18 has no high tension contact segments. Instead, the rotating hard rubber disk 16 has a single T-shaped, inlaid brass segment, receiving current from the carbon brush 25. The cross bar of this segment travels around, making contact one at a time with as many carbon distributing brushes as there are cylinders. These brushes take the place of the usual stationary segments, and the brass segment takes the place of the usual distributing brush. The effect is to increase considerably the insulating distance from one collector brush to the next, since the brushes are much smaller than the usual segments. In this way arcing from one segment to the next is avoided. The clearance between armature and pole pieces is as small as accurate workmanship and due allowance for expansion from heat will permit. After being completely assembled the armature is brought to final size by grinding.

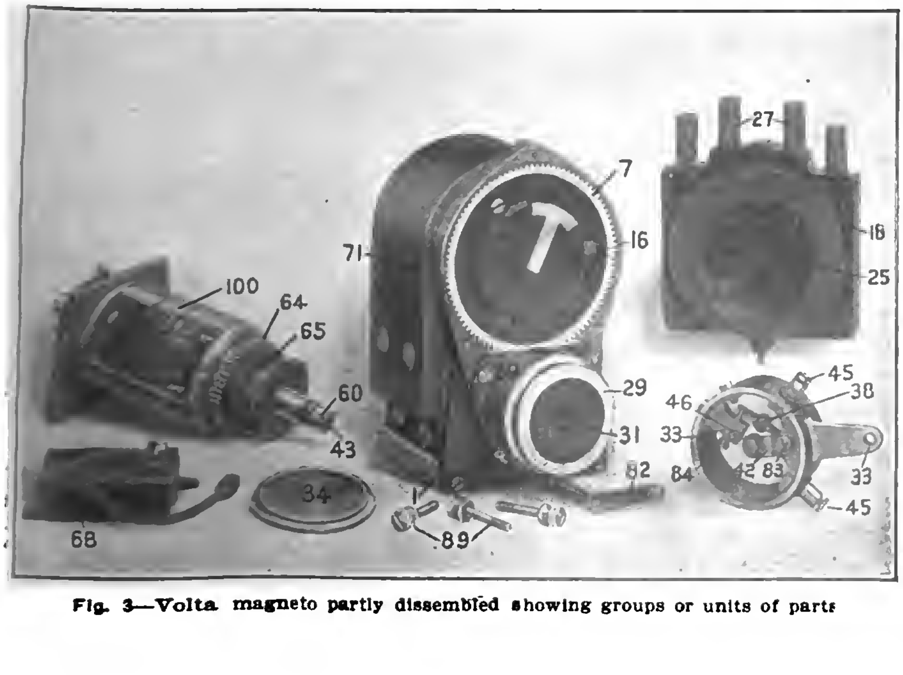


Fig. 3—Volta magneto partly dissembled showing groups or units of parts

Extreme care is taken in the winding and insulation of the armature. An automatic indicator shows the condition of the insulation continuously while the winding is in progress, and if the wire breaks or a short circuit occurs the fact is shown instantly. After winding, the armatures are baked and lacquered in such a manner as to expel every particle of moisture.

The field magnets are imported, and before being used are aged to determine whether they hold their magnetism. After ageing, they are tested for magnetic strength, and if not up to the required standard they are remagnetized and aged again. If the second test shows them to be deficient they are rejected, unless so close to the standard that a second remagnetizing will save them. The material used in the magnets is a special mixture known to produce the best results from the point of view of magnetic density and retentivity. The magnets are aged so that the magnetic performance will be the same for several years of good service.

Urban Scene in Which a Woods Electric Coupe Occupies the Foreground

Makers of electric cars in particular are wont to show their cars in scenes which suggest the comfort and refinement so characteristic of them. Here the Woods coupe, with its elegant lines and luxurious fittings, harmonizes perfectly with the entourage of the residential district in a Western city

Just forty years ago Dr. B. F. Goodrich moved about a dozen pieces of machinery from a half-successful rubber plant in New Jersey to Akron, O., locating on a small piece of ground which then cost $1,800. The machinery was all that was worth moving that distance. This meager outfit was put into a small brick building of two stories. This was the modest beginning of the first attempt to make rubber products in the United States outside of the Eastern and industrially established portion of the country. It was in 1880 that the business was incorporated under its present title, the B. F. Goodrich Company, with a capitalization of $100,000. Up to this time the output consisted of hose, belting, packing and moulded goods.

Shortly, the first factory enlargement was made at a small outlay. Then came another building and then another. Development was rapid. Buildings were added every year. The B. F. Goodrich Company now covers twenty acres with twenty-three acres of floor space and employs 5,000 men. From the modest start in 1870 the resources have grown to over $10,000,000 from its earnings alone.

Postmaster David C. Owen, of Milwaukee, Wis., originator of the idea of using automobiles for transportation of the mails, was in Washington, D. C., last week to report on the results obtained during the third year of this venture in Milwaukee. The general report issue by First Assistant Postmaster-General Grandfield shortly afterward, based on results in Milwaukee Washington, Boston and Indianapolis, is highly favorable to the automobile system. For the Milwaukee system the Johnson Service Company built four special-body cars, with steam power to start with, and this number has been increased to 14 for Milwaukee alone. Gasoline motors are used in the later models.

Among patents recently granted to Milwaukee inventors is one to George L. Odenbrett for a self-starter device for gasoline engines. It will be recalled that Mr. Odenbrett was killed by an explosion of a gas recharging tank in Milwaukee last November. He was probably the original automobilist of the Northwest and ranked high as an inventor. He perfected the self-starting device only a short time before his death. Manufacturers who investigated it had much faith in the device and gave Mr. Odenbrett much encouragement. W. C. Westaway, of Beloit, Wis., is another Wisconsin inventor who has just been granted patents on an ignition device.

The Excelsior Express & Standard Cab Company is about to enter the taxicab business in Pittsburg. It has purchased 20 four-seated, 20-horsepower taxicabs from the Atlas Motor Car Company, of Springfield, Mass., and service will be started in this city February 1. The company's offices will be at 1127-1133 Liberty avenue, opposite the Union Station, and its garage will be at 1133-1145 Liberty avenue. It will establish waiting points at the railroad stations, and will also have direct private telephone communication with the leading hotels. The officers of the company are: President, William H. Keech; vice-president, J. D. Callery; general manager, Joseph Ford.

At an annual meeting of the Swinehart Clincher, Tire and Rubber Company, W. W. Wuchter was elected president, succeeding J. A. Swinehart, the latter being elected vice-president. Other officers are: C. O. Baughman, secretary, and R. A. May, treasurer. Frank R. Talbot was elected to the board of directors to succeed J. O. Surbey. The rest of the board is as follows: Frank B. Theiss, William Byrider, R. A. May, Joseph Dangel, Frank R. Talbot, J. A. Swinehart and W. W. Wuchter.

Within the next four months the police department of Baltimore will have five automobile patrols in service, for the Board of Police Commissioners has placed an order with Callahan, Atkinson & Co., local agents for the Locomobile, for three more four-cylinder, 60-horsepower cars. These cars have a wheelbase of 148 inches. The first one in service, which is used in the central district, makes an average of 60 miles an hour and over, and has climbed high hills at a 40-mile rate.

During the recent snow in Columbus, Ohio, J. Shrum rigged up a motor sleigh which attracted much attention. It was made out of an ordinary sled, equipped with a third runner for steering and with a circular saw, which furnished the motive power in connection with an automobile motor. By an ingenious contrivance the circular saw was so fixed that by a lever it could be raised and lowered, thus adjusting it to the unevenness of the surface of the snow and ice.

It is said that the American Locomotive Company will greatly enlarge its automobile manufacturing department at Providence, R. I., and that it was recently decided to expend half a million dollars for this purpose. A portion of the appropriation will go for new tools and machinery and the balance toward the erection of new buildings. With these facilities this company will be able to double their output of Alco cars.

Indiana, Illinois and Wisconsin are after the Cobe trophy race for 1910. The initial contest at Crown Point, Ind., proved profitable, and the Indiana people feel that it will be hard to find a better circuit. W. C. Moore, president of the Wisconsin State Automobile Association, has a scout car out on the roads near Racine and Lake Geneva, and Frank B. Wood, strong for the Illinois course, announces that he has a circuit admirably suited for road racing.

The Racine Mfg. Co., of Racine, Wis., is now employing 50 per cent. of the total number of workmen in the big shops before the disastrous fire of December 12, which wiped out the buildings. As fast as new machinery can be installed in temporary quarters more skilled men are engaged. It is now definite that the company will remain in Racine, as business men and manufacturers have subscribed enough money to warrant an early start on the buildings.

New contracts will be let in Los Angeles, Cal., for the carrying of the United States mails in automobiles. These will conform closely to the regular screen wagons, of such style and construction as may be acceptable to the department. Each proposal must be accompanied with a statment naming the kind of vehicle to be used, giving a detailed description of the motor and wagon, and also the speed limit permitted for such vehicle in Los Angeles.

The house committee of the New Jersey Automobile and Motor Club will hold a smoker and entertainment on the night of February 10 in Newark. At that time the lecture on aviation will be delivered by Wilbur K. Kimball, secretary of the Aeronautic Association. It is expected that aviation will find the place as a branch of sport with this club, and that a large number of present members will enroll themselves as members of the aviation section.

E. Planche and C. Morel have established a garage and machine shop at 126 East Fifty-fourth street, New York City. All kinds of experimental work will be handled. A special repair-shop department will be maintained with the best French mechanics. Mr. Planche has been connected with the Walter Automobile Company as designer and superintendent.

Hartford is to have another modern garage. It is now under way, and is being built for E. J. Hoadley, on Hoadley place. The building is to be 46 x 90 feet, and will have about 4,000 feet of floor space, with no posts to interfere with the free passage of cars. The new building will be of brick and steel, and the foundations will be made sufficiently heavy to permit of additions.

Yielding to the protests of automobile manufacturers, the projected advance on freight rates which was to have been made by a transcontinental line will be held in abeyance until the next meeting of the Trans-Continental Freight Bureau. This decision means that the rates will remain at $3 per hundred pounds, or about $360 per carload. The increase ordered at a recent meeting would have raised the charge 33 1-3 per cent.

Wisconsin automobile manufacturers have been experiencing great difficulty in their testing divisions because of the heavy snows, general throughout the State of the last two weeks. The snows are the heaviest since 1881. The snow storms, however, have given splendid opportunity for unusual service tests, although under discomfort to the men at the wheels, who go forth with picks, shovels, chains, etc., for emergencies.

It is said that the American Automobile Company, Toledo, Ohio, has purchased Glidden Tour with another one, in which a perfect mechanical and road score will be rewarded with a certificate, and, while no announcement has been made, it is believed that this year the race will be through the Southland, where there is a rapidly developing market for low and medium-priced cars.

St. Louis has a new type of "rubberneck" wagon which has just been placed in commission by the "Seeing St. Louis" Automobile Company. The car is completely inclosed, insuring comfort during the cold weather, and also affording passengers a good view of the sights. Its carrying capacity is twelve persons, while the driver's seat provides for four additional ones.

Reports from San Francisco indicate that the hay market of that city is being seriously affected through the rapid increase in the number of automobiles, both of the pleasure and trucking classes. Livery stables and carriage companies claim to feel the passing of the horse, and one large carriage company was sold at auction because it could no longer make business pay.

George W. Armstrong, a member of the Board of Commissioners of Spokane, believes that the city should adopt auto fire apparatus and will advocate the change, saying that the cost of maintenance is much less than that of horses and wagons. Mayor N. S. Pratt and other officials look with favor upon the plan, and it is likely that it will be brought to a successful conclusion.

The latest thing in Indianapolis is a motor ambulance which, to all outward appearances, is but an elegantly appointed limousine pleasure car. A double floor eliminates all sound of the machinery while the patient is in the car, and, having all the outward earmarks of an ordinary car, the machine avoids arousing the morbid curiosity of street crowds.

A Hupmobile, driven by C. Z. Salling, covered the desert between Los Angeles, Cal., and Phoenix, Ariz., in 27 hours 40 minutes. The distance is 481 miles, a great part of it being heavy going on account of sand, and, owing to the isolated character of the road, it was impossible to secure supplies of any sort during the trip. All were carried on the car.

Chief Grant, of the fire department of South Bend, Ind., in his annual report renewed his request for an automobile chemical engine for the department. He recommends the purchasing of an automobile chemical engine equipped with two 60-gallon tanks and two sets of 1-inch hose, so that two leads could be worked at one fire.

"The Firestone Trio" is the title of a handsome art panel calendar which is being sent out to the trade by the Firestone Tire & Rubber Company, Akron, Ohio. It is 16 1-2 x 34 1-2 inch in size, lithographed in twelve colors, and has a large calendar pad, making it especially suitable for garage, salesrooms and office use.

In the future all automobiles owned by the city of Cleveland, Ohio, will be painted bright yellow with blue trimmings. It is expected that this striking and distinctive coloring will serve to give city cars a right of way, and, in addition, it may prevent unauthorized pleasure excursions and joy rides.

It is reported that plans are well under way by the Mitchell Motor Car Company for beginning the work of manufacture of taxicabs. According to Superintendent J. Bate, specifications for a taxicab which will attract considerable attention will shortly be made.

The "Flag to Flag" automobile contest and international event for motor cars and motor cycles will this year be run from Denver to the City of Mexico. The Wahlgreen trophy will be given the winner. The run will be carried out along the lines of the Glidden tour.

At a recent meeting of the Goshen, N. Y., Board of Trade it was decided to develop a Coates-Goshen automobile, and $150,000 was subscribed by individual members of the Board for a new factory, which will have an output of 150 cars a year.

A number of business men in Carlisle, Pa., have announced that they are about to establish an up-to-date garage and auto business. They will not only cater to the local trade, but will also have branches in several other towns and cities.

The board of trade in Little Rock, Ark., is backing a movement to convert the Clinton Park tract in that city into a speedway. The plot contains 106 acres, and, by incorporating a loop, a course 3 1-2 miles in length can be laid out.

The motorists of Texas have organized a State association and are now pushing a campaign for membership. Indications go to show that this association will become powerful among the automobile bodies of the country.

It is said there will be erected and made ready for use at the next Lakewood, N. J., season an automobile racing course which will cost at least $500,000. The course will be 8 miles in length and complete in every particular.

The Mitchell old model automobile, which was commandeered in San Francisco by General Frederick Funston at the time of the earthquake, is still doing service in that city, and bids fair to last many years.

Matt Weber, of LaCrosse, Wis., and A. J. Frogue, of Kansas City, Mo., have been granted patents on a tireless wheel for automobiles, based on the internal spring principles. Spokes are interchangeable.

The Monon Railroad Company will build an immense shed at Louisville, Ky., for the purpose of loading and unloading automobiles. Plans for the construction have already been drawn.

The Ohio State Highway Commission has filed estimates for the needs of the department for road improvement for 1910. It asks for $880,000, or $10,000 for each of the 88 counties in the State.

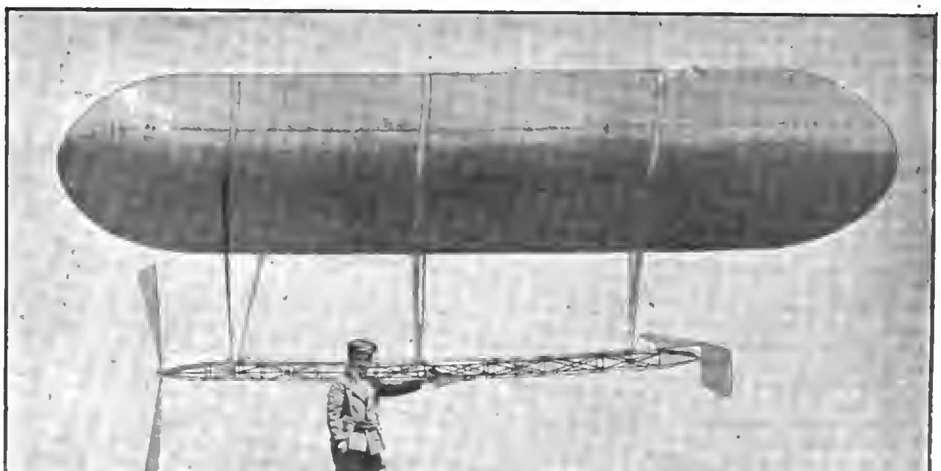
It is reported in Syracuse, N. Y., that an automobile stage route will be established between Seneca Falls and Ovid. A passenger and express service, it is said, would pay.

A recent chauffeur strike crippled the Brooklyn, N. Y., Taxicab Company and left that borough taxiless for quite a while.

The People's Natural Gas Company, of Wilkinsburg, Pa., has purchased a heavy motor truck for its deliveries.

COMING PHILADELPHIA AUTO EVENTS

The Quaker City Motor Club, of Philadelphia, is planning a number of events which, from a social and racing standpoint, will probably eclipse the efforts of 1909. The racing factors for this year will include the famous Fairmount Park race, several track meets, road-ability running, and other events to be decided on later. Track meets are booked for June 4 and August 6. They will be held at Point Breeze track. The Fairmount Park race will be held October 8.



Model of Dirigible Balloon Which Uses Hartford Rubber Company's Fabric

The dirigible is the work of a youthful resident of Hartford who gives promise of becoming a notable inventor. Although hardly of man-carrying size, or even of a size to carry its constructor, it can travel at fairly good speed and is readily controlled from the ground

Packard Testers Snow-Bucking on Grand Boulevard, Detroit

The recent heavy snowfall blocked the streets, and it was necessary to clear some of them immediately so that the fire department might not be hampered. In this work the ubiquitous testers made themselves of great service

The Love Garage Company, of Columbus, Ohio, a new corporation which handles the White, both steamer and gasoline, and the Cole "30" in central Ohio, has moved into the new building which was built especially for a sales agency and garage. The structure has two floors, with a total of 15,000 square feet of floor space. James P. Love is president; Fred E. Love, general manager, and M. L. Love, secretary and treasurer. C. W. Cain, formerly with the American Auto Company of Columbus, becomes sales agent for the Love company.

One hundred and eighty dealers of the Pence Automobile Company, of Minneapolis, Minn., operating garages throughout Minnesota, North and South Dakota, and Montana, paid a visit to the plant of the Buick Motor Company, at Flint, Mich., at the opening of the new year. The trip was made in a train of nine Pullman cars, and two days were spent by the visitors in looking over the works and in enjoying the hospitality of the Buick Motor Company.

A large repair shop will be opened in Boston by the E. R. Thomas Motor Co. This company is realizing that any car, no matter how well it is cared for, needs occasional adjustments and repairs, and so its building on Stanhope street will have a corps of expert mechanicians whose duties will be to make adjustments and give advice as to the running and maintenance of cars. Much of this service will be rendered free of charge.

When the Salt Lake City Automobile Show is held there will be among the exhibits a six-cylinder Franklin with which George T. O'Dell and party at Salt Lake City recently penetrated some of the coldest recesses of the Alps. It is said that in the chilliest of altitudes the car had no freezing trouble. With this car the same party climbed to within a mile and a quarter of Mt. Vesuvius.

Within the past 60 days the Simplex Motor Car Company, of Mishawaka, has added $60,000 worth of new machinery to its plant in order to take care of the orders ahead for its product. It is the intention of the company to turn out 350 complete cars in the next year, as compared with 100 last year. Salesrooms have been opened in New York City at Broadway and Fifty-eighth street, in charge of S. J. Wise & Co.

A partial reorganization of the Smith Automobile Company, Topeka, Kan., has been completed and an additional working capital of $100,000 provided to enable them to take care of the demand for cars. The new officers are O. H. L. Wernicke, Grand Rapids, Mich., President, succeeding Dr. L. Anton Smith, retiring. Walter L. Smith will take care of the distribution.

The New York Mica & Mfg. Co. recently purchased the plant and equipment of the Auburn Mica Company, of Auburn, N. Y., and will make a specialty of mica spark plugs. The new plant is the largest in the country for the manufacture of this article. The company will continue to manufacture the "Auburn" plug, and will add the "Wright" aviation plug especially designed for aeronautical motors.

In order to satisfy himself that the Moon "30" is as powerful on the road as under dyanmometer tests in the factory, Stewart MacDonald, vice-president of the Moon Motor Car Company, drove a $1,500 car from St. Louis to Washington, Mo., and back, a total distance of 150 miles. The test was entirely successful and not a tool was touched.

The Rainier Motor Company, holders of the $10,000 trophy, will place it on exhibition in a selected list of cities in which the feat of the Rainier stock car has created most interest. It will be in the custody of two attendants and a representative of a well-known detective agency. Boston, Philadelphia, Chicago and other large cities will be included.

The Hartford Automobile & Boat Supply Company has filed a certificate of incorporation with the Connecticut Secretary of State. The purpose of the concern is to manufacture and sell automobiles and motor-cycles. The capital stock is $50,000, of which $4,000 is paid in. The incorporators are T. Edward Oakes, William J. Rabbitt and Geo. J. Stoner, of Hartford.

The Boston Offices of the United Vehicle Company have been removed from State street to 107 Massachusetts avenue, this latter address to be the local headquarters of the concern. The company has purchased a factory at Woodville and will erect new buildings to be used as factory offices. The product of their plant will be known as United trucks.

Fourteen carloads of steel for the new plant of the Corliss Motor Co., of Corliss, Wis., the $1,000,000 concern formed to produce the former Owen Thomas Six, have already arrived at Corliss and several carloads are coming daily. The owners of the company are also proprietors of several big steel mills in the vicinity of Pittsburg.

It is stated that plans have been completed for an up-to-date garage to be built by H. W. Brown on Water street, Albany, N. Y. It is estimated that 100 cars can be accommodated on the ground floor. The second floor will be divided into sales and storage rooms, while arrangements will be made on the roof for the landing of airships.

The Public Automobile Service Corporation has filed articles of incorporation at Newark, N. J. Its object will be to operate a taxicab service wheresoever it is required. Wm. R. Buehler, of New York, is said to be the principal incorporator, while Chas. E. S. Thorn, of Newark, N. J., is mentioned as the local agent.

A new car is to make its appearance in Pittsburg, Pa., in the shape of the Ohio "40," made by the Ohio Motor Car Company, of Cincinnati, Ohio. The new machine is to be handled by the Park Automobile Company. The company was recently reorganized by J. C. Armour, H. G. Knapp and Major A. G. C. Quay.

A new firm in the automobile world of Syracuse this season is that of Morrison & Smith, Syracuse, N. Y., who have opened an agency at 109 South State street, where the National and the Palmer-Singer may be seen. Charles J. Roehm, who for some time has represented the National, has taken up work for the new firm.

The Continental Caoutchouc Company is offering a dual demountable rim on which two pneumatic tires are fitted, making four tires on the rear wheels. These rims are designed for heavy trucks and commercial cars. This rim affords quick tire changes and any style clincher tire can be used on it.

The Buick Motor Company, Flint, Mich., has filed articles of incorporation and a statement to do business in Wisconsin. The capital stock is given at $500,000. This is the formal step necessary to the establishment of a branch in Milwaukee. George P. Hewitt, Matthews building, is the manager.

Carson, Pirie, Scott & Company have decided to use the Rapid automobiles for the transportation of goods from warehouse to delivery stations. This firm has already received three 3-ton trucks; more trucks of this type, as well as several 1 and 2-ton wagons, are scheduled for future delivery.

C. Roy Clough, manager of the Columbus, Ohio, branch of the Charles Schiear Motor Car Company, has placed the following sugabencies in Ohio for the Hupmobile: Kenton Auto and Electric Company, Kenton; Walter W. Wood, Marietta; Fritz Bros., Zanesville, and Fritz Bros., Cambridge.

The Pittsburg Automobile Company, now capitalized at $50,000, which has removed to Baum street, East End, has leased its former location at Seventh avenue and Grant boulevard to Leo Kaufman, who will conduct a large establishment in auto supplies and auto oils.

The Richards Iron Works at Manitowoc, Wis., is experimenting in the manufacture of motors for commercial and pleasure vehicles, and on the success of the experiment depends the matter of the establishment of a large plant for the construction of complete cars and trucks.

The first automobile ever made in Findlay, Ohio, will be ready for inspection about March 1. It is now being assembled in the Findlay Carriage Company plant. The car will be a five-passenger with a 124-inch wheelbase of 55 horsepower, and with a speed limit of 60 miles an hour.

The Eastern Automobile Company, of Bangor, Me., will open a new sales, storage and repair room, conducting a regular garage business and handling accessories for the wholesale and retail trade. The Oldsmobile, Oakland, Overland and Buick will be represented.

The Francisco Motor Car Company, Columbus, organized recently to take the Central Ohio agency for the Ohio, has located an office at 338 North High street. A salesroom will be leased later. The company is a partnership, consisting of J. B. and C. M. Francisco.

The E. M. F. car will be represented in Indianapolis by the Reliable Auto Exchange, of 820 East Washington street. The company has obtained an option on a salesroom on Massachusetts avenue, and will probably occupy the new quarters in the near future.

Harry B. Sims has been appointed sales agent for the Charles S. Schiear Motor Car Company in Columbus, Ohio. He will pay particular attention to the Hupmobile and Velie lines. Mr. Sims was formerly secretary of the Columbus Automobile Club.

The Bellevue Automobile Company has been formed by George J. Kurtz, J. H. Ehrhardt, Alton Hamilton, William Bittel and Louis Appel, and will start in business at once in Bellevue, Pittsburg's most aristocratic North Side suburb.

The Bruck Automobile Selling Company, Trenton, N. J., has been incorporated with a capital of $30,000. The incorporators are Norman P. Bruck, Edwin H. Steel and Levy H. Drisdon. This company will conduct a general automobile business.

The Empire Tire Company, of Trenton, N. J., has secured the service of J. M. Shackleford, who will manage the New York uptown branch at 73d Street and Broadway. Mr. Shackleford succeeds Marcus Allan, recently resigned.

The Crest Motor Car Company, Cleveland, Ohio, is to handle the new Warren car, manufactured in Detroit, Mich. The company is to open up headquarters on Euclid avenue, under the management of Messrs. Bunnell & Bishop.

The Mauser Auto-cab Company has been incorporated in Youngstown, Ohio, to do general taxicab and motor business. According to A. E. Elkins, who is to be manager of the company, a line of Cadillac taxicabs will be used.

The Colorado Studebaker Vehicle Company, of Denver, has a salesroom which is said to equal the best salesroom in the United States in appearance and lighting. It is one of Denver's show places.

The Cumberland Garage, of Brooklyn, will handle the Speedwell and Velie cars in that city. The garage company is composed of Alfred Witmarth, ex-president of the Long Island Automobile Club, and W. L. Gray.

The Thomas Company have established a direct branch of their business in Boston. C. S. Henshaw is the Eastern manager. This concern is located in the Back Bay section.

C. M. Blair, of Bartlett, Texas, will in the future handle the Great Western "30s" exclusively. William M. Crow, Millersburg, Ohio, will handle this same car in Holmes County, Ohio.

The Standard Motor Car Company, of 614 North Broad street, has just made a contract with the Velie Motor Car Company, of Moline, Ill., to handle the Velie in the Quaker City.

C. H. Davis, a well-known automobile man, of Alameda County, has been appointed agent for the Cartercar Automobile Company in this city, and is shortly to establish headquarters on 12th street.

PERSONAL TRADE MENTION

George Robertson spent a busy day last week at the factory of the Parry Auto Company at Indianapolis, for which he is the New York agent, in association with H. C. Mergenthaler. He made a careful inspection of the Parry models under the various stages of construction, and expressed himself as well pleased. The Parry plant is now working 600 men and turning out on an average of 18 cars a day.

A. R. Van Antwerp has become president of the Van Automobile Company, of St. Louis, vice C. F. Lorenz resigned. C. E. Darrow will be associated with the company as secretary and treasurer. Don A. Livingston will remain as head salesman, and C. E. Weaver, foreman of the garage, will be retained.

George W. Demack, who has been connected with the Revol Company, New Orleans, La., is planning to go into business on his own account. He has already selected a site for his building, and work is to commence shortly on the erection of a first-class garage and repair establishment.

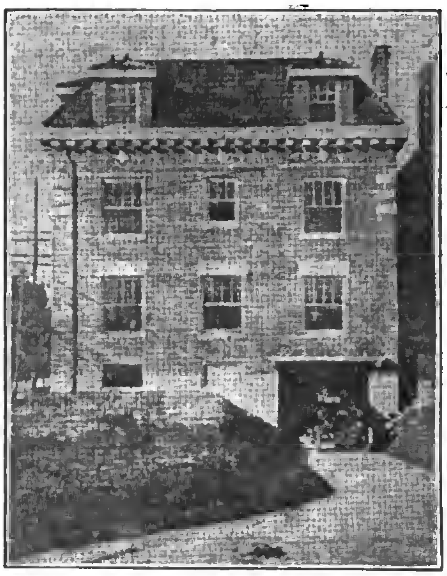
George L. Dorr, president and manager of the United Motor Company Agency for the American and Sterling cars, has leased quarters in New York for an Eastern branch of the concern. This concern has contracted for the entire output of the Sterling. They have placed 61 agencies.

W. H. Dotzaur, of Ilion, N. Y., has been appointed superintendent of the automobile hub department of the Weston-Mott Company, of Flint, Mich. Mr. Dotzaur has been connected with the Remington Arms Company in various capacities for several years.

H. C. Gottfried, manager of the General Motor Car Company, St. Louis, has sold his interest in the concern to J. H. Hutchison and S. H. Kohn, stockholders in the company. This leaves the two latter named in full control of the concern.

W. F. Plastine, of Seattle, Wash., has been appointed manager of the electric sales and garage business of the Studebaker Automobile Company. He was formerly with the Baker Motor Vehicle Company of Cleveland, Ohio.

J. N. Willys, of the Overland Automobile Company, Toledo, Ohio, has purchased the Payne shops in Elmira, N. Y. The plant is to be devoted to the manufacturing of various parts for the Overland cars.



Combined Residence and Garage

Dr. R. Y. Henry's new home on South Grand avenue, St. Louis, has a garage in the basement, thus solving the garage problem once and for all. In the photograph the doctor is shown driving out in his KisselKar

C. F. Frith and Charles G. Short, formerly of Wamego, are to go into the automobile general garage business in Topeka, Kan. Work has been commenced on the erection of an automobile plant.

MANY NEW CONCERNS IN OHIO

COLUMBUS, O., Jan. 25—A number of new concerns have been organized in Columbus to act as agents for cars and to do a garage business. The Francisco Motor Car Company will handle the Ohio and will be at 338 N. High st.

The Ohio Auto Company has been incorporated with a capital stock of $20,000 to take over the garage business of R. L. Patterson at 121 South Third street. Mr. Patterson recently purchased the business from F. H. Lawell. The incorporators are R. H. Kissinger, F. S. Armstrong, R. L. Patterson, Kerr R. Hosey and Theodore A. Patterson.

The Spangler Automobile Company of Circleville, Ohio, was incorporated with a capital of $10,000 by William I. Spangler and others to operate a sales agency and garage business at that place.

The Cleveland Speed Indicator Company was incorporated recently with a capital stock of $5,000 by William H. Marlatt and others to manufacture a speedometer.

The Booth Dismountable Rim Company of Cleveland was incorporated with a capital of $50,000 by W. N. Booth and others to establish a plant for the manufacture of auto rims.

E. H. Huffman, who has been conducting an implement store at 114 East Town street, Columbus, has taken the Central Ohio agency for the International Automobiles and also the commercial car manufactured by the International Harvester Company. The concern will sell roadsters and light delivery wagons.

G. D. Wilson, of the Norris-Toledo Motor Sales Company, of Toledo, has placed the Central Ohio agency for the Parry car with E. C. Barr, Columbus, who has been operating a supply store and motor cycle agency under the name of the Franklin Cycle & Supply Company. He now has the Parry and Demot cars.

INDEX TO ADVERTISERS

CHICAGO will witness the opening of the Ninth Annual Show of the N. A. A. M. at the Coliseum on the 5th proximo, and from indications, with a precision as to time, which would serve as a standard for the "Twentieth Century Limited" to go by. There will be 78 makes of automobiles, and in some cases several models of the respective makes on view, they coming from the Licensed Association for the most part, the A. M. C. M. A. to a considerable extent, and a few outsiders, to swell the list. Pleasure vehicles of the gasoline type will represent the bulk of the exhibitors, but electric vehicles will also be in greater presence, and as to commercials, there will be enough of them to adequately indicate that this phase of the automobile industry is now coming into its own.

Those who may not have paid attention to the growth of the automobile industry, would scarcely be able to realize just what this show represents. From the baker's dozen of exhibitors who braved the public at the first show, to the stupendous array of this, the ninth annual exhibition, represents, when the truth is told, the difference between less than $100,000 as the value of the first year's product, and $500,000,000 which is a fair estimate for the present year, counting the money which changes hands in the conduct of the automobile business which would not change hands otherwise.

Between 1908 and 1909, according to the A. L. A. M. records, the automobiles produced by association members increased 130 per cent., but 1910 over 1909 will show an increase, in all probability, of 200 per cent., which figures show absolutely nothing of the increase in quality of the cars produced from year to year. This question of quality is sufficiently broad in its aspect as to include in its makeup a decided advance in the methods of fabricating steel, a wide variation in the details of the production of castings, and as to machine tools, they to-day, as the direct result of the demand of automobile makers, are so much more capable that it is quite impossible to make an estimate which will be believable if it portrays the facts.

Measuring this exhibition in terms of the prosperity which it has engendered, it would be enough to point out the influence it has brought to bear on the machine tool industry alone. It has been conservatively estimated that the value of the new machine tools which were brought into Detroit alone, to satisfy the automobile requirement, was not far from $85,000,000. It is a well-established fact that the price of a machine tool is probably a good half of the cost of placing the same in operation, considering the jigs, fixtures, and appurtenances which are essential to its proper use. Taking this as a basis, the machine tool builders of this country were benefited directly to the extent of $170,000,000 by contact with the automobile builders in the city of Detroit.

While it is true that something like 50 per cent. of all the automobiles made come from Michigan, within the measure of a comfortable trolley ride from the heart of Detroit, this is not to say that the value of the automobiles turned out in Detroit and vicinity represents half of the total valuation. A fairly conservative estimate of Michigan's *pro rata* of the total automobile business, as measured in dollars, lies somewhere between 35 and 40 per cent., and considering some percentage within these limits, it will then be possible to estimate as to just what the National Show at Chicago represents in the automobile business as a whole, taking it as it is found to-day in America.

OTHER AND IMPORTANT DISTINCTIONS TO BE MADE

This year the automobiles which are being produced are more nearly in accord with theoretical standards by far than they were even last year, the difference is sufficiently marked as to be self-evident to even a casual observer, and the improvements wrought are in all fairness the reward which comes from closely studying the little details all along the line, whereas in some of the earlier efforts, going back perhaps a year or two, much of the then alleged refinements decamped with the glisten of the varnish, which probably did serve as a coat over the last effort of the rubbers in the process of finishing the car in the factory paint shop.

Exterior finish, in former times, covered a multitude of sins, and convinced buyers in many cases. When purchasers were obdurate their fancy was excited by the dexterity with which the family crest was transferred to a convenient panel, nor did they ponder long over the quality of the machinery equipment, believing, perhaps, if they furnished the chauffeur a leather coat he would find it agreeable to lie on his back beneath the car and gaze longingly at the stars above.

It is a little strange, perhaps, that the quality of the automobiles from the mechanical point of view, improved in the same ratio that overdone exterior finish disappeared. The underlying reason for the changes wrought, lies in the increased quality of the mechanical equipment, and the entire absence of any attempt to disguise lack of quality by an attractive coat of paint. As a matter of experience, it is now fairly proven that the patrons of the industry are a discriminating set and they appreciate quality in the equipment as a whole, and the further fact that some of the earlier creations lacked in comfort-producing details about in the same proportion as the machinery equipment at that time verged away from stability.

OLDER PROBLEMS BOWED TO INTELLIGENT TREATMENT

The National Show, for the very reason that it will have in its makeup all the excellent examples from the several camps and clans, will prove of exceeding value to those who take an interest in the growth and prosperity of the industry, because it will bring together the several schools of design, and accentuate for purposes of inspection, the advantages therein contained, but if some of the schools are lacking in essential particulars, the facts will at once be rendered apparent.

In addition to the automobiles, there will be the accessory divisions numbering in their classifications parts makers, who, to a very large extent, are as the foundation for many of the superior examples of cars. These parts makers serve as specialists in their line; they do some one thing, and that they should become experts, is but natural. Some of the parts makers work to drawings and specifications at the command of the companies who employ them, in which cases, they assume no responsibility beyond that of completing the tasks in conformity with the drawings and specifications. Others of the parts makers, preferring to grow a reputation of their own, offer designs in distinctive form, and being experts from force of habit, are able to convince the makers that they can deliver a better product for less cost.

An innovation will be introduced in the opening ceremonies of this show. It has long been the custom to drag into this performance some political luminary, who knew little and cared less about the automobile business. At Chicago, the idea will be tried of opening the show without any formal ceremony whatever. General Manager Miles will quietly give a signal at the hour of 2:30 Saturday afternoon, at which signal, the show completed on time, will be opened to the public, with no further delay. In proof that the show will be ready, the committee say the buildings were at their disposal two days ahead.

N·A·A·M· SHOW COMMITTEE

WHEN the show opens at the Coliseum on the 5th proximo, General Manager Samuel A. Miles will have completed the most stupendous task which was ever undertaken within the confines of the great metropolis of the Middle West. Every inch of available floor space mounting up to 89,000 square feet, will be covered by some interesting phase of the greatest industry known to modern man, not forgetting that it is the self-contained handywork of but ten or eleven consecutive years. The Coliseum and the First Regiment Armory combined are not nearly large enough to hold the aspirants to exhibition honors, and the committee has been beset at every hand, and with consuming persistance, by the automobile hosts, who evidently evinced a desire to make the Ninth Annual event of this character at Chicago so national in its scope as to represent the high water mark.

The scheme of decoration has been put forward on a most comprehensive basis, departing from the conventional, and following in the footsteps of Dame Nature to the last degree. Nearby Wilmette was drawn upon for enough black oaks to make a forest, to serve as a background for the wares of the 257 exhibitors, and the committee decided that the Annex basement should be devoted to cars rather than to accessories, so that the actual number of exhibitors this year will have fallen below the number which were accommodated when last the show was there. This difference comes from the mere fact that automobiles take up more room, but it was deemed expedient to make an abiding place for as many automobile exhibits as possible, even though to the detriment of the accessory division. Some of the accessory makers, having failed to successfully negotiate positions for themselves, were able to double up with their more fortunate neighbors. The Pittsfield Spark Coil Company, for illustration, are in this class, they having procured a position by annexing part of two separate allotments in the gallery, and by the simple process of pre-empting the unused space which forms a strip on the two sides of the party line.

When the show opens, considering the situation as it stands, the Holsman Automobile Company, of Chicago, will probably be the only concern which will fail to put in an appearance, which action on the part of this company is due to its having gone into the hands of a receiver after making application for space. The waiting list numbers about 130 separate applicants for space, and after having squeezed in four makes of cars, putting them in the basement, Manager Miles seems to have reached the conclusion that ingenuity no longer applies. The four additional makes of cars which were accommodated by dint of an excessive display of ingenuity were the Diamond T Motor Car Company, Monitor Auto Works and A. C. Clark Carriage Company, all of Chicago, and the Springfield Motor Car Company, of Springfield, Ill.

The entire situation, summed up in a word, portrays a condition of the utmost harmony, and the consensus of opinion as voiced by all who have had dealings with the committee leads but to the one conclusion, *i.e.*, the undertaking is a large one, and it demanded treatment at the hands of veterans, which it received without stint.

The members of the committee, as pictured here, are so well and favorably known to the automobile fraternity and the wide world that introduction would be absurdly superfluous. Chairman A. L. Pope, in his collaboration on this occasion, has rendered up his customary distinguished **services, and the veteran of the Winton plant, Thos. Henderson, lent the guiding influence of a steady hand, which was none the less potent due to the presence of Wm. E. Metzger on the committee.**

The prospects of a successful run for the show are assured, in view of the wide interest which is taken by the citizens at large, which is backed up by the "Old Guard" of autoists of which Chicago and vicinity numbers a legion. As a further evidence of the wide interest taken, the Central Passenger Association has granted a rate of one and one-half fares to all visitors to the Chicago show, provided that no fewer than 1,000 present their certificates to the railroad authorities at the Coliseum. The rate is granted on account of the convention of the A. A. A., rather than as a direct result of the show holding, but membership in the A. A. A. is not necessary to participation in the benefits.

SOME STATISTICS OF THE CARS

ESTIMATED PRODUCTION BY STATES

States	Cars	Value
Michigan	150,000	$190,000,000
Ohio	44,000	64,000,000
Indiana	35,000	50,000,000
New York	12,000	39,000,000
Pennsylvania	6,000	15,000,000
Illinois	7,000	12,000,000
Connecticut	4,000	12,000,000
Wisconsin	8,000	11,000,000
Missouri	4,000	10,000,000
Massachusetts	3,000	7,000,000
Scattered	7,000	9,000,000
Total	280,000	$419,000,000

COUNTING the value of the automobile industry is a process which must include far more than a mere statement which will give the number of automobiles in process, or which have been made. In the building of an automobile, it is first necessary to mine the ores of which the materials must be fabricated; then, comes the work of fabrication in the steel mills, the processes in the foundries, and the endeavors in the forges. There are intervening matters to be taken into account, one of which item is that of transportation, and it is reoccurring.

With the materials in sight it becomes rational to consider the purchases of land, the erection of buildings, and the designing of the automobile models. Coincident with these activities, is the question of the machine tools, and they must go through a process which is parallel to that of the automobile proper in which the first effort is at the mines, thence to the smelters, and so on down the line, until the propitious time arrives, when the special machine tools as demanded in the building of automobiles may be priced, ordered, and delivered.

The first model of an automobile, even under the most refined conditions, due to much experience on the part of designers, will be likely to foot up to the comfortable sum of $50,000, which is but the A B C of the undertaking. With the model on the road, and its incongruities noted, it is then wise to undertake the designing of the jigs, tools, special fixtures, by means of which the automobile may be duplicated in quantity, on a basis of interchangeability, bereft of the personal equation, and at a cost which will permit of selling with a difference which will take care of "overhead," selling, and contingent expenses. These fixtures, of which one company alone is the possessor of 90,000, cost all the way from $500 to $5,000 apiece, which, added to the cost of patterns (a detail which might readily approach $100,000 in a decent sized plant) will give a fair insight into the preliminaries of a situation such as this, provided a $50,000 drawing account is added, and a dead labor value of overhead administration charges is not forgotten in the process.

Occasionally, when advertising, and not infrequently in apparently serious statements elsewhere, the point is made that all these expenses have been obviated in some specially skilled process which ended in a full-fledged automobile. These statements, if not qualified, have a ring of truth, but to see the situation on a broad basis, is to stumble over the fact that some parts maker, or a whole school of them perhaps, sustained the expenses of exploitation, incurred all the cost as above enumerated, and in some measure this is the kernel peeping out of the shell, which tells the story of the accessory maker and the short cut to success.

If, by a specialized process, plans, patterns, templates, gauges, jigs, fixtures, and facilities in general, may be utilized in a dozen undertakings, then, the preliminaries of these undertakings, severally, will be at a cost somewhat less than the total which might be indicated were each one to operate independently of the other. The advocates of specializing, as accessory makers, claim that they have added materially to the process of standardization, and to the value of the statistics which are now so overgrown that it becomes a difficulty of no small moment to make compilation, and in so far as specialists do add to the stability and value of the product, they are entitled to credit, but all the specialists are not in the accessory plants, nor is a maker of automobiles debarred from specializing merely because the work is confined to the manufacture of a given design of cars.

When the grist comes from the mill, it will be found that the bran and the chaff will be the product as aggregated from the several sets of "stones," and that the statistics of the automobile industry as here briefly put, are the square root of mean

GASOLINE PLEASURE CARS

ALCO: American Locomotive Co., Providence, R. I.
AMERICAN: American Motor Car Co., Indianapolis.
AMERICAN SIMPLEX: Simplex Motor Co., Mishawaka.
APPERSON: Apperson Bros. Auto Co., Kokomo, Ind.
ATLAS: Atlas Motor Car Co., Springfield, Mass.
AUBURN: Auburn Automobile Co., Auburn, Ind.
AUSTIN: Austin Automobile Co., Grand Rapids, Mich.
BLACK-CROW: Black Mfg. Co., Chicago, Ill.
BRUSH: Brush Runabout Co., Detroit, Mich.
BUICK: Buick Motor Co., Flint, Mich.
CADILLAC: Cadillac Motor Car Co., Detroit, Mich.
CARTERCAR: Cartercar Co., Pontiac, Mich.
CHADWICK: Chadwick Eng'g Works, Pottstown, Pa.
CHALMERS-DETROIT: Chalmers-Detroit Co., Detroit.
CAMERON: Cameron Car Co., Beverly, Mass.
COLUMBIA: Columbia Motor Car Co., Hartford, Conn.
CORBIN: Corbin Motor Vehicle Corp., New Britain.
DORRIS: Dorris Mfg. Car. Co., St. Louis, Mo.
ELMORE: Elmore Mfg. Co., Clyde, O.
E-M-F: Everitt-Metzger-Flanders Co., Detroit, Mich.
EVERITT: Metzger Motor Co., Detroit, Mich.
FAL CAR: F. A. L. Motor Co., Chicago, Ill.
FRANKLIN: H. H. Franklin Mfg. Co., Syracuse, N. Y.
FULLER: Fuller Buggy Co., Jackson, Mich.
GAETH: Gaeth Automobile Co., Cleveland, O.
GLIDE: Bartholomew Co., Peoria, Ill.
GREAT WESTERN: Great Western Co., Peru, Ind.
HALLADAY: Streator Motor Car Co., Streator, Ill.
HAYNES: Haynes Automobile Co., Kokomo, Ind.
HOLSMAN: Holsman Automobile Co., Chicago, Ill.
HUDSON: Hudson Motor Car Co., Detroit, Mich.
HUPMOBILE: Hupp Motor Car Co., Detroit, Mich.
INTER-STATE: Inter-State Auto Co., Muncie, Ind.
JACKSON: Jackson Automobile Co., Jackson, Mich.
KISSELKAR: Kissel Motor Car Co., Hartford, Wis.
KNOX: Knox Automobile Co., Springfield, Mass.
LAMBERT: Buckeye Mfg. Co., Anderson, Ind.
LION: Lion Motor Car Co., Adrian, Mich.
LOCOMOBILE: Locomobile Co., Bridgeport, Conn.
LOZIER: Lozier Motor Co., New York.
MARMON: Nordyke & Marmon Co., Indianapolis, Ind.
MATHESON: Matheson Motor Co., Wilkesbarre, Pa.
MAXWELL: Maxwell-Briscoe Motor Co., Tarrytown.
McINTYRE: W. H. McIntyre Co., Auburn, Ind.
MIDLAND: Midland Motor Co., Moline, Ill.
MITCHELL: Mitchell Motor Car Co., Racine, Wis.
MOLINE: Moline Automobile Co., Moline, Ill.
MOON: Moon Motor Car Co., St. Louis, Mo.
MORA: Mora Motor Car Co., Newark, N. Y.
NATIONAL: National Motor Vehicle Co., Indianapolis.
OAKLAND: Oakland Motor Car Co., Pontiac, Mich.
OHIO: Ohio Motor Car Co., S. Cincinnati, O.
OLDSMOBILE: Olds Motor Works, Lansing, Mich.
OVERLAND: Willys-Overland Company, Toledo, O.
PACKARD: Packard Motor Car Co., Detroit, Mich.

ESTIMATED PRODUCTION BY CITIES

Cities	Cars	Value
Detroit, Mich.	90,000	$100,000,000
Flint, Mich.	40,000	50,000,000
Cleveland, O.	35,000	50,000,000
Indianapolis, Ind.	30,000	45,000,000
Buffalo, N. Y.	6,000	24,000,000
Lansing, Mich.	12,000	19,000,000
St. Louis, Mo.	4,000	10,000,000
Racine, Wis.	6,000	8,000,000
Moline, Ill.	4,000	7,000,000
York, Pa.	3,000	7,000,000
Dayton, O.	3,000	6,500,000
Toledo, O.	5,000	6,000,000
Springfield, Mass.	2,000	5,500,000
Jackson, Mich.	3,000	5,000,000
Scattered	37,000	73,000,000
Total	280,000	$419,000,000

SOME STATISTICS OF THE CARS

square of all the efforts that each little effort will be found in the whole, that none are lost, and that a balanced condition is the real result of this aggregation.

The exhibition of automobile parts and fittings, which is about to be opened as a national event at Chicago, represents, under the circumstances, the whole industry, counting everything from the product of an automatic screw machine to the slab which comes from the hundred-ton press; and it presents in orderly array all the things which are made and which add (taking the present as a basis) $500,000,000 per annum to the wealth of a nation, spreading the same out into the little increments which may be measured in loaves of bread within the reach of those who find it a daily need, more than it can be looked upon in a coupon clipping way by those who are not on speaking terms with the baker for lack of interest.

This same exhibition represents something besides the material things called automobiles. These very statistics carry with them a potential force which is not measured in dollars. The elimination of the horse from streets in metropolitan districts, thins out the staff in the office of the "board of health," reduces the appropriation which is required for purposes of cleaning the streets, suppresses mortality as it is measured hy the insurance companies, and in so far as it is possible to estimate the several advantages in dollars merely to enable the mind to grasp the situation, these dollars must be added to the $500,000,000 already set down as directly due to the automobile industry.

The elimination of the horse as looked upon by the contractor, the grocery man, and the farmer, whose returns are measured in horses sold, as being a serious evil, may have certain justification, but this damage which may be directly traced to the automobile, and which must be considered in connection with the statistics thereof, has a certain offset, and who can tell if the algebra sum of all the increments above and below zero measure, will be anything but advantageous for all concerned. If the contractor finds himself handicapped by a span of horses, it will he because some other contractor who uses automobiles is beating him out, and if the farmer, who found it profitable to raise horses, does not wish to raise automobiles instead, he will have the more time at his disposal for the purpose of raising wheat, and the automobile plow will permit him to turn up alluvial soil from a far greater depth than ever before with less labor, and for his greater advantage.

The humanitarian will accept the coming of the automobile as being the emancipator of the horse, and he will have in his audience a vast concourse of materialists who will undoubtedly find that the automobile is a machine which only has to be fed when it works, which bows to superior intelligence, whenever that rare condition grasps the guiding lever, and wills the way.

Let us pursue another angle which has its bearing on the statistical side of the review of the automobile. The time was when man in his state of savagery moved out from his communal acreage merely if he discovered that some other community was the possessor of something which he did not find in his own small zone, but as he made slow progress across the face of untrammeled Mother Earth, he had plunder in his heart, and it was a good thing for the possessors of what he wanted that the roads were unimproved, so that the uncivilized plunderer of bygone days was impeded by Nature in just proportion to his lack of intelligence. Wisdom hrought the warrior's chariot, and slight improvements in roadways at impassahle spots, but since like begets like, it was not profitable, so it was found, to fight for that which could he had for the asking on a basis of trade, and road improvements naturally followed as one of the accessories of a more civilized state.

GENERAL REVIEW OF THE INDUSTRY

Estimated Number of Cars for 1910, 280,000
Value of These Cars Approximates $419,000,000
Their Motors Will Develop 80,000,000 Horsepower
The Cars Will Weigh More Than 300,000 Tons
Altogether They Could Carry 1,200,000 People
End to End They Would Stretch at Least 650 Miles
Capital Invested In Them Totals $200,000,000
Factories Which Build Them Are Worth $30,000,000
These Factories Cover 2,500 Acres of Land, Total
The Floor Space Used Is 28,000,000 Square Feet
Machinery and Equipment Is Valued at $85,000,000
Workmen Employed in the Industry Number 120,000
These Workmen Receive $80,000,000 Wages Yearly

PEERLESS: Peerless Motor Car Co., Cleveland, O.
PENNSYLVANIA: Penna. Auto-Motor Co., Bryn Mawr, Pa.
PIERCE-ARROW: Pierce-Arrow Motor Co., Buffalo.
POPE HARTFORD: Pope Mfg. Co., Hartford, Conn.
PREMIER: Premier Motor Car Co., Indianapolis.
PULLMAN: York Motor Car Co., York, Pa.
RAMBLER: T. B. Jeffery & Co., Kenosha, Wis.
REGAL: Regal Motor Car Co., Detroit, Mich.
REO: Reo Motor Car Co., Lansing, Mich.
RICHMOND: Wayne Works, Richmond, Ind.
RICKETTS: Ricketts Auto Works, South Bend.
RIDER-LEWIS: Rider-Lewis Motor Co., Anderson, Ind.
ROYAL TOURIST: Royal Tourist Car Co., Cleveland.
SCHACHT: Schacht Mfg. Co., Cincinnati, O.
SELDEN: Selden Motor Vehicle Co., Rochester, N. Y.
SPEEDWELL: Speedwell Motor Car Co., Dayton, O.
STAVER: Staver Carriage Co., Chicago, Ill.
STEARNS: F. B. Stearns Co., Cleveland, O.
STERLING: Elkhart Motor Car Co., Elkhart, Ind.
STEVENS-DURYEA: Stevens-Duryea Co., Chicopee Falls.
STODDARD-DAYTON: Dayton M. C. Co., Dayton, O.
STUDEBAKER: Studebaker Auto Co., South Bend.
THOMAS: E. R. Thomas Motor Co., Buffalo, N. Y.
WINTON: Winton Motor Carriage Co., Cleveland.
WHITE: White Company, Cleveland, O.
ZIMMERMAN: Zimmerman Mfg. Co., Auburn, Ind.

COMMERCIAL CARS

ALCO: American Locomotive Co., Providence, R. I.
FRANKLIN: H. H. Franklin Mfg. Co., Syracuse, N. Y.
GRABOWSKY: Grabowsky Power Wagon Co., Detroit.
KNOX: Knox Automobile Co., Springfield, Mass.
PACKARD: Packard Motor Car Co., Detroit, Mich.
POPE HARTFORD: Pope Mfg. Co., Hartford, Conn.
RAPID: Rapid Motor Vehicle Co., Pontiac, Mich.
STUDEBAKER: Studebaker Auto. Co., South Bend.
THOMAS (TAXI): Thomas Motor Co., Buffalo, N. Y.

ELECTRIC PLEASURE CARS

BABCOCK: Babcock Electric Carriage Co., Buffalo.
BAKER: Baker Motor Vehicle Co., Cleveland, O.
COLUMBIA: Columbia Motor Car Co., Hartford, Conn.
DETROIT: Anderson Carriage Co., Detroit, Mich.
R. & L.: Rauch & Lang Carriage Co., Cleveland, O.
STUDEBAKER: Studebaker Auto. Co., South Bend.
WAVERLEY: Waverley Company, Indianapolis, Ind.
WOODS: Woods Motor Vehicle Co., Chicago, Ill.

FOREION PLEASURE CARS

BERLIET: Berliet Import Co., Chicago, Ill.
FIAT: Fiat Automobile Co., New York.
RENAULT: Renault Freres Selling Branch, Inc., N. Y.

GEOGRAPHICAL DISTRIBUTION OF PLANTS

Plants	States	Plants	Cities
37	Michigan	23	Detroit, Mich.
28	Indiana	10	Cleveland, O.
28	Ohio	10	Indianapolis
25	New York	8	Chicago, Ill.
19	Illinois	6	Buffalo, N. Y.
17	Pennsylvania	6	Cincinnati, O.
15	Massachusetts	5	New York City
10	Wisconsin	5	Pontiac, Mich.
9	Connecticut	5	St. Louis, Mo.
6	Missouri	4	York, Pa.
3	New Jersey	4	Springfield, Mass.
3	Maryland	3	Philadelphia, Pa.
3	Minnesota	3	Dayton, O.
2	Iowa	3	Reading, Pa.
6	Scattered	3	Hartford, Conn.
		3	Auburn, Ind.
211	total.		

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS

MAKE AND MODEL			BODY		MOTOR				COOLING		IGNITION				TRANSMISSION							BEARINGS				TIRES	
	Price	H.P.	Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Transmission	Axle	Weight	Front	Rear
Abbott-Detroit	$1500	25.6	Tour'g.	5	4	4	4½	Pairs.	...	...	Splitdorf	Battery.	Pump.	Disc.	Sel.	3	Frame.	Shaft 2.	110	56	P. steel.	3 plain.	Ball.	Ball.	2,000	34x3½	34x3½
A. B. C. "M"	700	14.5	R'bout.	2	2	4¼	4	Single.	Tubular.	None.	None.	Dry.	4 mech.	None.	Fric.	...	Frame.	2-chain.	96	‡56	Steel.	2 plain.	Roller.	Ball.	1,300	28x3	28x3
A. B. C. "O"	900	25.6	Surrey.	4	4	4	4	Pairs.	Tubular.	Centrif'l.	None.	Dry.	6 mech.	None.	Fric.	...	Frame.	2-chain.	96	‡56	Steel.	3 plain.	Roller.	Ball.	1,450	28x3	28x3
Acme	2500	22.5	Tour'g.	5	4	3¾	4¾	Block.	Cellular.	Centrif'l.	Bosch.	None.	Pump.	Disc.	Sel.	4	Frame.	Shaft 1.	115½	56	P. steel.	3 plain.	Ball.	Ball.	2,400	33x4	33x4
Adams-Farwell "9"	3000	60.3	R'dster.	4	5	5½	5	Single.	Air-c'l'd.	...	Magneto.	Storage.	3 mech.	3-plate.	Sel.	3	Motor.	1-chain.	120	56	P. steel.	3 plain.	Ball.	Roller.	2,400	36x4	36x4½
Adams-Farwell "9"	3500	60.3	Tour'g.	7	5	5½	5	Single.	Air-c'l'd.	...	Magneto.	Storage.	3 mech.	3-plate.	Sel.	3	Motor.	1-chain.	128	56	P. steel.	3 plain.	Ball.	Roller.	3,000	36x4	36x4½
Alco 16	3750	24.8	Land'l't	6	4	100	120	Pairs.	H'comb.	Centrif'l.	Bosch.	None.	Mech.	Disc.	Sel.	3	Frame.	Shaft 2.	104	55½	P. steel.	3 plain.	Ball.	Ball.	...	32x4	32x4
Alco 22	4350	24.8	Land'l't	6	4	100	120	Pairs.	H'comb.	Centrif'l.	Bosch.	None.	Mech.	Disc.	Sel.	3	Frame.	Shaft 2.	112	55½	P. steel.	3 plain.	Ball.	Ball.	...	32x4	32x4
Alco 40	*4750	35.8	Tour'g.	7	4	120	150	Pairs.	H'comb.	Centrif'l.	Bosch.	Storage.	Mech.	Disc.	Sel.	4	Frame.	Shaft 2.	126	55½	P. steel.	3 plain.	Ball.	Ball.	...	36x4	36x5
Alco 60	*6000	53.6	Tour'g.	7	6	120	150	Pairs.	H'comb.	Centrif'l.	Bosch.	Storage.	4 mech.	Disc.	Sel.	4	Frame.	Shaft 2.	134	55½	P. steel.	4 plain.	Ball.	Ball.	3,900	36x4	36x5
Allen-Kingston	2500	28.9	B. tonn.	5	4	4¼	5	Pairs.	H'comb.	Centrif'l.	Bosch.	Storage.	Pump.	Cone.	Sel.	4	Frame.	Shaft 2.	117	56½	P. steel.	3 plain.	Roller.	Roller.	2,500	34x4	34x4
Allen-Kingston	4500	44.1	Tour'g.	7	4	5¼	6½	Pairs.	H'comb.	Centrif'l.	Bosch.	Storage.	6 mech.	Disc.	Sel.	4	Frame.	Shaft 2.	125	56½	P. steel.	3 plain.	Ball.	Ball.	3,300	34x4½	34x4½
American	4000	46.0	R'dster.	3	4	5⅜	5½	Pairs.	Tubular.	Centrif'l.	Bosch.	Storage.	7 mech.	Cone.	Sel.	4	Frame.	Shaft 1.	110	56	P. steel.	3 plain.	Ball.	Ball.	2,800	40x4	40x4
American	4000	46.0	B. tonn	5	4	5⅜	5½	Pairs.	Tubular.	Centrif'l.	Bosch.	Storage.	7 mech.	Cone.	Sel.	4	Frame.	Shaft 1.	122	56	P. steel.	3 plain.	Ball.	Ball.	2,900	40x4	40x4
American	4000	46.0	Tour'g.	7	4	5⅜	5½	Pairs.	Tubular.	Centrif'l.	Bosch.	Storage.	7 mech.	Cone.	Sel.	4	Frame.	Shaft 1.	124	56	P. steel.	3 plain.	Ball.	Ball.	3,100	36x4	36x5
American Simplex	4000	†	Tour'g.	7	4	5	5	Pairs.	Cellular.	Centrif'l.	Magneto.	Storage.	10 mech.	5-plate.	Sel.	3	Axle.	Shaft 2.	117	56	P. steel.	5 plain.	Ball.	Ball.	3,800	36x4	36x5
Anchor	1850	28.9	Tour'g.	5	4	4¼	5	Single.	Tubular.	None.	Remy.	Dry.	Pump.	Cone.	Sel.	3	Axle.	Shaft 1.	110	56½	P. steel.	3 plain.	Roller.	Roller.	2,200	34x3½	35x4
Anhut	1700	29.4	R'bout.	2	6	3½	4	Pairs.	Cellular.	Centrif'l.	Magneto.	Battery.	Pump.	28-disc.	Sel.	3	Motor.	Shaft 2.	110	56	P. steel.	4 plain.	Plain.	Roller.	...	34x3½	34x3½
Anhut	1800	29.4	B. tonn.	4	6	3½	4	Pairs.	Cellular.	Centrif'l.	Magneto.	Battery.	Pump.	28-disc.	Sel.	3	Motor.	Shaft 2.	110	56	P. steel.	4 plain.	Plain.	Roller.	...	34x3½	34x4
Apperson 4-30	2000	30.6	Tour'g.	5	4	4⅜	5	Single.	Tubular.	Ecc'c.	Bosch.	Storage.	4 mech.	Con. b'd.	Sel.	3	Frame.	Shaft.	112	56	P. steel.	5 plain.	Ball.	Ball.	2,700	34x4	34x4
Apperson "O"	2450	30.6	B. tonn.	4	4	4⅜	5	Single.	Tubular.	Ecc'c.	Bosch.	Storage.	4 mech.	Con. b'd.	Sel.	3	Frame.	Shaft.	119	56	P. steel.	5 plain.	Ball.	Ball.	...	34x4	34x4
Apperson 4-40	3000	36.1	Tour'g.	7	4	4¾	5	Single.	Tubular.	Ecc'c.	Bosch.	Storage	4 mech.	Con. b'd.	Sel.	3	Frame.	Shaft.	122	56	P. steel.	5 plain.	Ball.	Ball.	...	36x4	36x4½
Apperson 4-30	4000	48.4	B. tonn.	4	4	5½	5	Single.	Tubular.	Ecc'c.	Bosch.	Storage.	4 mech.	Con. b'd.	Sel.	3	Frame.	2-chain.	116	56	P. steel.	5 plain.	Ball.	Ball.	...	36x4	36x4½
Apperson 4-30	4200	48.4	Tour'g.	7	4	5½	5	Single.	Tubular.	Ecc'c.	Bosch.	Storage.	4 mech.	Con. b'd.	Sel.	4	Frame.	Shaft.	128	56	P. steel.	5 plain.	Ball.	Ball.	...	36x4	36x4½
Apperson 6-40	4200	48.6	Tour'g.	7	6	4½	5	Single.	Tubular.	Ecc'c.	Bosch.	Storage.	6 mech.	Con. b'd.	Sel.	3	Frame.	Shaft.	128	56	P. steel.	7 plain.	Ball.	Ball.	...	36x4	36x4½
Atlas F	2000	†	Tour'g.	5	3	4½	4½	Single.	Tubular.	Centrif'l.	None	Dry.	7 mech.	Ex. b'd.	Sel.	3	Frame.	Shaft 2.	110	56	P. steel.	4 plain.	Roller.	Roller.	2,400	34x4	34x4
Atlas G	2500	†	B. tonn.	4	4	5	5	Single.	Tubular.	Centrif'l.	None.	Dry.	9 mech.	Ex. b'd.	Sel.	3	Frame.	Shaft 2.	120	56	P. steel.	5 plain.	Roller.	Roller.	2,600	36x4	36x4
Atlas H	2500	†	Tour'g.	7	4	5	5	Single.	Tubular.	Centrif'l.	None.	Dry.	9 mech.	Ex. b'd.	Sel.	3	Frame.	Shaft 2.	128	56	P. steel.	5 plain.	Roller.	Roller.	2,600	36x4½	36x4½
Auburn X	1650	32.4	Tour'g.	5	4	4½	5	Single.	Tubular.	Gear.	Remy.	Dry.	Pump.	Disc.	Sel.	3	Frame.	Shaft 2.	116	56	P. steel.	5 plain.	Ball.	Roller.	2,500	36x3½	36x3½
Austin 45	*3000	45.9	Tour'g.	5	6	4⅜	5¼	Pairs.	...	...	Magneto.	Battery.	...	...	Sel.	3	Frame.	Shaft.	125	...	P. steel.	4 plain.	...	...	3,200	36x4	36x4
Austin 30	*4500	48.6	Tour'g.	7	6	4½	6	Single.	...	...	Magneto.	Battery.	...	...	Sel.	4	Frame.	Shaft.	134	...	P. steel.	7 plain.	...	...	3,750	36x4½	36x4½
Austin 60	*6000	72.6	Tour'g.	7	6	5½	5½	Single.	...	...	Magneto.	Battery.	...	...	Sel.	4	Frame.	Shaft.	140	...	P. steel.	7 plain.	...	...	4,500	37x5	37x5
Autocar XXII	1800	25.6	Tour'g.	5	4	4	4½	Single.	Tubular.	Centrif'l.	Bosch.	Battery.	3 mech.	3-plate.	Prog.	3	Frame.	Shaft 2.	102	56	P. steel.	3 plain.	Roller.	Roller.	...	34x3½	34x3½
Babcock 30	2750	27.2	Tour'g.	5	4	4⅛	5¼	Pairs.	Tubular.	Centrif'l.	Bosch.	Storage.	Pump.	Disc.	Sel.	3	Frame.	Shaft 2.	114	56	P. steel.	3 plain.	Roller.	Ball.	2,500	34x4	34x4
Badger B	1600	25.6	Tour'g.	5	4	4	4	Pairs.	Tubular.	None.	Bosch.	Storage.	Pump.	Cone.	Sel.	3	Motor.	Shaft 1.	112	‡56	P. steel.	3 plain.	Ball.	Ball.	2,000	34x3½	34x3½
Bailey Olympic	2500	†	B. tonn.	4	4	4½	5	Single.	Tubular.	Centrif'l.	Magneto.	Storage.	4 mech.	Disc.	Sel.	3	Frame.	Shaft 1.	112	56	Armor'd.	5 plain.	Ball.	Ball.	2,000	36x4	36x4
Belden B	4500	48.6	Tour'g.	7	6	4½	5¼	Pairs.	H'comb.	Centrif'l.	Bosch.	Storage.	Pump.	Plate.	Sel.	4	Frame.	Shaft 1.	132	56	P. steel.	4 plain.	Ball.	Ball.	3,600	36x4½	37x5
Belden A	6000	60.0	Tour'g.	7	6	5	5½	Pairs.	H'comb.	Centrif'l.	Bosch.	Storage.	Pump.	Plate.	Sel.	4	Frame.	Shaft 1.	136	56	P. steel.	4 plain.	Ball.	Ball.	3,800	40x4½	41x5
Belmont 30	1650	25.6	Tour'g.	5	4	4	5	Single.	H'comb.	Centrif'l.	Remy.	Dry.	Pump.	Cone.	Sel.	3	Frame.	Shaft 1.	110	56	P. steel.	5 plain.	Roller.	Ball.	2,400	36x3½	36x4
Bergdoll 30	1500	25.6	Tour'g.	5	4	4	4½	Block.	Tubular.	Centrif'l.	Bosch.	Storage.	Pump.	32-disc.	Sel.	3	Motor.	Shaft 1.	112	56	P. steel.	2 ball.	Ball.	Roller.	...	34x3½	34x3½
Berkshire E	2650	35.2	R'dster.	3	4	4$\frac{11}{16}$	5½	Single.	H'comb.	Centrif'l.	Bosch.	Storage.	Pump.	Disc.	Sel.	3	Frame.	Shaft 2.	106	56	P. steel.	5 plain.	Ball.	Ball.	2,700	36x4	36x4
Berkshire E	2900	35.2	Tour'g.	7	4	4$\frac{11}{16}$	5½	Single.	H'comb.	Centrif'l.	Bosch.	Storage.	Pump.	Disc.	Sel.	3	Frame.	Shaft 2.	120	56	P. steel.	5 plain.	Ball.	Ball.	2,900	36x4	36x4½
Billy "Four"	500	18.2	R'bout.	2	4	3⅜	4½	Block.	Tubular.	None.	None	Storage.	Pump.	Cone.	Sel.	2	Axle.	Shaft.	88	56	P. steel.	...	...	...	1,000	32x3	32x3
Black-Crow F	1200	24.0	B. tonn.	4	4	3⅞	4½	Single.	Tubular.	None.	Remy.	Dry.	Pump.	Disc.	Sel.	3	Axle.	Shaft 1.	107	56	P. steel.	5 plain.	Roller.	Roller.	1,900	32x3½	32x3½
Black-Crow M	1750	28.9	Tour'g.	7	4	4¼	4½	Pairs.	Tubular.	None.	Remy.	Dry.	Pump.	Disc.	Sel.	3	Axle.	Shaft 1.	120	56	P. steel.	3 plain.	Roller.	Roller.	...	34x4	34x4

* Price includes top. † Two-cycle motor. ‡ Also 60 inches.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL			BODY		MOTOR				COOLING		IGNITION				TRANSMISSION							BEARINGS				TIRES	
	Price	H.P.	Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Transmission	Axle	Weight	Front	Rear
Brush	$ 485	6.4	R'bout.	2	1	4	5	Single.	Tubular.	None....	None....	Dry....	....	Lisc....	Plan.	2	Frame..	2-chain.	80	‡56	Wood...	2 plain..	Ball...	Ball...	1,050	28x3	28x3
Buick "10"	1150	22.5	B. tonn.	4	4	3¾	3¾	Pairs..	Tubular.	Centrif'l.	Remy...	Dry....	Pump...	Cone....	Plan.	2	Frame..	Shaft 1.	92	56	P. steel..	3 plain..	Roller.	Roller.	1,800	30x3½	30x3½
Buick "19"	1400	28.9	Tour'g..	5	4	4½	4½	Pairs..	Tubular.	Centrif'l.	Remy...	Dry....	Pump...	Cone....	Sel...	3	Frame..	Shaft 1.	105	56	P. steel..	3 plain..	Roller.	Roller.	.....	32x4	32x4
Buick "17"	1750	32.4	Tour'g..	5	4	4½	5	Pairs..	Tubular.	Centrif'l.	Remy...	Dry....	Pump...	Cone....	Sel...	3	Frame..	Shaft 1.	112	56	P. steel..	3 plain..	Roller.	Roller.	.....	34x4	34x4
Burdick C.	7000	60.0	Tour'g..	8	6	5	5	Single.	H'comb..	Gear....	Bosch...	Storage .	Pump...	Lisc....	Sel...	4	Frame..	Shaft 2.	142	56	P. steel..	7 plain..	Ball...	Ball...	4,600	36x6	36x6
Cadillac 30	1600	28.9	Tour'g..	5	4	4½	4½	Single.	Tubular.	Gear....	Splitd'f..	Dry....	Pump...	Cone....	Sel ..	3	Frame..	Shaft 2.	110	‡56	P. steel..	5 plain..	Ball...	Roller.	.....	34x4	34x4
Cadillac 30	3000	28.9	Limous.	7	4	4½	4½	Single.	Tubular.	Gear....	Splitd'f..	Dry....	Pump...	Cone....	Sel...	3	Frame..	Shaft 2.	114	‡56	P. steel..	5 plain..	Ball...	Roller.	.....	34x4½	34x4½
Cameron "15"	850	24.0	R'bout.	2	4	3½	3½	Single.	Air-c'l'd.	....	Remy...	Dry....	Pump...	Cone....	Sel...	3	Axle...	Shaft 1.	100	‡56	P. steel..	3 plain..	Ball...	Ball...	1,075	32x3	32x3
Cameron "16"	1100	24.0	Tour'g..	5	4	3½	3½	Single.	Air-c'l'd.	....	Remy...	Dry....	Pump...	Cone....	Sel...	3	Axle...	Shaft 1.	104	‡56	P. steel..	3 plain..	Ball...	Ball...	1,400	30x3½	30x3½
Cameron "11"	1500	36.1	Tour.g..	5	6	3½	3½	Single.	Air-c'l'd.	....	Remy...	Dry....	Pump...	Cone....	Sel...	3	Axle...	Shaft 1.	114	‡56	P. steel..	4 plain..	Ball...	Ball...	1,675	34x3½	34x3½
Cartercar H.	1150	25.6	B. tonn.	4	4	4	4	Pairs..	Tubular.	None....	Splitd'f..	Dry....	Pump...	None....	Fric..	...	Frame..	1-chain.	100	‡56	P. steel...	3 plain..	Ball...	Roller.	2,000	32x3½	32x3½
Cartercar L.	1600	28.9	Tour'g..	5	4	4½	4½	Pairs..	Tubular.	Centrif'l.	Splitd'f..	Dry....	Pump...	None....	Pric..	...	Frame..	1-chain.	110	‡56	P. steel..	3 plain..	Ball...	Roller.	2,300	34x4	34x4
Chadwick Great Six	5500	60.0	Tour'g..	7	6	5	6	Pairs..	Cellular..	Centrif'l.	Bosch...	Dry....	14 mech.	Ex. b'd..	Sel...	4	Frame..	2-chain.	130	56	P. steel..	4 plain..	Ball...	Ball...	3,500	36x4½	36x5
Chadwick Great Six	6500	60.0	R'bout.	2	6	5	6	Pairs..	Cellular..	Centrif'l.	Bosch...	Dry....	14 mech.	Ex. b'd..	Sel...	4	Prame..	2-chain.	112	56	P. steel..	4 plain..	Ball...	Ball...	3,000	36x4½	36x4½
Chalmers-Detroit 30	1500	25.6	Tour'g..	5	4	4	4½	Block.	Tubular.	Centrif'l.	Extra...	Storage..	Pump...	Disc.....	Sel...	3	Motor..	Shaft 1.	115	‡55	P. steel..	2 ball...	Ball...	Roller.	.....	34x3½	34x3½
Chalmers-Detroit 40	2750	40.0	Tour'g..	5	4	5	4¾	Pairs..	H'comb..	Centrif'l.	Bosch...	Storage..	Pump...	Cone....	Sel...	3	Frame..	Shaft 2.	123	‡55	P. steel..	3 plain..	Ball...	Roller.	.....	36x4	36x4
Cino A.	2250	30.6	Tour'g..	5	4	4⅜	5	Pairs..	Tubular.	Centrif'l.	Remy...	Dry....	3 mech..	Disc.....	Sel...	3	Frame..	Shaft 2.	113	56	P. steel..	3 plain..	Roller.	Roller.	2,250	34x4	34x4
Clark 30	1400	25.6	Tour'g..	5	4	4	4	Single.	Tubular.	....	Remy...	Dry....	....	Cone....	Sel...	3	Axle...	Shaft 2.	110	56	P. steel..	....	......	......	.....	34x3½	34x3½
Clark 40	1750	32.4	Tour'g..	5	4	4½	5	Single.	Tubular.	....	Remy...	Dry....	....	Cone....	Sel...	3	Axle...	Shaft 2.	118	56	P. steel..	....	......	......	.....	34x4	34x4
Coates-Goshen 32	2925	32.4	B. tonn.	4	4	4½	5	Single.	Cellular..	Gear....	Bosch...	Storage..	Pump...	Cone....	Sel...	3	Frame..	Shaft 2.	116	56	P. steel..	5 plain..	Ball...	Roller.	2,800	36x4	36x4
Coates-Goshen 40	3250	40.0	B. tonn.	4	4	5	5½	Pairs..	Cellular..	Gear....	Bosch...	Storage..	Pump...	Cone....	Sel...	3	Frame..	Shaft 1.	123	56	P. steel..	3 plain..	Ball...	Roller.	3,000	36x4½	36x4½
Colburn M.	3500	28.9	Tour'g..	5	4	4½	4½	Pairs..	Cellular..	None....	Bosch...	Storage..	Pump...	Disc.....	Sel...	4	Frame..	Shaft 1.	115	56	P. steel..	3 ball...	Ball...	Ball...	2,500	36x4	36x4
Cole 30	1500	25.6	R'bout.	2	4	4	4	Pairs..	Tubular.	None....	Splitd'f..	Dry....	Pump...	Cone....	Sel...	3	Motor..	Shaft 1.	108	‡56	P. steel..	3 plain..	......	Roller.	2,000	34x3½	34x3½
Cole 30	1500	25.6	Tour'g..	5	4	4	4	Pairs..	Tubular.	None....	Splitd'f..	Dry....	Pump...	Cone....	Sel...	3	Motor..	Shaft 1.	108	‡56	P. steel..	3 plain..	......	Roller.	2,100	32x3½	32x3½
Columbia Mark 48	2750	32.4	Tour'g..	5	4	4½	4.7	Pairs..	Cellular..	Centrif'l.	M.& B...	Storage..	Pump...	Cone....	Sel...	3	Frame..	Shaft 2.	115	56	P. steel..	3 plain..	Ball...	Roller.	2,720	34x4	34x4
Continental 30	1400	30.6	Tour'g..	5	4	4⅜	4½	Block.	Cellular..	Centrif'l.	Remy...	Dry....	Splash...	60-disc..	Sel...	3	Axle...	Shaft 1.	116	56	P. steel..	3 plain..	Ball...	Roller.	2,200	34x3½	34x3½
Corbin "18"	2750	32.4	Tour'g..	5	4	4½	4½	Single.	H'comb..	Gear....	Bosch...	Dry....	Pump...	Cone....	Sel...	3	Frame..	Shaft 2.	120	56	P. steel..	2bl.,3pl.	Ball...	Ball...	2,780	34x4	34x4
Courier	1050	22.5	R'bout.	2	4	3¾	4½	Block.	Tubular.	None....	Hercules.	Dry....	Pump...	Cone....	Sel...	3	Axle...	Shaft 1.	100	56	P. steel..	2 plain..	Roller.	Ball...	1,800	32x3½	32x3½
Crawford "10"	1350	28.9	Tour'g..	5	4	4¼	4½	Pairs..	Cellular..	Centrif'l.	Remy...	Dry....	Pump...	Cone....	Sel...	3	Frame..	Shaft 1.	110	56	P. steel..	3 plain..	Ball...	Ball...	2,250	32x3½	32x3½
Crawford G.	3000	40.0	Tour'g..	5	4	5	5	Single.	Cellular..	Centrif'l.	Remy...	Storage..	Pump...	Disc....	Sel...	4	Frame..	Shaft 2.	125	56	P. steel..	5 plain..	Ball...	Ball...	3,250	36x4	36x4½
Crawford F-G	3500	40.0	Tour'g..	8	4	5	5½	Single.	Cellular..	Centrif'l.	Remy...	Storage..	Pump...	Disc....	Sel...	4	Frame..	Shaft 2.	130	56	P. steel..	5 plain..	Ball...	Ball...	3,750	36x4½	36x5
Croxton-Keeton	2850	28.9	Surrey..	4	4	4½	4½	Pairs..	Tubular.	None....	Bosch...	None....	6 mech..	61-disc..	Sel...	3	Frame..	Shaft 1.	115½	56	P. steel..	3 plain..	Ball...	Ball...	2,575	36x3½	36x4
Croxton-Keeton	3500	....	Tour'g..	7	4	....	....	......	....	....	Bosch...	Battery..	Pump...	Cone....	Sel...	3	Frame..	Shaft...	130	56	P. steel..	Plain...	Ball...	Roller.	.....	36x4	36x4½
Croxton-Keeton	4000	28.9	Limous.	6	4	4½	4½	Pairs..	Tubular.	None....	Bosch...	None....	6 mech..	61-disc..	Sel...	3	Frame..	Shaft 1.	115½	56	P. steel..	3 plain..	Ball...	Ball...	.....	32x4	32x4
Cutting 40	1650	28.9	Tour'g..	5	4	4½	5	......	....	Centrif'l.	Magneto.	Battery..	Pump...	Cone....	Sel...	3	Frame..	Shaft...	117	‡56	P. steel..	Plain...	......	......	2,000	34x3½	34x3½
Demot	550	10.5	R'bout.	2	2	3⅝	3½	Single.	Tubular.	None....	Remy...	Dry....	Splash...	Disc.....	Plan.	2	Motor..	Shaft...	80	56	P. steel..	2 ball...	Ball...	Ball...	800	30x2½	30x2½
De Tamble "Two"	650	....	R'bout.	3	2	....	....	Single.	....	....	Magneto.	....	....	....	.....	...	....	Shaft...	90	....	....	....	......	......	.....	30x3	30x3
De Tamble "Four"	1400	28.9	Tour'g..	5	4	4½	4½	Pairs..	....	....	Magneto.	Battery..	....	....	Sel...	3	Frame..	Shaft...	115	....	....	3 plain..	......	Ball...	.....	34x3½	34x3½
Detroit-Dearborn	1650	27.2	Tour'g..	5	4	4½	4¾	Pairs..	Tubular.	None....	Magneto.	....	2 mech..	Ex. b'd..	Sel...	3	Frame..	Shaft 1.	112	56	P. steel..	3 plain..	Roller.	Ball...	2,200	36x3½	36x3½
Dorris E.	*2500	28.9	Tour'g..	5	4	4½	5	Pairs..	Tubular.	Centrif'l.	Bosch...	Dry....	7 mech..	Disc.....	Sel...	3	Motor..	Shaft 2.	110	56	P. steel..	3 plain..	Roller.	Roller.	2,630	34x4	34x4
Eastern	1250	20.2	B. tonn.	4	4	3⅜	4½	Block.	....	....	Choice...	....	....	....	.....	...	....	Shaft...	105	56	P. steel..	....	......	......	.....	36x3½	36x3½
Elmore 36	1750	†	Tour'g..	5	4	4½	4	Single.	Tubular.	None....	None....	Dry....	6 mech..	Con. b'd.	Sel...	3	Frame..	Shaft 2.	110	56	P. steel..	5 plain..	Ball...	Roller.	2,400	34x4	34x4
Elmore 46	2500	†	Tour'g..	5	4	4¾	4	Single.	Tubular.	None....	None....	Dry....	6 mech..	Con. b'd.	Sel...	3	Frame..	Shaft 2.	120	56	P. steel..	5 plain..	Ball...	Roller.	2,800	36x4	36x4

* Price includes top. † Two-cycle motor. ‡ Also 60 inches.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
E-M-F 30	$1250	25.6	Tour'g.	5	4	4	4½	Pairs	Tubular	Centrif'l.	Splitd'f.	Storage	Splash	Cone	Sel.	3	Axle	Shaft	108	‡56½	P. steel	3 plain	Ball	Ball	1,800	32x3½	32x3½
Empire 20	800	19.6	R'bout.	2	4	3½	4	Block	Tubular	None	Remy	Battery	Splash	Cone	Sel.	2	Frame	2-chain	96	56	Armor'd.	2 plain	......	......	1,600	32x3½	32x3½
Enger A	2000	32.4	Tour'g.	5	4	4½	5	Pairs	....	....	Remy	Dry	....	Disc	Sel.	3	Frame	Shaft	115	56	P. steel	3 plain	......	......	.....	34x4	34x4
Everitt 30	1350	25.6	Tour'g.	5	4	4	4¾	Block	Tubular	Centrif'l.	Magneto	Dry	Splash	Cone	Sel.	3	Axle	Shaft 1	110	56	P. steel	3 plain	......	......	2,200	34x3½	34x3½
F-A-L-Car	1750	27.2	Tour'g.	5	4	4⅛	5¼	Pairs	Tubular	....	Magneto	Battery	Pump	Cone	Sel.	3	Frame	Shaft	116	56	P. steel	3 plain	Ball	Ball	1,900	34x3½	34x4
Firestone-Columbus	.....	25.6	B. tonn.	4	4	4	4	Pairs	Tubular	Centrif'l.	Remy	Dry	Pump	Cone	Sel.	3	Frame	Shaft 1	106	50	P. steel	3 plain	Ball	Ball	1,750	32x3½	32x3½
Firestone-Columbus	2000	32.4	Tour'g.	5	4	4½	4½	Pairs	Cellular	Centrif'l.	Remy	Dry	Pump	Cone	Sel.	3	Frame	Shaft 1	120	56	P. steel	3 plain	Ball	Ball	2,175	34x4	34x4
Flanders 20	750	20.2	R'bout.	2	4	3⅝	3¾	Block	Tubular	Centrif'l.	Splitd'f.	Dry	Splash	Cone	Prog.	2	Axle	Shaft 1	100	‡56½	P. steel	2 plain	Ball	Ball	1,200	32x3	32x3
Ford T	950	22.5	Tour'g.	5	4	3¾	4	Block	Tubular	None	Ford sp.	None	Splash	Disc	Plan.	2	Motor	Shaft 1	100	‡56	P. steel	3 plain	Plain	Roller	1,200	30x3	30x3½
Franklin G	1850	18.2	B. tonn.	4	4	3⅜	4	Single	Air-c'l'd	....	Bosch	None	4 mech	Disc	Sel.	3	Frame	Shaft 2	91½	53½	Wood	5 plain	Ball	Ball	1,800	32x3½	32x4
Franklin D	2800	28.9	Tour'g.	5	4	4¼	4	Single	Air-c'l'd	....	Bosch	None	4 mech	Disc	Sel.	3	Frame	Shaft 2	106	56	Wood	5 plain	Ball	Ball	2,400	36x4	36x4½
Franklin K-4	3200	18.2	Limous.	5	4	3⅜	4	Single	Air-c'l'd	....	Bosch	None	4 mech	Disc	Sel.	3	Frame	Shaft 2	100	53½	Wood	5 plain	Ball	Ball	2,250	30x3½	30x4
Franklin H	3750	43.8	Tour'g.	7	6	4¼	4	Single	Air-c'l'd	....	Bosch	None	6 mech	Disc	Sel.	3	Frame	Shaft 2	127	56	Wood	7 plain	Ball	Ball	2,850	36x4½	37x5
Franklin D	4000	28.9	Limous.	5	4	4¼	4	Single	Air-c'l'd	....	Bosch	None	4 mech	Disc	Sel.	3	Frame	Shaft 2	111½	56	Wood	5 plain	Ball	Ball	2,800	34x4½	35x5
Frontenac D	3500	36.1	R'dster.	3	4	4¾	5	Pairs	H'comb.	Centrif'l.	Bosch	Dry	2 mech	Cone	Sel.	3	Frame	Shaft 2	124	56½	P. steel	3 plain	Ball	Ball	2,900	34x4	34x4½
Frontenac C	3500	36.1	Tour'g.	7	4	4¾	5	Pairs	H'comb.	Centrif'l.	Bosch	Dry	2 mech	Cone	Sel.	3	Frame	Shaft 2	124	56½	P. steel	3 plain	Ball	Ball	3,300	36x4	36x4½
Fuller A-2	1500	25.6	Tour'g.	5	4	4	4	Single	Tubular	Gear	Choice	Dry	Pump	Disc	Plan.	2	Frame	Shaft 1	110	56	Armor'd.	5 plain	Plain	Roller	1,900	32x3½	32x3½
Fuller A	2000	32.4	Tour'g.	5	4	4½	5	Single	Cellular	Gear	Choice	Dry	Pump	Disc	Plan.	2	Frame	Shaft 1	115	56	Armor'd.	5 plain	Plain	Roller	2,100	32x3½	32x3½
Gaeth XXI	3500	38.0	Tour'g.	7	4	4⅞	5¼	Pairs	H'comb.	None	M. & B.	Dry	4 mech	Con. b'd.	Sel.	3	Frame	Shaft 2	120	56	P. steel	3 plain	Ball	Ball	3,200	36x4	36x4½
Gleason M	1000	18.0	Surrey	4	2	4¾	4	Single	Tubular	None	Remy	Dry	2 Mech	Disc	Sel.	3	Frame	Shaft 2	95	56	P. steel	2 Plain	Roller	Roller	1,600	36x2	34x3½
Glide 45	2500	36.1	Tour'g.	7	4	4¾	5	Single	Cellular	Gear	Eisem'n.	Storage	Pump	Disc	Sel.	3	Axle	Shaft 1	120	56	P. steel	Plain	Roller	Roller	3,300	36x4½	36x4½
Great Smith 45	2650	32.4	Tour'g.	5	4	4½	5	Single	Tubular	Centrif'l.	Splitd'f.	Dry	6 feeds	23-disc	Prog.	3	Frame	Shaft 1	110	56	Wood	3 plain	Roller	Roller	2,600	34x4	34x4
Great Western 30	1600	28.9	Tour'g.	5	4	4¼	5	Single	Tubular	Centrif'l.	Remy	Battery	Pump	Cone	Sel.	3	Frame	Shaft	112	‡56	P. steel	5 plain	......	......	.....	34x3½	34x3½
Grout 40	*2500	36.1	Tour'g.	5	4	4¾	5	......	H'comb.	Gear	Remy	Dry	Pump	Cone	Sel.	3	Frame	Shaft 2	123	56	P. steel	Plain	Ball	Roller	3,000	36x4	36x4
G. J. G	2500	36.1	B tonn.	4	4	4¾	5	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Cone	Sel.	3	Frame	Shaft 1	121	56	P. steel	3 plain	Ball	Ball	2,600	34x4	34x4
Halladay	1250	....	Tour'g.	5	4	....	....	Single	....	....	Remy	Battery	....	Disc	Sel.	3	Axle	Shaft	108	56	P. steel	5 plain	Ball	Roller	.....	32x3½	32x3½
Halladay	1500	....	Tour'g.	5	4	....	....	Single	....	....	Bosch	Battery	....	....	Sel.	...	....	Shaft	110	56	P. steel	5 plain	Ball	Roller	.....	34x3½	34x3½
Halladay	2500	....	Tour'g.	7	4	....	....	Single	....	....	Bosch	Battery	....	....	Sel.	...	....	Shaft	123	56	P. steel	5 plain	Ball	Roller	.....	36x4	36x4
Haynes "19"	*2000	28.9	Tour'g.	5	4	4¼	5	Pairs	Cellular	Gear	Splitd'f.	Dry	Pump	Con. b'd.	Sel.	3	Motor	Shaft 2	110	56	P. steel	3 plain	Roller	Roller	2,500	34x4	34x4
Henry 35	1750	27.2	Tour'g.	5	4	4⅛	5¼	Pairs	H'comb.	Centrif'l.	Splitd'f.	Dry	Pump	63-disc	Sel.	3	Frame	Shaft 1	116	56	P. steel	3 plain	Ball	Ball	2.500	34x4	34x4
Herreshoff	1650	18.2	Tour'g.	5	4	3⅜	3¾	Pairs	Tubular	None	Bosch	Storage	Pump	Cone	Sel.	3	Motor	Shaft 1	100	56	P. steel	3 plain	Ball	Roller	1,750	32x3½	32x3½
Houpt	.....	48.4	Tour'g.	7	4	5½	6	Pairs	H'comb.	Centrif'l.	....	....	....	53-disc	Sel.	4	Frame	Shaft	127	56	P. steel	3 plain	Ball	......	3,100	36x4	36x5
Houpt	.....	72.6	Tour'g.	7	6	5½	6	Pairs	H'comb.	Centrif'l.	....	....	....	Disc	Sel.	4	Frame	Shaft	140	56	P. steel	4 plain	Ball	......	3,900	36x4	36x5
Hudson 20	1000	22.5	R'dster.	3	4	3¾	4½	Block	Tubular	Centrif'l.	Extra	Dry	Pump	Cone	Sel.	3	Frame	Shaft 1	100	56	P. steel	2 plain	Plain	Roller	1,800	32x3½	32x3½
Hudson 20	1150	22.5	Tour'g.	5	4	3¾	4½	Block	Tubular	Centrif'l.	Extra	Dry	Pump	Cone	Sel.	3	Frame	Shaft 1	110	56	P. steel	2 plain	Plain	Roller	2,000	32x3½	32x3½
Hupmobile B	750	16.9	R'bout.	2	4	3¼	3⅜	Pairs	Tubular	None	Bosch	None	Splash	Disc	Sel.	2	Motor	Shaft 1	86	‡56	P. steel	3 plain	Plain	Roller	1,100	30x3	30x3
Illinois	1250	25.6	Tour'g.	5	4	4	4	Single	Air-c'l'd	....	Remy	Dry	Pump	Cone	Plan.	2	Frame	Shaft 1	107	56	P. steel	5 plain	Roller	Roller	2,000	32x3½	32x3½
Inter-State 40	1750	32.4	Tour'g.	5	4	4½	5	Pairs	Cellular	Centrif'l.	U. & H.	Dry	Pump	63-disc	Sel.	3	Shaft	Shaft 1	118	56½	P. steel	3 plain	Ball	Roller	2,700	34x4	34x4
Jackson 30	1250	25.6	Tour'g.	5	4	4	4	Single	H'comb.	None	Splitd'f	Dry	Splash	Cone	Sel.	3	Motor	Shaft	105	56½	P. steel	5 plain	Ball	Roller	1,950	32x3½	32x3½
Jackson 40	1750	32.4	Tour'g.	5	4	4½	4½	Single	H'comb.	None	Splitd'f.	Dry	Splash	Cone	Sel.	3	Motor	Shaft	110	56½	P. steel	5 plain	Ball	Roller	2,650	34x4	34x4
Jackson 50	2350	36.1	Tour'g.	5	4	4¾	4¾	Single	H'comb.	None	Splitd'f	Dry	Splash	Cone	Sel.	3	Motor	Shaft	120	56½	P. steel	5 plain	Ball	Roller	2,850	36x4	36x4

* Price includes top. † Two-cycle motor. ‡ Also 60 inches.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
Johnson 30	$1500	28.9	Tour'g	5	4	4¼	4½	Pairs	....	....	Extra	Dry	Pump	Cone	Sel	3	Frame	Shaft 1	112	56	P. steel	3 plain	Ball	Ball	2,200	32x3½	32x3½
Johnson 35-40	2500	32.4	Tour'g	5	4	4½	5¼	Pairs	....	....	Extra	Dry	Pump	Cone	Sel	3	Frame	Shaft 1	112	56	P. steel	3 plain	Ball	Ball	2,700	34x4	34x4
Johnson 50	3000	40.0	Tour'g	7	4	5	5¼	Pairs	....	....	Extra	Dry	Pump	Cone	Sel	3	Frame	Shaft 1	124	56½	P. steel	3 plain	Ball	Ball	3,100	36x4½	36x4½
Kauffman	1250	25.6	R'dster	4	4	4	3¾	Single	Air-c'l'd	....	Remy	Dry	4 mech	....	Sel	3	Axle	Shaft 1	104	56	P. steel	3 plain	Ball	Roller	1,750	34x3½	34x3½
Kenmore	625	....	R'dster	3	2	.....	.....	Single	Air-c'l'd	....	None	Dry	....	Plate	Plan	2	Motor	Shaft 2	....	....	Angle	2 plain	Plain	Roller	.....	28x2½	28x2½
Keystone 6-60	2500	48.6	Tour'g	5	6	4½	5¼	Single	H'comb	Centrif'l	Bosch	Battery	....	Disc	Sel	4	Frame	Shaft	130	56	P. steel	7 plain	Ball	Ball	.....	36x4	36x4
KisselKar LD 10	1500	28.9	Tour'g	5	4	4¼	4½	Pairs	Tubular	Centrif'l	Remy	Dry	6 mech	Cone	Sel	3	Frame	Shaft 2	112	56	P. steel	3 plain	Ball	Roller	.....	34x4	34x4
KisselKar D 10	2000	38.0	Tour'g	5	4	4⅞	4¾	Pairs	Tubular	Centrif'l	Remy	Dry	6 mech	Cone	Sel	4	Frame	Shaft 2	120	56	P. steel	3 plain	Roller	Roller	.....	36x3½	36x4
KisselKar F 10	2500	38.0	Tour'g	7	4	4⅞	4¾	Pairs	Tubular	Centrif'l	Bosch	Dry	6 mech	Cone	Sel	4	Frame	Shaft 2	124	56	P. steel	3 plain	Roller	Roller	.....	36x4	36x4½
KisselKar F 10	2500	38.0	B. tonn	4	4	4⅞	4¾	Pairs	Tubular	Centrif'l	Bosch	Dry	6 mech	Cone	Sel	4	Frame	Shaft 2	124	56	P. steel	3 plain	Roller	Roller	.....	40x4	40x4
KisselKar G 10	3000	54.1	Tour'g	7	6	4¾	4¾	Pairs	Tubular	Centrif'l	Bosch	Dry	8 mech	Cone	Sel	4	Frame	Shaft 2	132	56	P. steel	4 plain	Roller	Roller	.....	36x4	36x4½
KisselKar G 10	3000	54.1	B. tonn	4	6	4¾	4¾	Pairs	Tubular	Centrif'l	Bosch	Dry	8 mech	Cone	Sel	4	Frame	Shaft 2	132	56	P. steel	4 plain	Roller	Roller	.....	40x4	40x4
Kline Kar 4-24	1575	26.8	Tour'g	5	4	4 3/32	5	Single	Cellular	Centrif'l	Bosch	Battery	Pump	Cone	Sel	3	Frame	Shaft	109	56	P. steel	5 plain	Ball	Roller	1,900	34x3½	34x3½
Kline Kar 6-40	2500	40.2	R'bout	2	6	4 3/32	5	Single	Cellular	Centrif'l	Bosch	Battery	Pump	Cone	Sel	3	Frame	Shaft	108	56	P. steel	7 plain	Ball	Roller	2,500	34x4	34x4
Kline Kar 6-40	2500	40.2	Tour'g	5	6	4 3/32	5	Single	Cellular	Centrif'l	Bosch	Battery	Pump	Cone	Sel	3	Frame	Shaft	122	56	P. steel	7 plain	Ball	Roller	2,700	36x4	36x4
Knox R	*3250	40.0	Tour'g	5	4	5	4¾	Single	Cellular	Centrif'l	Bosch	Storage	Pump	3-plate	Sel	3	Motor	Shaft 2	117	56	P. steel	5 plain	Ball	Ball	3,100	36x4½	36x4½
Knox M	*4000	48.4	Tour'g	5	4	5½	5½	Single	Cellular	Centrif'l	Bosch	Storage	Pump	3-plate	Sel	3	Motor	Shaft 2	127	56	P. steel	5 plain	Ball	Ball	4,000	36x4½	36x5
Knox S	*5000	60.0	Tour'g	7	6	5	4¾	Single	Cellular	Centrif'l	Bosch	Storage	Pump	3-plate	Sel	3	Motor	Shaft 2	134	56	P. steel	7 plain	Ball	Ball	4,400	36x5	36x5
Koehler 40	1650	32.4	Tour'g	5	4	4½	5	Single	Cellular	Centrif'l	Splitd'f	Dry	Pump	Cone	Sel	3	......	Shaft	112	56	P. steel	5 plain	Roller	Roller	2,000	34x3½	34x3½
K-R-I-T	850	22.5	B. tonn	4	4	3¾	4	Block	Tubular	None	Bosch	None	Splash	Disc	Prog	2	Motor	Shaft 1	96	56	P. steel	2 ball	Ball	Ball	1,250	32x3	32x3
Lambert "17"	900	25.6	R'bout	2	4	4	4	Block	Tubular	None	Magneto	Dry	Pump	None	Fric	...	Frame	1-chain	100	56	P. steel	2 plain	Roller	Roller	.....	30x3½	30x3½
Lambert "28"	1200	27.2	B. tonn	4	4	4½	4½	Block	Tubular	None	Magneto	Dry	Pump	None	Fric	...	Frame	1-chain	105	56	P. steel	2 plain	Roller	Roller	.....	32x3½	32x3½
Lambert "36"	1275	27.2	Tour'g	5	4	4½	4½	Block	Tubular	None	Magneto	Dry	Pump	None	Fric	...	Frame	1-chain	110	56	P. steel	2 plain	Roller	Roller	1,700	32x3½	32x3½
Lambert "47"	1700	32.4	Tour'g	5	4	4½	5	Single	Tubular	Centrif'l	Magneto	Dry	Pump	None	Fric	...	Frame	1-chain	115	56	P. steel	5 plain	Roller	Roller	.....	34x4	34x4
Lexington D	1650	32.4	Tour'g	5	4	4½	5	Single	Tubular	Centrif'l	Extra	Dry	Pump	Cone	Sel	3	Frame	Shaft 1	116½	56	P. steel	5 plain	Ball	Roller	2,250	34x3½	34x3½
Lexington A	2500	36.1	Tour'g	7	4	4¾	5	Single	Tubular	Centrif'l	Extra	Storage	Pump	Cone	Sel	3	Frame	Shaft 2	122½	56	P. steel	5 plain	Ball	Roller	3,250	36x4½	36x4½
Lion 40	1600	32.4	Tour'g	5	4	4½	5	Pairs	H'comb	Centrif'l	Magneto	Battery	Pump	Cone	Sel	3	Motor	Shaft	112	56½	P. steel	3 plain	Roller	Roller	.....	36x3½	36x3½
Locomobile L	3500	32.4	Tour'g	5	4	4½	4½	Pairs	H'comb	Centrif'l	M. & B.	None	3 mech	Cone	Sel	4	Frame	Shaft 2	120	54	P. steel	3 plain	Ball	Ball	.....	34x4	34x4½
Locomobile I	4500	40.0	Tour'g	7	4	5	6	Pairs	H'comb	Centrif'l	M. & B.	None	3 mech	Cone	Sel	4	Frame	2-chain	123	54	P. steel	3 plain	Ball	Ball	.....	36x4	36x5
Lozier J	3500	33.7	Tour'g	5	6	3¾	4½	Pairs	H'comb	Centrif'l	Bosch	Storage	3 mech	Disc	Sel	3	Frame	Shaft 1	116	55	P. steel	4 ball	Ball	Ball	2,900	36x4	36x4
Lozier H	5000	46.0	Tour'g	7	4	5⅜	5½	Pairs	H'comb	Centrif'l	Bosch	Storage	2 mech	Disc	Sel	4	Frame	Shaft 1	124	56	P. steel	3 ball	Ball	Ball	3,500	36x4	36x5
Lozier I	6000	51.6	Tour'g	7	6	4⅜	5½	Pairs	H'comb	Centrif'l	Bosch	Storage	3 mech	Disc	Sel	4	Frame	Shaft 1	131	56	P. steel	4 ball	Ball	Ball	3,700	36x4	36x5
Luverne 540	2000	32.4	Tour'g	5	4	4½	5	Single	Tubular	Gear	Bosch	Dry	Pump	Disc	Sel	3	Frame	Shaft 1	120	56	P. steel	5 plain	Ball	Roller	2,600	34x4	34x4
Marathon	1500	28.9	Tour'g	5	4	4¼	4½	Pairs	Tubular	Centrif'l	Remy	Dry	Pump	Disc	Sel	3	Axle	Shaft 1	112	56	P. steel	3 plain	Roller	Roller	.....	34x3½	34x3½
Marion "10"	1850	28.9	Tour'g	5	4	4¼	4½	Pairs	H'comb	Centrif'l	Splitd'f	Dry	Pump	38-disc	Sel	3	Axle	Shaft 1	112	56	P. steel	3 plain	Roller	Roller	2,150	34x4	34x4
Marmon 32	2650	32.4	Tour'g	5	4	4½	5	Pairs	H'comb	Centrif'l	Bosch	Dry	Pump	Cone	Sel	3	Axle	Shaft 2	116	56½	P. steel	3 plain	Ball	Ball	2,300	34x4	34x4
Maryland	2750	28.9	Tour'g	5	4	4¼	4	Single	Cellular	Gear	Splitd'f	Dry	2 mech	Cone	Sel	3	Frame	Shaft 2	116	56	P. steel	5 plain	Plain	Roller	2,700	34x4	34x4
Mason	1250	20.0	Tour'g	5	2	5	6	Single	Cellular	Gear	None	Dry	....	Plate	Plan	2	Frame	1-Chain	100	56	P. steel	2 plain	Plain	Roller	.....	32x3½	32x3½
Matheson Six	3000	48.6	Tour'g	5	6	4½	5	Pairs	H'comb	Centrif'l	Bosch	Battery	Mech	53-disc	Sel	3	Axle	Shaft 1	125½	56½	P. steel	4 plain	Ball	Ball	.....	36x4	36x4
Matheson Four	5000	40.0	Tour'g	7	4	5	6	Single	H'comb	Centrif'l	M. & B.	Dry	Mech	Disc	Sel	4	Frame	2-chain	128	56½	P. steel	5 plain	Ball	Ball	.....	36x4	36x5
Maxwell AA	600	12.8	R'bout	2	2	4	4	Single	Cellular	None	Splitd'f	Dry	Splash	Disc	Plan	2	Motor	Shaft 2	82	‡56½	P. steel	2 plain	Plain	Roller	1,150	28x3	28x3
Maxwell Q	1000	22.5	B. tonn	4	4	3¾	4	Pairs	Cellular	None	Splitd'f	Dry	5 mech	15-disc	Prog	3	Motor	Shaft 2	93	‡56½	P. steel	3 plain	Roller	Roller	1,500	30x3½	30x3½
Maxwell E	1500	28.9	Tour'g	5	4	4¼	4¼	Single	Cellular	None	Splitd'f	Dry	5 mech	Disc	Prog	3	Motor	Shaft 2	110	‡56½	P. steel	5 plain	Roller	Roller	2,500	34x4	34x4
McCue-Hartford XXX	2750	32.4	Tour'g	5	4	4½	5	Pairs	Cellular	Centrif'l	Bosch	Battery	Pump	Cone	Sel	3	Frame	Shaft 2	123	56	P. steel	3 plain	Ball	Ball	2,600	36x4	36x4
McFarlan Six	2000	31.6	Tour'g	5	6	3⅜	4	Pairs	Tubular	Centrif'l	Splitd'f	Dry	Pump	30-disc	Sel	3	Motor	Shaft 1	120	56	P. steel	4 plain	Ball	Roller	2,700	36x3½	36x4

* Price includes top. † Two-cycle motor. ‡ Also 60 inches.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY		MOTOR				COOLING		IGNITION		Lubrication	Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
			Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery			Type	Speeds	Location	Drive				Crankshaft	Transmission	Axle		Front	Rear
McIntyre A-1	$ 600	18.0	R'bout.	2	2	4¾	4¾	Single.	Tubular.	None....	None....	Battery..	Mech....	Disc.....	Plan.	2	Frame..	2-chain.	90	‡56	Steel....	2 plain..	Plain..	Roller.	.....	30x3	30x3
McIntyre M-4	1250	27.2	Tour'g..	5	4	4¼	3¾	Single.	Tubular.	Centrif'l.	Splitd'f..	Dry.....	Pump...	Cone....	Sel...	3	Frame..	Shaft...	112	‡56	P. steel..	5 plain..	Roller.	Roller.	.....	36x3½	36x3½
McIntyre M-20	1750	28.9	Tour'g..	5	4	4½	5½	Pairs..	Tubular.	Centrif'l.	Bosch...	Battery..	Pump...	Cone....	Sel...	3	Frame..	Shaft...	115	‡56	P. steel..	3 plain..	Ball...	Roller.	.....	37x4	37x4
Mercer C	1950	30.6	R'bout.	2	4	4⅜	4¾	Pairs..	Tubular.	Centrif'l.	Bosch...	Dry.....	Pump...	42-disc..	Sel...	3	Frame..	Shaft 2.	116	56	P. steel..	3 plain..	Ball...	Roller.	.....	36x3½	36x4
Mercer A	1950	30.6	Tour'g..	5	4	4⅜	4¾	Pairs..	Tubular.	Centrif'l.	Bosch...	Dry.....	Pump...	42-disc..	Sel...	3	Frame..	Shaft 2.	116	56	P. steel..	3 plain..	Ball...	Roller.	.....	34x4	34x4
Metz	475	9.8	R'bout.	2	2	3½	3½	Single.	Air-c'l'd.	....	Bosch...	None....	Splash...	None....	Fric..	...	Frame..	2-chain.	81	56½	P. steel..	2 ball...	Ball...	Ball...	550	28x2½	28x2½
Middleby	1250	25.6	Tour'g..	5	4	4	4	Single.	Air-c'l'd.	....	Splitd'f..	Dry.....	4 mech..	....	Prog.	3	Frame..	Shaft...	108	56½	....	....	....	....	2,200	33x4	33x4
Midland L	1800	32.4	Tour'g..	5	4	4½	5	Pairs..	Tubular.	Centrif'l.	Remy...	Dry.....	Pump...	3-plate..	Sel...	3	Motor..	Shaft 1.	115	56	P. steel..	3 plain..	Roller.	Ball...	2,400	34x4	34x4
Midland G-10	2250	32.4	Tour'g..	5	4	4½	5½	Pairs..	Tubular.	Centrif'l.	Remy...	Dry.....	Pump...	3-plate..	Sel...	3	Motor..	Shaft 1.	118	56	P. steel..	3 plain..	Roller.	Roller.	2,700	36x4	36x4
Mitchell R	1100	28.9	R'bout.	3	4	4¼	5	Pairs..	Cellular..	Centrif'l.	Splitd'f..	Dry.....	6 mech..	Cone....	Sel...	3	Shaft...	Shaft 1.	100	‡56½	P. steel..	3 plain..	Roller.	Roller.	1,800	32x3	32x3
Mitchell T	1350	28.9	Tour'g..	5	4	4¼	5	Pairs..	Cellular..	Centrif'l.	Splitd'f..	Dry.....	6 mech..	Cone....	Sel...	3	Shaft...	Shaft 1.	112	‡56½	P. steel..	3 plain..	Roller.	Ball...	2,300	34x3½	34x3½
Mitchell S	2000	43.8	Tour'g..	7	6	4¼	5	Pairs..	Cellular..	Centrif'l.	Splitd'f..	Dry.....	8 mech..	Cone....	Sel...	3	Shaft...	Shaft 1.	130	‡56½	P. steel..	4 plain..	Roller.	Ball...	3,300	36x4	36x4
Moline	1500	25.6	Tour'g..	5	4	4	4½	Pairs..	Tubular.	None....	Splitd'f..	Battery..	Pump...	Cone....	Sel...	3	Frame..	Shaft...	110	56	P. steel..	3 plain..	Roller.	Roller.	2,100	34x3½	34x3½
Moline	2500	32.4	Tour'g..	5	4	4½	5	Pairs..	Tubular.	None....	Bosch...	Battery..	Pump...	Cone....	Sel...	3	Frame..	Shaft...	116	56	P. steel..	3 plain..	Roller.	Roller.	2,650	36x3½	36x4
Moon 30	1500	28.9	Tour'g..	5	4	4¼	5	Pairs..	Tubular.	Centrif'l.	Remy...	Dry.....	Pump...	Ex. b'd..	Sel...	3	Axle...	Shaft 1.	110	56	P. steel..	3 plain..	Roller.	Roller.	2,400	34x3½	34x3½
Moon 45	3000	36.1	Tour'g..	5	4	4¾	5	Pairs..	H'comb..	Centrif'l.	Bosch...	Battery..	Pump...	Disc.....	Sel...	4	Frame..	Shaft...	120	56	P. steel..	3 plain..	Roller.	Roller.	2,850	36x4	36x4½
Mora 20	1050	16.9	R'bout.	2	4	3¼	3½	Pairs..	Tubular.	None....	Remy...	Dry.....	Pump...	Ex. b'd..	Prog.	2	Axle...	Shaft 2.	84	56	P. steel..	3 plain..	Roller.	Roller.	1,300	32x3	32x3
Mora 40	2500	32.4	Tour'g..	5	4	4½	5⅜	Pairs..	Tubular.	Centrif'l.	Bosch...	Storage..	Pump...	Cone....	Sel...	3	Motor..	Shaft 1.	120	56	P. steel..	3 plain..	Ball...	Roller.	2,500	34x4	34x4
National 40	2500	40.0	Tour'g..	5	4	5	5 11/16	Pairs..	H'comb..	Centrif'l.	Bosch...	Storage..	Pump...	Cone....	Sel...	3	Frame..	Shaft 1.	124	56½	P. steel..	3 plain..	Ball...	Roller.	2,850	36x4	36x4
National 50	4200	48.6	Tour'g..	7	6	4½	4¾	Pairs..	H'comb..	Centrif'l.	Bosch...	Storage..	Pump...	Cone....	Sel...	3	Frame..	Shaft 1.	130	56½	P. steel..	4 ball...	Ball...	Ball...	3,100	36x4½	36x4½
National 60	5000	60.0	Tour'g..	7	6	5	5	Single.	H'comb..	Centrif'l.	Bosch...	Storage..	Pump...	Cone....	Sel...	3	Frame..	Shaft 1.	137	56½	P. steel..	4 ball...	Ball...	Ball...	3,750	36x5	36x5
Oakland 25	1250	25.6	Tour'g..	4	4	4	4	Pairs..	Tubular.	Centrif'l.	Magneto.	Battery..	Pump...	Disc.....	Sel...	3	Frame..	Shaft...	100	56	P. steel..	3 plain..	Ball...	Roller.	1,800	32x3½	32x3½
Oakland K	1700	32.4	Tour'g..	5	4	4½	5	Pairs..	Tubular.	Centrif'l.	Magneto.	Battery..	Pump...	Disc.....	Sel...	3	Frame..	Shaft...	112	56	P. steel..	3 plain..	Ball...	Roller.	2,250	34x4	34x4
Ohio 40-A	*1850	28.9	Tour'g..	5	4	4¼	4¾	Pairs..	Cellular..	None....	Splitd'f..	Dry.....	Pump...	3-plate..	Sel...	3	Motor..	Shaft...	115	56	P. steel..	3 plain..	Ball...	Ball...	2,300	34x4	34x4
Oldsmobile	3000	36.1	Tour'g..	5	4	4¾	4¾	Pairs..	H'comb..	Centrif'l.	Bosch...	Dry.....	Pump...	Cone....	Sel...	4	Frame..	Shaft...	118	56	P. steel..	3 plain..	Ball...	Roller.	.....	36x4	36x4
Oldsmobile	4600	54.1	R'bout.	2	6	4¾	4¾	Pairs..	H'comb..	Centrif'l.	Bosch...	Dry.....	Pump...	Cone....	Sel...	4	Frame..	Shaft...	118	56	P. steel..	4 plain..	Ball...	Ball...	.....	42x4½	42x4½
Oldsmobile	4600	54.1	Tour'g..	7	6	4¾	4¾	Pairs..	H'comb..	Centrif'l.	Bosch...	Dry.....	Pump...	Cone....	Sel...	4	Frame..	Shaft...	130	56	P. steel..	4 plain..	Ball...	Ball...	.....	42x4½	42x4½
Only Car	700	....	R'bout.	2	1	....	....	Single.	....	....	Bosch...	....	....	....	.....	...	....	Shaft...	104	....	P. steel..	2 plain..	Ball...	Ball...	.....	....	....
Otto 10-A	1900	30.6	R'dster.	3	4	4⅜	5½	Pairs..	H'comb..	Centrif'l.	Bosch...	Battery..	Pump...	Cone....	Sel...	3	Axle...	Shaft 1.	123	56	P. steel..	3 plain..	Ball...	Roller.	1,950	34x3½	34x3½
Otto 10-A	2000	30.6	Tour'g..	5	4	4⅜	5½	Pairs..	H'comb.	Centrif'l.	Bosch...	Battery..	Pump...	Cone....	Sel...	3	Axle...	Shaft 1.	123	56	P. steel..	3 plain..	Ball...	Roller.	2,060	34x4	34x4
Overlaod "38"	1000	22.5	R'bout.	2	4	3¾	4½	Single.	Cellular..	None....	Remy...	Dry.....	Pump...	Plate....	Plan.	2	Axle...	Shaft 1.	102	56	P. steel..	5 plain..	Plain..	Roller.	1,850	32x3½	32x3½
Overland "40"	1250	28.9	R'dster.	3	4	4¼	4½	Single.	Cellular..	None....	Remy...	Dry.....	Pump...	Plate...	Plan.	2	Axle...	Shaft 1.	112	56	P. steel..	5 plain..	Plain..	Roller.	2,100	34x3½	34x3½
Overland "41"	1400	28.9	Tour'g..	5	4	4¼	4½	Single.	Cellular..	None....	Remy...	Dry.....	Pump...	Plate....	Plan.	2	Axle...	Shaft 1.	112	56	P. steel..	5 plain..	Plain..	Roller.	2,200	34x4	34x4
Overland "42"	1500	28.9	Tour'g..	5	4	4¼	4½	Single.	Cellular..	None....	Remy...	Dry.....	Pump...	Cone....	Sel...	3	....	Shaft...	112	56	P. steel..	5 plain..	Ball...	Roller.	2,200	34x4	34x4
Packard 18	3200	26.4	R'dster.	3	4	4 1/16	5½	Pairs..	H'comb..	Centrif'l.	Eisem'n.	Storage..	2 mech..	Plate....	Sel...	3	Axle...	Shaft 2.	102	56½	P. steel..	3 plain..	Ball...	Roller.	2,400	34x3½	34x4
Packard 18	3200	26.4	Tour'g..	5	4	4 1/16	5½	Pairs..	H'comb..	Centrif'l.	Eisem'n.	Storage..	2 mech..	Plate ...	Sel...	3	Axle...	Shaft 2.	112	56½	P. steel..	3 plain..	Ball...	Roller.	2,750	34x4	34x4
Packard 30	4200	40.0	R'dster.	3	4	5	5½	Pairs..	H'comb..	Centrif'l.	Eisem'n.	Storage..	2 mech..	Plate....	Sel...	3	Axle...	Shaft 2.	108	56½	P. steel..	3 plain..	Ball...	Roller.	2,900	36x3½	36x4½
Packard 30	4200	40.0	Tour'g..	7	4	5	5½	Pairs..	H'comb..	Centrif'l.	Eisem'n.	Storage..	2 mech..	Plate....	Sel...	3	Axle...	Shaft 2.	123½	56½	P. steel..	3 plain..	Ball...	Roller.	3,300	36x4	36x4½
Paige-Detroit	800	†	R'bout.	2	3	3¾	4	Single.	Tubular.	None....	Magneto.	None....	....	Cone....	Sel...	2	Frame..	Shaft...	90	56	P. steel..	4 plain..	....	....	.....	32x3	32x3
Palmer-Sioger XXX	2250	28.9	R'dster.	3	4	4¼	4½	Pairs..	H'comb..	Centrif'l.	Bosch...	Battery..	Pump...	Disc.....	Sel...	4	Frame..	Shaft...	115	56	P. steel..	3 plain..	Ball...	Ball...	.....	34x4	34x4
Palmer-Singer LXI	3250	54.1	R'dster.	3	6	4¾	5½	Single.	H'comb..	Centrif'l.	Bosch...	Battery..	Pump...	Disc.....	Sel...	4	Frame..	Shaft...	127	56	P. steel..	Plain..	Ball...	Ball...	.....	34x4	34x4
Palmer-Singer LXII	3500	57.0	Tour'g..	5	6	4¾	5½	Pairs..	H'comb..	Centrif'l.	Bosch...	Battery..	Pump...	Disc.....	Sel...	4	Frame..	Shaft...	127	56	P. steel..	4 plain..	Ball...	Ball...	.....	36x4	36x4½
Palmer-Singer XXX	3650	28.9	Limous.	6	4	4¼	4½	Pairs..	H'comb..	Centrif'l.	Bosch...	Battery..	Pump...	Disc.....	Sel...	4	Frame..	Shaft...	120	56	P. steel..	3 plain..	Ball...	Ball...	.....	34x4	34x4
Parry 32-36	1285	32.4	R'bout.	2	4	4½	4½	Pairs..	Tubular.	Centrif'l.	Kurtz...	Dry.....	....	Cone....	Sel...	3	Frame..	Shaft 1.	116	56	P. steel..	3 plain..	....	....	.....	32x3½	32x3½
Parry 32-36	1485	32.4	Tour'g..	5	4	4½	4½	Pairs..	Tubular.	Centrif'l.	Kurtz...	Dry.....	....	Cone....	Sel...	3	Frame..	Shaft 1.	116	56	P. steel..	3 plain..	....	....	.....	34x3½	34x4½
Paterson 30	1400	25.6	Tour'g..	5	4	4	4	Pairs..	Tubular.	None....	Remy...	Dry.....	Splash...	Cone....	Sel...	3	....	Shaft 2.	104	56	P. steel..	3 plain..	Ball...	Roller.	2,000	32x3½	32x3½

* Price includes top. † Two-cycle motor. ‡ Also 60 inches.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY		MOTOR				COOLING		IGNITION		Lubrication	Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	‡ TIRES	
			Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery			Type	Speeds	Location	Drive				Crankshaft	Transmission	Axle		Front	Rear
Peerless "29"	$4500	25.6	Limous.	6	4	4	4½	Pairs	H'comb.	Gear	Bosch	Storage	3 mech.	Ex. b'd.	Sel.	4	Frame	Shaft 2	113	56	P. steel	3 plain	Ball	Ball	.....	32x3½	32x3½
Peerless "27"	4300	38.0	R'dster.	3	4	4½	5½	Pairs	H'comb.	Gear	Bosch	Storage	3 mech.	Ex. b'd.	Sel.	4	Frame	Shaft 2	118½	56	P. steel	3 plain	Ball	Ball	.....	36x4	36x5
Peerless "27"	4300	38.0	Tour'g.	7	4	4½	5½	Pairs	H'comb.	Gear	Bosch	Storage	3 mech.	Ex. b'd.	Sel.	4	Frame	Shaft 2	122	56	P. steel	3 plain	Ball	Ball	.....	36x4	36x5
Peerless "28"	6000	57.0	R'dster.	3	6	4½	5½	Pairs	H'comb.	Gear	Bosch	Storage	4 mech.	Ex. b'd.	Sel.	4	Frame	Shaft 2	132½	56	P. steel	3 plain	Ball	Ball	.....	36x4	36x5
Peerless "28"	6000	57.0	Tour'g.	7	6	4½	5½	Pairs	H'comb.	Gear	Bosch	Storage	4 mech.	Ex. b'd.	Sel.	4	Frame	Shaft 2	136	56	P. steel	3 plain	Ball	Ball	.....	36x4	36x5
Pennsylvania D 25	2500	28.9	Tour'g.	5	4	4½	4½	Pairs	Cellular	Gear	Bosch	Battery	Mech.	Cone	Sel.	3	Axle	Shaft 1	110	56	P. steel	3 plain	Ball	Ball	2,300	34x4	34x4
Pennsylvania C 50	3000	36.1	Tour'g.	5	4	4¾	5¼	Pairs	Cellular	Gear	Bosch	Battery	Mech.	Cone	Sel.	3	Axle	Shaft 1	114	56	P. steel	3 plain	Ball	Ball	3,000	34x4	34x4½
Pennsylvania E 50	3500	36.1	Tour'g.	7	4	4¾	5¼	Pairs	Cellular	Gear	Bosch	Battery	Mech.	Cone	Sel.	3	Axle	Shaft 1	122	56	P. steel	3 plain	Ball	Ball	3,300	36x4	36x4½
Pennsylvania F Six	4500	54.1	Tour'g.	5	6	4¾	5¼	Pairs	Cellular	Gear	Bosch	Battery	Mech.	Cone	Sel.	3	Axle	Shaft 1	129	56	P. steel	4 plain	Ball	Ball	3,300	36x4	36x4½
Petrel	1350	30.6	R'bout.	2	4	4¾	4¾	Pairs	Cellular	Centrif'l.	Magneto	Battery	Pump	None	Fric.	...	Frame	2-chain	108	56	P. steel	......	......	......	2,000	32x3½	32x3½
Petrel	1500	30.6	Tour'g.	5	4	4¾	4¾	Pairs	Cellular	Centrif'l.	Magneto	Battery	Pump	None	Fric.	...	Frame	2-chain	115	56	P. steel	......	......	......	2,400	34x3½	34x4½
Pierce-Racine	1750	28.9	Tour'g.	5	4	4½	5	Pairs	H'comb.	Centrif'l.	Remy	Dry	Pump	39-disc.	Sel.	3	Frame	Shaft 2	112	56	P. steel	3 plain	Roller	Roller	2,700	34x4	34x4
Pierce-Arrow 36	3850	38.4	R'dster.	3	6	4	4¾	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 2	119	55	P. steel	4 plain	Ball	Roller	.....	36x4	36x4
Pierce-Arrow 36	4000	38.4	Tour'g	5	6	4	4¾	Pairs	H'comb	Centrif'l.	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 2	125	55	P. steel	4 plain	Ball	Roller	.....	36x4	36x4½
Pierce-Arrow 48	485'	48.6	R'dster.	3	6	4½	4¾	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 2	128	56	P. steel	4 plain	Ball	Roller	.....	36x4½	36x4½
Pierce-Arrow 48	5000	48.6	Tour'g.	5	6	4½	4¾	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 2	134½	56	P. steel	4 plain	Ball	Roller	.....	36x4½	37x5
Pierce-Arrow 66	5850	66.2	R'dster.	3	6	5½	5½	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 2	133½	56	P. steel	4 plain	Ball	Roller	.....	37x5	37x5
Pierce-Arrow 66	6000	66.2	Tour'g.	7	6	5½	5½	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 2	140	56	P. steel	4 plain	Ball	Roller	.....	37x5	38x5½
Pittsburgh B	3000	54.1	R'dster.	3	6	4¾	5¼	Single	Cellular	Gear	Bosch	Storage	Pump	Disc	Sel.	3	Frame	Shaft 2	122	56	P. steel	7 plain	Ball	Ball	3,000	36x4	36x4
Pittsburgh C	3200	54.1	B. tonn.	4	6	4¾	5¼	Single	Cellular	Gear	Bosch	Storage	Pump	Disc	Sel.	3	Frame	Shaft 2	124	56	P. steel	7 plain	Ball	Ball	3,100	36x4	36x4
Pittsburgh D	3600	54.1	Tour'g.	7	6	4¾	5¼	Single	Cellular	Gear	Bosch	Storage	Pump	Disc	Sel.	3	Frame	Shaft 2	134	56	P. steel	7 plain	Ball	Ball	3,500	36x4½	36x4½
Pope-Hartford T	2750	29.7	Tour'g.	5	4	4 5/16	5½	Pairs	Cellular	Centrif'l.	Extra	Storage	4 mech.	Cone	Sel.	3	Frame	Shaft 2	118	56	Armor'd.	3 plain	Roller	Roller	.....	36x4	36x4
Powercar	1250	25.6	Tour'g.	5	4	4	4½	Single	Tubular	None	Remy	Dry	....	Disc.	Sel.	3	Motor	Shaft	105	56	P. steel	3 plain	Roller	Roller	.....	33x4	33x4
Premier 4-40	2500	32.4	Tour'g.	5	4	4½	5½	Pairs	Cellular	Centrif'l.	M. & B.	Extra	5 mech.	Disc.	Sel.	3	Frame	Shaft	120	56½	P. steel	3 plain	Ball	Ball	2,800	34x4	34x4
Premier 6-60	3500	48.6	Tour'g.	7	6	4½	5½	Pairs	Cellular	Centrif'l.	M. & B.	Battery	7 mech.	Disc.	Sel.	4	Frame	Shaft	139½	56½	P. steel	4 plain	Ball	Ball	.....	36x4	36x5
Pullman O	1650	25.6	B. tonn.	4	4	4	5	Single	Cellular	Centrif'l.	Bosch	Dry	Pump	Cone	Sel.	3	Frame	Shaft	108	56½	P. steel	5 plain	Ball	Roller	1,800	34x3½	34x3½
Pullman K	2000	32.4	Tour'g.	5	4	4½	4¾	Single	Cellular	Centrif'l.	Bosch	Dry	Pump	Cone	Sel.	3	Frame	Shaft	112	56½	P. steel	5 plain	Ball	Roller	2,400	34x4	34x4
Pullman 4-40	3000	40.0	R'dster.	3	4	5	5¼	Single	Cellular	Centrif'l.	Bosch	Dry	Pump	Cone	Sel.	3	Frame	Shaft	110	56½	P. steel	5 plain	Ball	Roller	2,600	36x4	36x4
Pullman M	3500	44.1	Tour'g.	7	4	5¼	6	Single	Cellular	Centrif'l.	Bosch	Dry	Pump	Cone	Sel.	3	Frame	Shaft	124	56½	P. steel	5 plain	Ball	Roller	3,500	36x4	36x4
Rainier	4500	40.0	Tour'g.	5	4	5	5½	Pairs	Cellular	Centrif'l.	M. & B.	....	Pump	Disc.	Sel.	4	Frame	Shaft 2	119	56	P. steel	3 plain	Ball	Ball	3,000	36x4	36x4½
Rambler "53"	1800	32.4	Tour'g.	5	4	4½	4½	Single	Tubular	Centrif'l.	Splitd'f.	Storage	4 mech.	Cone	Sel.	3	Shaft	Shaft 1	108	‡56	P. steel	3 plain	Roller	Roller	.....	36x3½	36x3½
Rambler "54"	2250	40.0	Tour'g.	5	4	5	5½	Single	Tubular	Centrif'l.	Bosch or	Storage	4 mech.	Ex. b'd	Sel.	3	Shaft	Shaft 1	117	‡56	P. steel	3 plain	Roller	Roller	.....	36x4	36x4
Rambler "55"	2500	40.0	Tour'g.	7	4	5	5½	Single	Tubular	Centrif'l.	Eisem'n.	Storage	4 mech.	Ex. b'd	Sel.	3	Shaft	Shaft 1	123	‡56	P. steel	3 plain	Roller	Roller	.....	36x4½	36x4½
Ranger D	395	13.2	R'bout.	2	2	4 1/16	4	Single	Air-c'l'd.	....	None	Dry	4 mech.	Disc.	Plan.	2	Frame	2-chain	74	56	Angle	2 plain	Plain	Roller	900	28x3	28x3
Regal 30	1250	25.6	Tour'g.	5	4	4	4	Pairs	Tubular	None	Remy	Dry	Pump	Cone	Sel.	3	Frame	Shaft 2	107	56	P. steel	3 plain	Roller	Roller	2,000	32x3½	32x3½
Regal 40	1750	....	Tour'g.	7	4	....	....	Pairs	....	....	....	....	....	....	....	...	....	....	...	...	....	....	....	....	....	....	....
Reo	500	9.0	R'bout.	2	1	4¾	6	Single	Tubular	Gear	None	Dry	Splash	Plate	Plan.	2	Motor	1-chain	78	‡55	P. steel	2 plain	Plain	Roller	.....	28x3	28x3
Reo	1000	18.0	Tour'g.	5	2	4¾	6	Single	Tubular	Gear	None	Dry	Splash	Plate	Plan.	2	Motor	1-chain	96	‡55	P. steel	2 plain	Plain	Roller	.....	32x3½	32x3½
Reo 30-35	1250	25.6	Tour'g.	5	4	4	4½	Pairs	Tubular	Gear	Splitd'f.	Dry	Pump	Disc.	Sel.	3	Frame	Shaft 2	108	‡56	P. steel	3 plain	Ball	Roller	2,100	34x3½	34x3½
Ricketts G	2250	40.9	Tour'g.	7	6	4½	4½	Pairs	H'comb.	Gear	U. & H	Dry	Pump	Cone	Sel.	3	Motor	Shaft 2	146	56	P. steel	4 plain	Ball	Roller	2,450	36x4½	36x4½
Rider-Lewis	1050	25.6	Tour'g.	5	4	4	4½	Block	Tubular	None	Bosch	None	....	Cone	Sel.	3	Axle	Shaft 2	100	56	P. steel	....	....	....	1,700	32x3½	32x3½
Rider-Lewis	2500	38.4	Tour'g.	7	6	4	4	Single	Tubular	None	Bosch	None	....	Cone	Sel.	3	Axle	Shaft 2	123	56	P. steel	....	....	....	.....	34x4	34x4
Royal Tourist M	4500	48.4	Tour'g.	7	4	5½	6	Pairs	H'comb.	Centrif'l.	Magneto	Storage	....	Cone	Sel.	4	Frame	Shaft 2	126	56	P. steel	3 plain	....	....	.....	36x4½	36x5
Salter A	1750	28.9	Tour'g.	5	4	4½	4½	Pairs	Tubular	Centrif'l.	Remy	Dry	Splash	Ex. b'd	Plan.	3	Motor	Shaft 2	110	56	P. steel	3 plain	Ball	Roller	2,200	32x4	32x4
Schacht	875	21.0	R'bout.	2	2	5½	4½	Single	Tubular	None	Extra	Dry	6 mech.	Plate	Plan.	2	Frame	2-chain	104	56	P. steel	2 plain	Plain	Roller	1,400	32x3½	32x3½
Schlosser 24	4500	32.4	Tour'g.	7	4	4½	5	Single	H'comb.	Gear	Bosch	Dry	4 mech.	Disc.	Sel.	4	Frame	Shaft 2	120	56	P. steel	3 plain	Ball	Ball	3,500	36x4½	36x4½
Sebring	2750	30.5	B. tonn.	4	6	3 11/16	4	Pairs	H'comb.	Centrif'l.	Splitd'f.	Dry	Pump	28-disc.	Sel.	3	Frame	Shaft 1	120	56	P. steel	4 ball	Roller	Roller	2,200	34x4	34x4

* Price includes top. † Two-cycle motor. ‡ Also 60 inches.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication
Selden 35T	$2000	36.1	Tour'g.	5	4	4¾	5	Pairs	H'comb.	Centrif'l.	Extra	Storage	Pump
Selden 35S	2500	36.1	Tour'g.	7	4	4¾	5	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump
Sellers 30	1700	30.6	Tour'g.	5	4	4⅜	4¾	Pairs	Tubular	Centrif'l.	Remy	Dry	Splash
Sharp-Arrow 40	3000	40.0	R'bout.	2	4	5	5	Pairs	Cellular	Centrif'l.	Bosch	Dry	Pump
Sharp-Arrow 40	3050	40.0	Tour'g.	5	4	5	5	Pairs	Cellular	Centrif'l.	Bosch	Dry	Pump
Simplex 50	4450	53.0	Extra	..	4	5¾	5¾	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.
Simplex 50	4450	53.0	Extra	..	4	5¾	5¾	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.
Speedwell 50	2500	40.0	Tour'g.	5	4	5	5	Pairs	H'comb.	Centrif'l.	Bosch	Storage	4 mech.
Spoerer B	3000	38.0	Tour'g.	7	4	4⅜	5½	Pairs	H'comb.	Centrif'l.	Bosch	Battery	Pump
Springfield 10-G	2500	40.0	Tour'g.	5	4	5	4¾	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Mech.
Springfield 10-H	2500	40.0	Tour'g.	7	4	5	4¾	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Mech.
Standard Six	3000	48.6	Tour'g.	5	6	4½	5	Pairs	H'comb.	Centrif'l.	Remy	Dry	Pump
Staver H	1600	25.6	Tour'g.	5	4	4	4	Pairs	Cellular	None	Splitd'f.	Dry	Splash
Staver L	2250	38.4	Tour'g.	5	6	4	4	Pairs	Cellular	None	Splitd'f.	Dry	Splash
Stearns 15-30	3200	32.4	Tour'g.	5	4	4½	4⅝	Block	H'comb.	Centrif'l.	Bosch	Dry	Pump
Stearns 30-60	4600	46.2	B. tonn.	5	4	5⅜	5½	Pairs	H'comb.	Centrif'l.	Bosch	Dry	Pump
Stearns 30-60	4600	46.2	Tour'g.	7	4	5⅜	5½	Pairs	H'comb.	Centrif'l.	Bosch	Dry	Pump
Stearns 30-60	4600	46.2	Tour'g.	7	4	5⅜	5½	Pairs	H'comb.	Centrif'l.	Bosch	Dry	Pump
Stearns 45-90	6500	69.3	Tour'g.	7	6	5⅜	5½	Pairs	H'comb.	Centrif'l.	Bosch	Dry	Pump
Sterling O	1750	25.6	Tour'g.	5	4	4	5	Single	Tubular	Centrif'l.	Remy	Dry	4 mech.
Stevens-Duryea XXX	2850	36.1	R'dster.	3	4	4¾	4½	Pairs	Cellular	Centrif'l.	Magneto	Storage	4 mech.
Stevens-Duryea X	2850	36.1	Tour'g.	5	4	4¾	4½	Pairs	Cellular	Centrif'l.	Magneto	Storage	4 mech.
Stevens-Duryea AA	3300	43.8	Tour'g.	5	6	4½	4¾	Pairs	Cellular	Centrif'l.	Magneto	Storage	6 mech.
Stevens-Duryea Y	4000	54.1	Tour'g.	7	6	4¾	4½	Pairs	Cellular	Centrif'l.	Magneto	Storage	6 mech.
Stoddard-Dayton 10-H	1500	24.0	R'bout.	2	4	3¾	4½	Pairs	Tubular	Centrif'l.	Splitd'f.	Dry	Mech.
Stoddard-Dayton 10-B	1600	24.0	Tour'g.	5	4	3¾	4½	Pairs	Tubular	Centrif'l.	Splitd'f.	Dry	Mech.
Stoddard-Dayton 10-A	2100	28.0	Tour'g.	5	4	4 3/16	5	Pairs	Tubular	Centrif'l.	Pittsf'ld.	Dry	Mech.
Stoddard-Dayton 10-K	2650	36.1	R'dster.	3	4	4¾	5	Pairs	Tubular	Centrif'l.	Bosch	Dry	Mech.
Stoddard-D'ton 10-K4	2750	36.1	B. tonn.	4	4	4¾	5	Pairs	Tubular	Centrif'l.	Bosch	Dry	Mech.
Stoddard-Dayton 10-F	2800	36.1	Tour'g.	7	4	4¾	5	Pairs	Tubular	Centrif'l.	Bosch	Dry	Mech.
Studebaker G-7	4000	36.1	Tour'g.	7	4	4¾	5¼	Pairs	Tubular	Centrif'l.	Bosch	None	3 mech.
Sultan 800	2800	14.0	Limous.	6	4	75	110	Pairs	Tubular	None	Bosch	None	2 mech.
Thomas M	*3500	43.8	Tour'g.	5	6	4½	5½	Pairs	H'comb.	Centrif'l.	Bosch	Dry	9 mech.
Thomas 4-28	4000	28.9	Br'h'm.	6	4	4¼	5½	Pairs	H'comb.	Centrif'l.	Bosch	Dry	6 mech.
Thomas F	*4500	53.0	Tour'g.	7	4	5¾	5½	Single	H'comb.	Gear	Bosch	Dry	8 mech.
Thomas K	*6000	72.6	Tour'g.	7	6	5½	5½	Single	H'comb.	Gear	Bosch	Dry	10 mech.
Traveller E	1250	29.3	Tour'g.	5	4	4 3/16	5¾	Pairs	Tubular	Gear	Extra	Storage	4 mech.
Velie	1800	32.4	Tour'g.	5	4	4½	5¼	Pairs	H'comb.	Centrif'l.	Splitd'f.	Storage	Pump
Warren-Detroit 10-A	1100	25.6	R'dster.	3	4	4	4½	Block	Tubular	Centrif'l.	Volta	Dry	Pump
Warren-Detroit 10-B	1250	25.6	Tour'g.	5	4	4	4½	Block	Tubular	Centrif'l.	Volta	Dry	Pump
Washington A-2	1750	28.9	Tour'g.	5	4	4½	4½	Pairs	Tubular	None	Remy	Dry	Pump
Washington B-1	2250	34.2	Tour'g.	5	4	4⅝	5¼	Pairs	Tubular	None	Remy	Dry	Pump
Watt A	1850	38.4	B. tonn.	4	6	4	4½	Single	H'comb.	Gear	Magneto	Storage	Mech.
Welch R	.....	48.4	Tour'g.	7	4	5½	6	Block	H'comb.	Centrif'l.	Bosch	Storage	Mech.

MAKE AND MODEL	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
Selden 35T	Cone	Sel.	3	Frame	Shaft 1	116½	56	P. steel	3 plain	Roller	Roller	2,650	34x3½	34x4
Selden 35S	Cone	Sel.	3	Frame	Shaft 2	122	56	P. steel	3 plain	Roller	Roller	2,800	36x4	36x4
Sellers 30	3-plate	Sel.	3	Frame	Shaft 1	112	56	P. steel	3 plain	Ball	Ball	2,400	34x3½	34x3½
Sharp-Arrow 40	Cone	Sel.	3	Frame	Shaft 2	108	56	P. steel	3 plain	Ball	Ball	2,500	36x3½	36x4
Sharp-Arrow 40	Cone	Sel.	3	Frame	Shaft 2	120	56	P. steel	3 plain	Ball	Ball	2,700	36x4	36x4
Simplex 50	Disc.	Sel.	4	Frame	2-chain	124	56	P. steel	3pl., 1bl.	Ball	Ball	2,800	36x4	36x5
Simplex 50	Disc.	Sel.	4	Frame	2-chain	129	56	P. steel	3pl., 1bl.	Ball	Ball	2,850	36x4	36x5
Speedwell 50	Cone	Sel.	3	Frame	Shaft 2	121	56	P. steel	3 plain	Roller	Roller	2,600	36x4	36x4
Spoerer B	Cone	Sel.	3	Frame	Shaft 2	118	56	P. steel	3 plain	Ball	Roller	2,950	36x4	36x4
Springfield 10-G	Cone	Sel.	3	Frame	Shaft 2	126½	56½	P. steel	3 plain	Ball	Ball	2,400	36x4	36x4½
Springfield 10-H	Cone	Sel.	3	Frame	Shaft 2	128	56½	P. steel	3 plain	Ball	Ball	2,900	36x4	36x5
Standard Six	Cone	Sel.	3	Frame	Shaft 2	124	56	P. steel	4 plain	Ball	Roller	3,200	36x4	36x4
Staver H	Disc.	Sel.	3	Frame	Shaft 1	112	56	P. steel	3 plain	Roller	Ball	2,150	34x3½	34x3½
Staver L	Disc.	Sel.	3	Frame	Shaft 1	124	56	P. steel	4 plain	Roller	Ball	2,500	36x4	36x4
Stearns 15-30	Plate	Sel.	3	Axle	Shaft 1	116	56½	P. steel	3 ball	Ball	Ball	2,650	34x4	34x4
Stearns 30-60	Plate	Sel.	4	Frame	Shaft 1	121	56½	P. steel	3 ball	Ball	Ball	3,200	36x4	36x4½
Stearns 30-60	Plate	Sel.	4	Frame	Shaft 1	124	56½	P. steel	3 ball	Ball	Ball	3,450	36x4	36x5
Stearns 30-60	Plate	Sel.	4	Frame	2-chain	124	56½	P. steel	3 ball	Ball	Ball	3,450	36x4	36x5
Stearns 45-90	Plate	Sel.	4	Frame	2-chain	130	56½	P. steel	4 ball	Ball	Ball	.....	36x4½	36x5
Sterling O	Ex. b'd	Sel.	3	Axle	Shaft 1	118	56	P. steel	5 plain	Ball	Roller	2,500	34x3½	34x4½
Stevens-Duryea XXX	Plate	Prog.	3	Motor	Shaft 2	109	56	P. steel	3 plain	Ball	Ball	2,650	36x3½	36x4
Stevens-Duryea X	Plate	Prog.	3	Motor	Shaft 2	124	56	P. steel	3 plain	Ball	Ball	2,800	34x4	34x4
Stevens-Duryea AA	Plate	Prog.	3	Motor	Shaft 2	128	56	P. steel	4 plain	Ball	Ball	3,100	36x4½	36x4½
Stevens-Duryea Y	Plate	Prog.	3	Motor	Shaft 2	142	56	P. steel	4 plain	Ball	Ball	.....	36x4	36x5
Stoddard-Dayton 10-H	Cone	Sel.	3	Frame	Shaft 1	108	56	P. steel	3 plain	Roller	Roller	2,175	32x3½	32x3½
Stoddard-Dayton 10-B	Cone	Sel.	3	Frame	Shaft 1	108	56	P. steel	3 plain	Roller	Roller	2,500	32x4	32x4
Stoddard-Dayton 10-A	Cone	Sel.	3	Frame	Shaft 1	116	56	P. steel	3 plain	Roller	Roller	2,970	34x4	34x4
Stoddard-Dayton 10-K	Cone	Sel.	3	Frame	Shaft 1	120	56	P. steel	3 plain	Roller	Roller	3,110	36x4	36x4
Stoddard-D'ton 10-K4	Cone	Sel.	3	Frame	Shaft 1	120	56	P. steel	3 plain	Roller	Roller	3,450	36x4½	36x4½
Stoddard-Dayton 10-F	Cone	Sel.	3	Frame	Shaft 1	128	56	P. steel	3 plain	Roller	Roller	3,550	36x4½	36x4½
Studebaker G-7	Cone	Sel.	4	Frame	Shaft 2	117½	54	P. steel	3 plain	Ball	Ball	3,000	36x4	36x4½
Sultan 800	Cone	Sel.	3	Frame	Shaft 2	97	55½	P. steel	3 plain	Ball	Ball	2,450	32x4	32x4
Thomas M	3-plate	Sel.	3	Frame	Shaft 2	125	56	P. steel	4 plain	Ball	Roller	3,650	36x4½	36x4½
Thomas 4-28	3-plate	Sel.	3	Frame	Shaft 2	123	56	P. steel	3 plain	Ball	Roller	3,270	34x4½	34x4½
Thomas F	3-plate	Sel.	4	Frame	2-chain	127	56	P. steel	5 plain	Ball	Ball	3,525	36x4½	36x5
Thomas K	3-plate	Sel.	4	Frame	2-chain	140	56	P. steel	7 plain	Ball	Ball	4,160	36x4½	36x5
Traveller E	Plate	Plan.	2	Frame	Shaft 1	112	56	P. steel	3 plain	Plain	Ball	2,000	34x3½	34x3½
Velie	3-plate	Sel.	3	....	Shaft	115	56	P. steel	3 plain	Roller	Roller	2,750	34x4	34x4
Warren-Detroit 10-A	Cone	Sel.	3	Frame	Shaft 1	110	56	P. steel	2 plain	Plain	Roller	2,000	32x3½	32x3½
Warren-Detroit 10-B	Cone	Sel.	3	Frame	Shaft 1	110	56	P. steel	2 plain	Plain	Roller	2,100	34x3½	34x3½
Washington A-2	Disc.	Sel.	3	Frame	Shaft 2	112	56	P. steel	3 plain	Ball	Ball	2,800	34x4	34x4
Washington B-1	Disc.	Sel.	3	Frame	Shaft 2	112	56	P. steel	3 plain	Ball	Ball	2,800	34x4	34x4
Watt A	Ex. b'd	Sel.	3	Axle	Shaft 2	132	56	P. steel	7 plain	Roller	Roller	2,200	36x4	36x4
Welch R	Disc.	Sel.	3	Axle	Shaft 1	130	56	P. steel	3 plain	Ball	Ball	3,600	36x4½	36x4½

* Price includes top.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—AMERICAN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
White G-A	$2000	22.5	Tour'g.	5	4	3¾	5⅛	Block.	H'comb.	Centrif'l.	Bosch	None	Pump	Cone	Sel.	4	Frame.	Shaft 2.	110	56½	P. steel.	2 ball.	Ball.	Ball.	.....	32x4	32x4
White G-B	2500	22.5	Tour'g.	7	4	3¾	5⅛	Block.	H'comb.	Centrif'l.	Bosch	None	Pump	Cone	Sel.	4	Frame.	Shaft 2.	120	56½	P. steel.	2 ball.	Ball.	Ball.	.....	34x4	34x4
Wilcox 35	1500	28.9	Tour'g.	5	4	4½	5	Pairs.	Tubular.	Centrif'l.	Magneto.	Dry	Pump	Disc.	Sel.	3	Motor.	Shaft 2.	115	56	P. steel.	3 plain.	Plain.	Roller.	2,400	34x3½	34x3½
Winton 48	3000	48.6	Tour'g.	5	6	4½	5	Pairs.	Tubular.	Centrif'l.	Eisem'n.	Storage.	Pump	Disc.	Sel.	4	Frame.	Shaft 2.	124	56½	P. steel.	4 plain.	Ball.	Roller.	.....	36x4	36x4
Winton 60	4250	60.0	Tour'g.	7	6	5	5	Pairs.	Tubular.	Centrif'l.	Eisem'n.	Storage.	Pump	Disc.	Sel.	4	Frame.	Shaft 2.	132	56½	P. steel.	4 plain.	Ball.	Roller.	.....	36x4½	36x4½
Wisco A	1750	30.6	Tour'g.	5	4	4¾	4¾	Pairs.	Tubular.	Centrif'l.	Bosch	Dry	Pump	Cone	Sel.	3	Frame.	Shaft 1.	118	56	P. steel.	3 plain.	Ball.	Ball.	.....	34x4	34x4
Zimmerman Z-35	1500	28.9	Tour'g.	5	4	4½	4¾	Pairs.	Tubular.	None	Splitd'f.	Dry	Pump	Cone	Sel.	3	Frame.	Shaft 1.	115	56	P. steel.	3 plain.	Roller.	Roller.	2,100	34x3½	34x3½

HIGH-WHEELED AUTOMOBILES

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES (Solid) Front	TIRES (Solid) Rear
A. B. C. "O"	$ 900	25.6	Surrey.	4	4	4	4	Pairs.	Tubular.	Centrif'l.	None	Dry	6 mech.	None	Fric.	...	Frame.	2-chain.	96	‡56	Angle.	2 plain.	Roller.	Ball.	1,200	36x1½	36x1½
Buggyaut	700	†	Surrey.	4	2	3¾	3¾	Single	Air-c'l'd.	....	None	Dry	Splash	None	Fric.	2	Motor.	Fric.	84	‡56	Wood.	3 plain.	Roller.	Ball.	850	36x1½	44x1¾
Chase F	900	†	Surrey.	4	3	4½	4	Single	Air-c'l'd.	....	None	Dry	Splash.	Plate.	Plan.	2	Frame.	2-chain.	100	56	Armor'd.	4 plain.	Ball.	Roller.	1,500	40x1¾	40x1¾
Eureka F	750	12.8	Surrey.	4	2	4	4½	Single	Tubular.	None	Star	Dry	4 mech.	Disc.	Plan.	2	Frame.	Shaft.	96	‡56	Steel.	3 plain.	Plain.	Roller.	1,800	36x1¾	38x1¾
Lincoln D	1000	25.6	Tour'g.	5	4	4	4	Single	Tubular.	None	Remy	Dry	6 mech.	Disc.	Sel.	3	Frame.	Shaft 2.	104	56	P. steel.	5 plain.	Roller.	Roller.	1,800	36x2½	36x2½
Holsman 4-K	550	12.8	R'bout.	2	2	4	4	Single	Air-c'l'd.	....	None	Dry	2 mech.	None	Fric.	2	Motor.	Cable.	65	56	Angle.	2 plain.	Roller.	Plain.	800	40x1½	42x1½
Holsman 9-K	650	12.8	R'bout.	2	2	4	4	Single	Air-c'l'd.	....	None	Dry	2 mech.	None	Fric.	2	Motor.	Cable.	80	56	Angle.	2 plain.	Roller.	Roller.	925	40x1½	40x1½
Holsman 11-K	775	12.8	Surrey.	4	2	4	4	Single	Air-c'l'd.	....	None	Dry	2 mech.	None	Fric.	2	Motor.	Cable.	92	56	Angle.	2 plain.	Roller.	Roller.	1,100	40x1½	40x1½
Holsman H-9	850	25.6	R'bout.	2	4	4	3	Single	Air-c'l'd.	....	None	Dry	Splash	None	Fric.	2	Motor.	Cable.	80	56	Angle.	2 roller.	Roller.	Roller.	925	40x1½	40x1½
Holsman H-11	965	25.6	Surrey.	4	4	4	3	Single	Air-c'l'd.	....	None	Dry	Splash	None	Fric.	2	Motor.	Cable.	92	56	Angle.	2 roller.	Roller.	Roller.	1,100	40x1½	40x1½
McIntyre HH	475	13.6	R'bout.	2	2	4½	3¾	Single	Air-c'l'd.	....	None	Dry	Mech.	Plate.	Plan.	2	Frame.	2-chain.	69½	56	Angle.	2 plain.	Plain.	Roller.	.....	34x1½	34x1½
McIntyre NN	775	18.0	Surrey.	4	2	4¾	4¾	Single	Air-c'l'd.	....	None	Dry	Mech.	Plate.	Plan.	2	Frame.	2-chain.	95	56	Angle.	2 plain.	Roller.	Roller.	.....	34x1½	34x1½
Sears	395	7.8	R'bout.	2	2	3½	4	Single	Air-c'l'd.	....	None	Dry	Splash	None	Fric.	...	Frame.	2-chain.	72	56	Angle.	2 plain.	Roller.	Roller.	1,000	36x1½	36x1½
Worth	575	20.0	R'bout.	2	2	5	5	Single	Air-c'l'd.	....	None	Dry	4 mech.	None	Fric.	...	Frame.	Shaft.	88	56	Steel.	2 plain.	Ball.	Ball.	.....	36x1½	36x1¾

GASOLINE COMMERCIAL CARS AND TAXICABS

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Tons	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES (Solid) Front	TIRES (Solid) Rear
A. B. C. "O"	$ 650	14.5	Deliv'y	½	2	4½	4	Single	Air-c'l'd.	....	None	Dry	4 mech.	None	Fric.	...	Frame.	2-chain.	96	‡56	Steel.	2 plain.	Roller.	Ball.	1,200	36x1½	36x1½
American Truck M	3500	38.0	Exp'ss.	2	4	4¾	5½	Pairs.	H'comb.	Centrif'l.	Bosch	Storage.	10 mech.	Cone	Plan.	2	Frame.	2-chain.	132	56½	Armor'd.	5 plain.	Roller.	Roller.	5,000	36x4	36x5
American Truck O	4000	38.0	Extra	3	4	4¾	5½	Pairs.	H'comb.	Centrif'l.	Bosch	Storage.	10 mech.	Disc.	Plan.	2	Frame.	2-chain.	130	62	Armor'd.	5 plain.	Roller.	Roller.	7,500	36x5	36x4d
American Truck L	4500	44.1	Extra	5	4	5¼	6	Single	H'comb.	Centrif'l.	Bosch	Storage.	10 mech.	Disc.	Plan.	2	Frame.	2-chain.	130	62	Armor'd.	5 plain.	Roller.	Roller.	8,300	36x7	36x5d

† Two-cycle motor. ‡ Also 60 inches. d Double tires.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—GASOLINE COMMERCIAL CARS AND TAXICABS—(Continued)

MAKE AND MODEL			BODY		MOTOR				COOLING		IGNITION				TRANSMISSION							BEARINGS				TIRES (Solid)	
	Price	H.P.	Type	Tons	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Transmission	Axle	Weight	Front	Rear
Alco 16	$3350	24.8	Taxicab	..	4	100	120	Pairs	Cellular	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	3	Frame	Shaft 2.	104	55½	P. steel	3 plain	Ball	Ball	.....	32x4	32x4x
Alco Truck	3500	24.8	Express	3	4	100	120	Pairs	Tubular	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain	110	65	Channel	3 plain	Ball	Roller	.....	36x5	36x3½d
Atlas T	2400	†	Taxicab	..	2	4½	4½	Single	Cellular	Centrif'l.	Bosch	Dry	5 mech.	Ex. b'd	Sel.	3	Frame	Shaft 2.	102	56	P. steel	3 plain	Roller	Roller	2,600	30x4	30x4x
Autocar	2150	18.0	Extra	1½	2	4¾	4½	Single	Tubular	None	Magneto	Dry	Mech.	Plate	Prog.	3	Frame	Shaft 2.	97	58	P. steel	2 plain	Roller	Roller	.....	34x3½	34x4
Bergdoll	2000	25.6	Taxicab	..	4	4	4½	Block	Tubular	Centrif'l.	Bosch	None	Pump	32-disc.	Sel.	3	Motor	Shaft 1.	....	....	P. steel	2 ball	Ball	Roller	.....	32x4	32x4x
Beyster-Detroit A	1000	16.9	Deliv'y	¾	4	3½	3¾	Pairs	Tubular	None	Remy	Dry	2 mech.	Cone	Sel.	2	Motor	2-chain	106	‡56	P. steel	3 plain	Plain	Ball	2,000	32x2½	32x3½
Buffalo K	....	....	Various	½	4	....	....	Pairs	Tubular	Centrif'l.	Extra	Battery	Pump	Cone	Prog.	3	Frame	2-chain	....	....	Channel	3 plain	Roller	Roller	.....	34x2½	34x2½
Buffalo L	....	....	Various	1	4	....	....	Pairs	Tubular	Centrif'l.	Magneto	Battery	Pump	Cone	Prog.	3	Frame	2-chain	....	....	Channel	3 plain	Roller	Roller	.....	36x3½	36x3½
Buffalo N	....	....	Various	2	4	....	....	Pairs	Tubular	Centrif'l.	Magneto	Battery	Pump	Cone	Prog.	3	Frame	2-chain	....	....	Channel	3 plain	Roller	Roller	.....	36x3½	36x4
Buffalo M	....	....	Various	3	4	....	....	Pairs	Tubular	Centrif'l.	Magneto	Battery	Pump	Cone	Prog.	3	Frame	2-chain	....	....	Channel	3 plain	Roller	Roller	.....	36x4	36x5
Carlson	3500	36.1	Truck	3	4	4¾	5	Pairs	Tubular	None	Remy	Dry	7 mech.	Plate	Plan.	2	Frame	2-chain	108	64	Channel	3 plain	Ball	Roller	.....	36x4	42x5
Cartercar	2000	28.9	Taxicab	..	4	4½	4½	Pairs	Tubular	Centrif'l.	Splitd'f.	Dry	Pump	None	Fric.	...	Frame	1-chain	110	‡56	P. steel	3 plain	Ball	Roller	.....	34x4	34x4x
Chase	750	†	Deliv'y	½	2	4¾	4	Single	Air-c'l'd.	....	None	Dry	Splash	Plate	Plan.	2	Frame	2-chain	84	56	Armor'd.	3 plain	Ball	Roller	1,400	37x1¾	40x1¾
Chase	900	†	Deliv'y	¾	3	3¾	4	Single	Air-c'l'd.	....	None	Dry	Splash	Plate	Plan.	2	Frame	2-chain	100	56	Armor'd.	4 plain	Ball	Roller	1,650	37x1¾	40x1¾
De Dion-Bouton	2250	14.0	Extra	..	4	75	120	Pairs	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	109½	54½	P. steel	3 plain	Ball	Ball	.....	32x4	32x4x
De Dion-Bouton	2300	11.0	Extra	¾	4	66	100	Block	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	111	57	P. steel	2 plain	Ball	Ball	.....	880x120	880x120x
De Dion-Bouton	2800	11.0	Extra	1½	4	66	100	Block	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	120	57	P. steel	2 plain	Ball	Ball	.....	36d	38d
De Dion-Bouton	4250	20.1	Extra	3	4	90	125	Pairs	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	146	66	P. steel	3 plain	Ball	Ball	.....	36d	38d
De Dion-Bouton	4750	24.8	Extra	4	4	100	130	Pairs	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	4	Frame	2-shaft	154	67	P. steel	3 plain	Ball	Ball	.....	38d	40d
De Dion-Bouton	5200	35.8	Extra	5	4	120	130	Single	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	4	Frame	2-shaft	154	67	P. steel	5 plain	Ball	Ball	.....	38d	40d
Elmore	2500	†	Taxicab	..	4	4½	4	Single	Tubular	None	None	Dry	6 mech.	Con. b'd.	Sel.	3	Frame	Shaft 2.	110	56	P. steel	5 plain	Roller	Roller	.....	34x3½x	34x4x
Ewing	3000	24.0	Taxicab	..	4	3⅞	4½	Pairs	H'comb.	Centrif'l.	Magneto	None	Pump	33-disc.	Sel.	3	Frame	Shaft 1.	106	54	P. steel	3 plain	Plain	Ball	2,600	32x4x	32x4x
Ford T	1100	22.5	Taxicab	..	4	3¾	4	Block	Tubular	None	Ford S'l.	None	Splash	Disc.	Plan.	2	Motor	Shaft 1.	100	‡56	P. steel	3 plain	Plain	Roller	1,500	30x3x	30x3½x
Franklin L-1	2000	18.2	Extra	½	4	3⅝	4	Single	Air-c'l'd	....	Bosch	None	4 mech.	Disc.	Sel.	3	Frame	Shaft 2.	83	53½	Wood	5 plain	Ball	Roller	1,750	32x2½	32x3
Franklin L-2	2200	18.2	Extra	1	4	3⅝	4	Single	Air-c'l'd	....	Bosch	None	4 mech.	Disc.	Sel.	3	Frame	Shaft 2.	83	53½	Wood	5 plain	Ball	Roller	1,850	32x3	32x3½
Franklin J-3	2500	18.2	Extra	2	4	3⅝	4	Single	Air-c'l'd.	....	Bosch	None	4 mech.	Disc.	Sel.	3	Frame	Shaft 2.	100	53½	Wood	5 plain	Ball	Roller	2,550	32x3	32x3d
Frayer-Miller	....	30.6	Various	1	4	4⅜	5¼	Single	Air-c'l'd.	....	Bosch	Dry	8 mech.	Disc.	Sel.	4	Frame	2-chain	108	56½	Channel	3 plain	Ball	Roller	3,200	36x3½	36x3½
Frayer-Miller	....	30.6	Various	2	4	4⅜	5¼	Single	Air-c'l'd.	....	Bosch	Dry	8 mech.	Disc.	Sel.	4	Frame	2-chain	120	60	Channel	3 plain	Ball	Roller	4,000	36x4	36x5
Frayer-Miller	....	30.6	Various	3	4	4⅜	5¼	Single	Air-c'l'd.	....	Bosch	Dry	8 mech.	Disc.	Sel.	4	Frame	2-chain	128	66	Channel	3 plain	Ball	Roller	5,200	36x4	36x4d
Frontenac F	3500	40.0	Extra	3	4	5	5¾	Pairs	H'comb.	Centrif'l.	Magneto	Dry	2 mech.	Cone	Sel.	3	Frame	2-chain	122½	58	Channel	3 plain	Roller	Roller	6,650	36x5	36x4d
Grabowsky 101-A	2300	24.2	Panel	1	2	5½	5	Single	Tubular	None	Extra	Storage	4 mech.	Cone	Plan.	2	Frame	2-chain	102	56	P. steel	2 plain	Plain	Roller	.....	32x3½	32x3½
Grabowsky 313-A	2750	24.2	Screen	1½	2	5½	5	Single	Tubular	None	Extra	Storage	4 mech.	Cone	Plan.	2	Frame	2-chain	127	56	P. steel	2 plain	Plain	Roller	.....	32x4	34x4
Grabowsky 506-A	3050	24.2	Truck	2	2	5½	5	Single	Tubular	None	Extra	Storage	4 mech.	Cone	Plan.	2	Frame	2-chain	127	56	P. steel	2 plain	Plain	Roller	.....	32x4	34x5
Grabowsky 507-A	3500	28.8	Truck	3	2	6	5	Single	Tubular	None	Extra	Storage	4 mech.	Cone	Plan.	2	Frame	2-chain	127	60	P. steel	2 plain	Plain	Roller	.....	34x4	36x3½d
Gramm-Logan Y	1800	25.6	Deliv'y	¾	4	4	4	Pairs	Tubular	Centrif'l.	Splitd'f	Storage	Pump	Disc.	Prog.	2	Frame	2-chain	120	56	Angle	3 plain	Roller	Roller	2,200	34x3	34x3
Gramm-Logan V	2500	28.9	Truck	2	4	4¼	5	Pairs	Tubular	Centrif'l.	Splitd'f.	Storage	Pump	Disc.	Prog.	3	Frame	2-chain	104	60	Channel	3 plain	Roller	Roller	3,000	36x3½	36x3½
Gramm-Logan X	3500	36.1	Truck	3	4	4¾	5	Pairs	Tubular	Centrif'l.	Splitd'f.	Storage	Pump	Disc.	Prog.	3	Frame	2-chain	120	66	Channel	3 plain	Roller	Roller	5,000	36x5	36x3½d
Hart-Kraft B	1150	16.2	Extra	½	2	4½	4	Single	Tubular	None	Splitd'f.	Dry	Splash	Disc.	Plan.	2	Motor	2-chain	90	56	Angle	2 ball	Roller	Roller	1,800	34x2½	34x2½
Hewitt	3000	24.2	Truck	2	2	5½	5	Single	Cellular	None	Magneto	None	Mech.	Cone	Plan.	2	Frame	2-chain	112	60	Channel	2 plain	Plain	Plain	.....	34x4	34x3½d
Hewitt	5250	28.9	Truck	5	4	4¾	5½	Pairs	Cellular	None	Magneto	None	Mech.	Cone	Plan.	2	Frame	2-chain	140	68	Channel	3 plain	Plain	Plain	.....	36x4d	36x5d
Holsman 14-K	700	12.8	Deliv'y	½	2	4	4	Single	Air-c'l'd.	....	None	Dry	2 mech.	None	Fric.	2	Motor	Cable	92	56	Angle	2 plain	Roller	Roller	.....	40x1½	42x1½
Holsman H-14	900	25.6	Deliv'y	¾	4	4	3	Single	Air-c'l'd.	....	None	Dry	Splash	None	Fric.	2	Motor	Cable	92	56	Angle	2 roller	Roller	Roller	.....	40x1½	42x1½
Kline Kar	1400	13.4	Deliv'y	¾	2	4 1/16	5	Single	Tubular	None	Magneto	Dry	Splash	Plate	Plan.	2	Frame	2-chain	86	56	Angle	2 plain	Plain	Roller	1,850	36x3	36x3

† Two-cycle motor. ‡ Also 60 inches. x Pneumatic Tires. d Double tires.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—GASOLINE COMMERCIAL CARS AND TAXICABS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY		MOTOR				COOLING		IGNITION		Lubrication	Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES (Solid)	
			Type	Tons	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery			Type	Speeds	Location	Drive				Crankshaft	Transmission	Axle		Front	Rear
Knox	$1400	10.0	Extra	¾	1	5	7	Single	Air-c'l'd.	....	None	Dry	3 mech.	Plate	Plan.	2	Frame	2-chain.	85	56	Angle	2 plain	Plain	Roller.	1,800	32x3	36x3
Knox	2200	20.0	Extra	1½	2	5	6	Single	Air-c'l'd.	....	None	Dry	6 mech.	Plate	Plan.	2	Frame	2-chain.	97	56	Angle	2 plain	Plain	Roller.	2,100	32x3½	32x3½
Knox	2600	20.0	Extra	1½	2	5	6	Single	Air-c'l'd.	....	None	Dry	6 mech.	Plate	Plan.	2	Frame	2-chain.	100	56	Angle	2 plain	Plain	Roller.	3,260	34x3½	34x4
Knox	3500	40.0	Extra	2	4	5	4¾	Single	Cellular	Centrif'l.	Bosch	Storage	Pump	3-plate	Sel.	3	Frame	2-chain.	125	60‡	Channel.	5 plain	Ball	Roller.	4,200	34x4	34x5
Knox	3750	40.0	Extra	3	4	5	4¾	Single	Cellular	Centrif'l.	Bosch	Storage	Pump	3-plate	Sel.	3	Frame	2-chain.	149	67	Channel.	5 plain	Ball	Roller.	5,100	36x4	36x3½d
Knox	4000	48.4	Extra	4	4	5½	5½	Single	Cellular	Centrif'l.	Bosch	Storage	Pump	3-plate	Sel.	3	Frame	2-chain.	154	67	Channel.	5 plain	Ball	Roller.	5,400	36x4	36x4d
Knox	4300	48.4	Extra	4	4	5½	5½	Single	Cellular	Centrif'l.	Bosch	Storage	Pump	3-plate	Sel.	3	Frame	2-chain.	154	67	Channel.	5 plain	Ball	Roller.	5,600	36x5	36x4d
Manhattan	3500	48.4	Extra	2	4	5½	6	Pairs	H'comb.	Centrif'l.	Bosch	Dry	8 mech.	Cone	Sel.	3	Frame	2-chain.	126	68	Channel.	3 plain	Ball	Roller.	5,500	36x4	36x3d
Manhattan	4000	48.4	Extra	3	4	5½	6	Pairs	H'comb.	Centrif'l.	Bosch	Dry	8 mech.	Cone	Sel.	3	Frame	2-chain.	125	68	Channel.	3 plain	Ball	Roller.	6,000	36x5	36x3½d
Manhattan	4250	48.4	Extra	4	4	5½	6	Pairs	H'comb.	Centrif'l.	Bosch	Dry	8 mech.	Cone	Sel.	3	Frame	2-chain.	148	68	Channel.	3 plain	Ball	Roller.	6,600	36x5	36x3½d
Manhattan	4800	48.4	Extra	5	4	5½	6	Pairs	H'comb.	Centrif'l.	Bosch	Dry	8 mech.	Cone	Sel.	3	Frame	2-chain.	168	72	Channel.	3 plain	Ball	Roller.	7,200	36x6	36x4d
Martin	1400	16.2	Deliv'y	¾	2	4½	4½	Single	Tubular.	None	Remy	Battery.	4 mech.	Con. b'd.	Plan.	2	Motor	2-chain.	88	56	Angle	2 plain	Plain	Roller.	1,800	34x2½	34x2½
Martin	1500	16.2	Deliv'y	¾	2	4½	4½	Single	Tubular.	None	Remy	Battery.	4 mech.	Con. b'd.	Plan.	2	Motor	2-chain.	92	56	Angle	2 plain	Plain	Roller.	2,240	36x2½	36x2½
McIntyre	950	23.0	Deliv'y	1	2	5⅜	4⅞	Single	Tubular.	None	None	Dry	Mech.	Plate	Plan.	2	Frame	2-chain.	95	56	Angle	2 plain	Plain	Roller.	.....	34x2	34x2
Monitor	1275	20.0	Express	1	2	5	4	Single	Tubular.	None	Extra	Storage	4 mech.	Cone	Plan.	2	Frame	Shaft 1.	100	56	P. steel	2 plain	Ball	Roller.	2,200	36x2½	36x3
Morgan	3750	40.0	Truck	5	4	5	5	Pairs	Cellular	Centrif'l.	Magneto.	Battery.	Pump	5-plate	Plan.	2	Frame	2-chain.	....	....	P. steel	3 plain	Plain	Ball	.....	36x5	36x4d
Packard	3400	32.4	Extra	3	4	4½	5½	Pairs	Cellular	Centrif'l.	Eisem'n.	Storage	2 mech.	Plate	Prog.	3	Frame	2-chain.	144	68	P. steel	3 plain	Ball	Roller.	5,200	34x4	36x4d
Packard	3400	32.4	Extra	3	4	4½	5½	Pairs	Cellular	Centrif'l.	Eisem'n.	Storage	2 mech.	Plate	Prog.	3	Frame	2-chain.	172	68	P. steel	3 plain	Ball	Roller.	5,750	34x4	36x4d
Pope-Hartford	.....	29.7	Various	..	4	4 7/16	5½	Pairs	Cellular	Centrif'l.	Extra	Storage	4 mech.	Cone	Sel.	3	Frame	Shaft 2.	130	56	P. steel	3 plain	Roller.	Roller.	.....	34x5x	34x5x
Randolph C	.....	18.0	Various	1	2	4¾	5¾	Single	Tubular.	None	Magneto	Storage	Pump	Con. b'd.	Sel.	3	Frame	2-chain.	100	56	Steel	2 plain	Ball	Roller.	2,750	34x3	36x3½
Randolph D	.....	32.4	Various	2	4	4½	5	Pairs	Tubular.	Gear	Magneto.	Storage	Pump	Con. b'd.	Sel.	3	Frame	2-chain.	116	50	Steel	3 plain	Ball	Roller.	4,200	36x4	36x5
Randolph E	.....	32.4	Various	3	4	4½	5	Pairs	Tubular.	Gear	Magneto.	Storage	Pump	Con. b'd.	Sel.	3	Frame	2-chain.	132	60	Steel	3 plain	Ball	Roller.	5,700	36x5	36x4d
Randolph G	.....	40.0	Various	4	4	5	6	Pairs	Tubular.	Gear	Magneto.	Storage	Pump	Con. b'd.	Sel.	3	Frame	2-chain.	150	68	Steel	3 plain	Ball	Roller.	8,500	38x6	40x5d
Rapid	.....	20.0	Various	1	2	5	5	Single	Tubular.	Centrif'l.	None	Storage	5 mech.	3-plate	Plan.	2	Frame	2-chain.	100	56	Angle	2 plain	Plain	Roller.	2,250	32x3½	32x3½
Rapid	.....	22.0	Various	1½	2	5½	5	Single	Tubular.	Centrif'l.	None	Storage	5 mech.	3-plate	Plan.	2	Frame	2-chain.	111	56	Angle	2 plain	Plain	Roller.	2,680	32x4	34x4
Rapid	.....	36.1	Various	3	4	4¾	5½	Pairs	Tubular.	Centrif'l.	Remy	Storage	7 mech.	Disc.	Sel.	3	Frame	2-chain.	138	68	Channel.	3 plain	Roller.	Roller.	6,000	36x5	36x3½d
Rapid	.....	48.4	Various	5	4	5½	6½	Pairs	Tubular.	Centrif'l.	Remy	Storage	7 mech.	Disc.	Sel.	3	Frame	2-chain.	160	68	Channel.	3 plain	Roller.	Roller.	7,500	36x6	36x4d
Reliance G	2750	†	Extra	..	2	5¼	5	Single	Cellular	Centrif'l.	None	Storage	9 mech.	Disc.	Sel.	3	Frame	2-chain.	120	58	Channel.	3 plain	Ball	Roller.	4,250	36x4	36x3d
Reliance G-3	3100	†	Extra	..	3	5¼	5	Single	Cellular	Centrif'l.	None	Storage	11 mech.	Disc.	Sel.	3	Frame	2-chain.	120	58	Channel.	4 plain	Ball	Roller.	4,500	36x4	36x3d
Reliance H	3500	†	Extra	..	3	5¼	5	Single	Cellular	Centrif'l.	None	Storage	11 mech.	Disc.	Sel.	3	Frame	2-chain.	138	63	Channel.	4 plain	Ball	Roller.	5,900	36x5	36x4d
Reliance H-4	3750	†	Extra	..	4	5¼	5	Single	Cellular	Centrif'l.	None	Storage	14 mech.	Disc.	Sel.	3	Frame	2-chain.	138	63	Channel.	5 plain	Ball	Roller.	6,100	36x5	36x4d
Reliance K	4400	†	Extra	..	4	5¼	5	Single	Cellular	Centrif'l.	None	Storage	14 mech.	Disc.	Sel.	3	Frame	2-chain.	138	63	Channel.	5 plain	Ball	Roller.	7,000	36x6	36x5d
Rockwell	2350	20.2	Taxicab	..	4	3⅝	4½	Block	Cellular	Centrif'l.	Bosch	None	Pump	5-plate	Sel.	3	Frame	Shaft 1.	106	56	P. steel	3 plain	Ball	Ball	2,200	34x3½x	34x3½x
Sampson	4500	40.0	Truck	4	4	5	5½	Pairs	Tubular.	None	Bosch	Dry	3 mech.	Cone	Sel.	4	Frame	2-chain.	148	68	Channel.	3 plain	Ball	Plain	8,200	36x5	36x5d
Sampson	5000	40.0	Truck	5	4	5	5½	Pairs	Tubular.	None	Bosch	Dry	3 mech.	Cone	Sel.	4	Frame	2-chain.	155	68	Channel.	3 plain	Ball	Plain	9,000	36x6	42x6d
Saurer	4500	20.1	Extra	2	4	90	120	Pairs	H'comb.	Centrif'l.	Eisem'n.	None	Press	Disc.	Sel.	4	Frame	2-chain.	141	64	P. steel	3 ball	Ball	Ball	.....	34x4	38x4d
Saurer	5500	30.0	Extra	4	4	110	140	Pairs	H'comb.	Centrif'l.	Eisem'n.	None	Press	Disc.	Sel.	4	Frame	2-chain.	153	64	P. steel	3 ball	Ball	Ball	5,700	36x5	42x5d
Schacht B	850	21.0	Deliv'y	½	2	5½	4½	Single	Tubular.	None	Extra	Dry	6 mech.	Plate	Plan.	2	Frame	2-chain.	104	56	P. steel	2 plain	Plain	Roller.	1,400	32x3½x	32x3½x
Schurmeier C	1800	16.2	Extra	1½	2	4½	4¾	Single	Cellular	Centrif'l.	Magneto.	None	5 mech.	Cone	Sel.	2	Frame	2-chain.	87	56	Channel.	3 plain	Roller.	Roller.	2,500	36x2½	36x3
Schurmeier D	3500	25.7	Extra	2	3	4⅜	5	Single	Cellular	Centrif'l.	Magneto.	None	7 mech.	Cone	Sel.	3	Frame	2-chain.	112	56	Channel.	4 plain	Roller.	Roller.	4,000	36x4	36x3½d
Schurmeier E	4000	25.7	Extra	3	3	4⅜	5	Single	Cellular	Centrif'l.	Magneto.	None	7 mech.	Cone	Sel.	3	Frame	2-chain.	120	56	Channel.	4 plain	Roller.	Roller.	4,800	36x4	36x4d
Sultan "300"	2800	14.0	Taxicab	..	4	75	110	Pairs	Tubular.	None	Bosch	None	2 mech.	Cone	Sel.	3	Frame	Shaft 2.	97	55½	P. steel	3 plain	Ball	Ball	2,450	32x4	32x4
Sterling C	.....	†	....	1½	2	5	5⅜	Single	Tubular.	Centrif'l.	None	Storage	7 mech.	Ex. b'd	Sel.	3	Motor	Shaft 2.	88	56	Channel.	3 plain	Plain	Plain	2,700	36x2½	40x3
Thomas	3000	18.2	Taxicab	..	4	3⅝	4 5/16	Block	Tubular.	None	Bosch	None	Pump	3-plate	Sel.	3	Frame	Shaft 2.	104	56	P. steel	2 ball	Ball	Roller.	.....	32x4	32x4
United	1700	19.6	Extra	½	4	3½	4	Pairs	Tubular.	Centrif'l.	K-W	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain.	102	56	P. steel	5 plain	Roller.	Roller.	.....	32x2½	32x2½
United	2000	29.4	Extra	1	6	3½	4	Pairs	Tubular.	Centrif'l.	K-W	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain.	110	56	P. steel	7 plain	Roller.	Roller.	.....	36x3	36x3
United	2500	32.4	Extra	1½	4	4½	5	Pairs	Tubular.	Centrif'l.	K-W	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain.	116	56	P. steel	5 plain	Roller	Roller.	.....	36x4	36x5
United	2800	32.4	Extra	2	4	4½	5	Pairs	Tubular.	Centrif'l.	K-W	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain.	128	60	P. steel	5 plain	Roller.	Roller.	.....	36x5	36x6
United	3000	48.6	Extra	3	6	4½	5	Pairs	Tubular.	Centrif'l.	K-W	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain.	134	60	P. steel	7 plain	Roller.	Roller.	.....	36x6	36x7
United	3400	48.4	Extra	4	4	5½	6½	Pairs	Tubular.	Centrif'l.	K-W	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain.	138	68	P. steel	5 plain	Roller.	Roller.	.....	36x6	36x7
United	4000	72.6	Extra	5	6	5½	6½	Pairs	Tubular.	Centrif'l.	K-W	Storage	Mech.	Disc.	Sel.	3	Frame	2-chain.	142	68	P. steel	7 plain	Roller.	Roller.	.....	36x7	36x8
White	.....	22.5	Various	1½	4	3¾	5½	Block	H'comb.	Centrif'l.	Bosch	None	Pump	Cone	Sel.	4	Frame	Shaft 2.	144	60	P. steel	2 ball	Ball	Roller.	.....	36x4x	36x4dx

† Two-cycle motor. ‡ Also 60 inches. x Pneumatic tires. d Double tires.

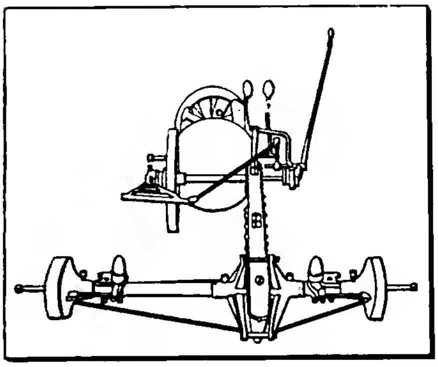
DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—ELECTRIC PLEASURE CARS

MAKE AND MODEL	Price	BODY		MOTOR			BATTERIES			SPEEDS		First Reduction	Drive	Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
		Type	Seats	Number	H.P.	Location	Type	No. Cells	Location	Forward	Reverse						Motor	Transmission	Axle		Front	Rear
Babcock 14	$2600	Coupe	4	One	5	Middle	Option, 11-plate	36	Divided	5	1	H'bone gears	Worm gear	86	56	Armored	Ball	Ball	Roller	2,600	32x4	32x4
Bailey	2000	Victoria	3	One	2½	Rear	Edison A-4	40	Rear	4	2	Silent chain	Double chain	79	56	Angle	Ball	Ball	Roller	2,000	34x3½	34x3½
Bailey	2000	Victoria	3	One	2½	Rear	Exide 9 PV	30	Rear	4	2	Silent chain	Double chain	79	56	Angle	Ball	Ball	Roller	2,000	34x3½	34x3½
Baker W	2000	Runabout	2	One	2	Middle	Exide 11 PV	30	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	1,900	32x3½	32x3½
Baker V	2000	Victoria	2	One	2	Middle	Exide 9 MV	28	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	1,950	32x3½	32x3½
Baker V	2400	Coupe	2	One	2	Middle	Exide 9 MV	28	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	2,100	32x3½	32x3½
Baker V	2600	Coupe	4	One	2	Middle	Exide 9 MV	28	Divided	6	3	Silent chain	Bevel gears	80	50	Steel	Ball	Ball	Ball	2,200	32x3½	32x3½
Broc D	2000	Stanhope	2	One	2	Middle	Exide 11 MV	28	Divided	5	5	Silent chain	Double chain	80	50	Steel	Ball	Ball	Ball	1,950	32x3½	32x3½
Broc D	2000	Runabout	2	One	2	Middle	Exide 11 MV	30	Divided	5	5	Silent chain	Double chain	80	50	Steel	Ball	Ball	Ball	2,000	32x3½	32x3½
Broc D	2200	Coupe	3	One	2	Middle	Exide 11 MV	28	Divided	5	5	Silent chain	Double chain	80	50	Steel	Ball	Ball	Ball	2,150	32x3½	32x3½
Broc D	2500	Coupe	4	One	2	Middle	Exide 11 MV	28	Divided	5	5	Silent chain	Double chain	80	50	Steel	Ball	Ball	Ball	2,350	32x3½	32x3½
Clark	2200	Runabout	3	One	3½	Middle	Niagara 13-plate	28	Divided	5	5	None	Chain	106	56	P. steel	Ball	Roller	Roller	2,000	34x3½	34x3½
Cleveland	2250	Runabout	2	One	3½	Middle	Cuyahoga 9 MV	42	Divided	6	3	Chain	Bevel gears	100	56	Steel	Ball	Ball	Ball	2,500	36x4	36x4
Cleveland	2500	Victoria	4	One	3½	Middle	Cuyahoga 9 MV	42	Divided	6	3	Chain	Bevel gears	100	56	Steel	Ball	Ball	Ball		36x4	36x4
Cleveland	2800	Coupe	4	One	3½	Middle	Cuyahoga 9 MV	42	Divided	6	3	Chain	Bevel gears	100	56	Steel	Ball	Ball	Ball		36x4	36x4
Columbia Mark 70	1600	Victoria	2	One	3½	Rear	Exide 13 PV	24	Divided	6	3	H'bone gears	Single chain	70	48	None	Ball	Ball	Ball	1,650	30x3½	30x3½
Columbus 1000		Stanhope	2	One	2	Middle	Exide 9 MV	24	Divided	6	6	Silent chain	Double chain	75	50	P. steel	Ball	Ball	Roller		30x3½	31x4
Columbus 1002		Coupe	2	One	2	Middle	Exide 9 MV	24	Divided	6	6	Silent chain	Double chain	75	50	P. steel	Ball	Ball	Roller		30x3½	31x4
Columbus 1202		Coupe	4	One	2	Middle	Exide 11 MV	24	Divided	6	6	Silent chain	Double chain	76	50	P. steel	Ball	Ball	Roller		32x3½	33x4
Columbus 1010		Runabout	2	One	2	Middle	Hycap 11 MV	30	Divided	6	6	Silent chain	Double chain	83	50	P. steel	Ball	Ball	Roller		32x3½	32x3½
Detroit H	1650	Roadster	3	One	3	Axle	Option, 13 MV	24	Divided	5	3	Silent chain	Single chain	87	51	Angle	Ball	Ball	Roller	1,900	32x3½	32x3½
Detroit A	1900	Victoria	2	One	3	Middle	Option, 13 MV	24	Divided	5	3	Silent chain	Double chain	80	51	Channel	Ball	Ball	Roller	2,100	32x3½	32x3½
Detroit E	2100	Coupe	2	One	3	Axle	Option, 13 MV	24	Divided	5	3	Silent chain	Single chain	87	51	Angle	Ball	Ball	Roller	2,300	32x3½	32x3½
Detroit C	2350	Coupe	2	One	3	Middle	Option, 13 MV	24	Divided	5	3	Silent chain	Double chain	80	51	Channel	Ball	Ball	Roller	2,300	32x3½	32x3½
Detroit D	2500	Brougham	4	One	3	Middle	Option. 13 MV	24	Divided	5	3	Silent chain	Double chain	80	51	Channel	Ball	Ball	Roller	2,400	32x3½	32x3½
Ideal	1875	Brougham	4	One	3	Rear	Exide, 9 plate	40	Divided	4	4	Silent chain	Double chain	92	56	Steel	Ball	Ball	Roller	2,300	30	32
Ohio D	2600	Coupe	4	One		Front	Exide	24	Divided	6	2	Silent ehain	Double chain	80	56	Armored	Ball	Ball	Ball	2,400		
Rauch & Lang 20	1900	Stanhope	2	One	2½	Middle	Exide 9 MV	24	Divided	6	3	Silent chain	Double chain	77	53	P. steel	Ball	Ball	Roller	1,975	32x3½	32x3½
Rauch & Lang 22	2100	Stanhope	3	One	2½	Middle	Exide 11 MV	24	Divided	6	3	Silent chain	Double chain	77	53	P. steel	Ball	Ball	Roller	2,125	32x3½	32x3½
Rauch & Lang 133	2100	Runabout	2	One	2½	Middle	Exide 11 PV	30	Divided	6	3	Silent chain	Double chain	85	53	P. steel	Ball	Ball	Roller	2,050	32x3½	32x3½
Rauch & Lang 23	2200	Victoria	4	One	2½	Middle	Exide 11 MV	24	Divided	6	3	Silent chain	Double chain	85	53	P. steel	Ball	Ball	Roller	2,100	32x3½	32x3½
Rauch & Lang 24	2700	Coupe	4	One	2½	Middle	Exide 13 MV	24	Divided	6	3	Silent Chain	Double chain	85	53	P. steel	Ball	Ball	Roller	2,550	32x4	32x4
Studebaker 22-C	1500	Stanhope	2	One		Middle	Exide 11-plate	24	Divided	5	3	H'bone gears	Single chain	67		Steel	Ball	Ball	Roller		30x3½	30x3½
Studebaker 22-G	1800	Coupe	2	One		Middle	Exide 11-plate	24	Divided	5	3	H'bone gears	Single chain	67		Steel	Ball	Ball	Roller		30x3½	30x3½
Studebaker 17-D	1850	Victoria	2	One		Middle	Exide 11 MV	28	Divided	5	3	H'bone gears	Single chain	71		Steel	Ball	Ball	Roller		30x3½	30x3½
Studebaker 17-B	2200	Coupe	2	One		Middle	Exide 11 MV	28	Divided	5	3	H'bone gears	Single chain	71		Steel	Ball	Ball	Roller		30x3½	30x3½
Studebaker 17-E	2300	Landaulet	2	One		Middle	Exide 11 MV	28	Divided	5	3	H'bone gears	Single chain	71		Steel	Ball	Ball	Roller		30x3½	30x3½
Waverley 69	1225	Runabout	2	One		Axle	Option, 9-plate	30	Divided	4	4	H'bone gears	H'bone gears	72	54	Armored	Ball	Ball	Roller		32x3	32x3½
Waverley 74	1600	Stanhope	2	One		Rear	Option, 11-plate	30	Divided	4	4	H'bone gears	H'bone gears	73½	54	Armored	Ball	Ball	Roller		32x3	32x3½
Waverley 78	1700	Roadster	2	One		Rear	Option, 11-plate	32	Divided	4	4	H'bone gears	H'bone gears	94	54	Armored	Ball	Ball	Roller		32x3½	32x3½
Waverley 60	1900	Surrey	4	One		Axle	Option, 13-plate	35	Divided	4	4	H'bone gears	Spur gears	91	54	Armored	Ball	Ball	Roller		32x3½	32x3½
Waverley 70C	2000	Coupe	2	One		Rear	Option, 11-plate	30	Divided	4	4	H'bone gears	H'bone gears	79	54	Armored	Ball	Ball	Roller		32x3	32x3½
Waverley 75C	2250	Brougham	4	One		Rear	Option, 13-plate	32	Divided	4	4	H'bone gears	H'bone gears	79	54	Armored	Ball	Ball	Roller		32x3½	32x3½
Woods	2100	Victoria	2	One		Middle	Exide 9 MV	40	Divided	4	4	H'bone gears	Double chain	74	56	Bronze	Ball	Ball	Ball	2650	30x3½	34x3½
Woods	2650	Brougham	4	One		Middle	Exide 9 MV	40	Divided	4	4	H'bone gears	Double chain	74	56	Bronze	Ball	Ball	Ball	2850	30x3½	34x3½

NOTE—Due to a lack of space, two pages of tables, including Steam Pleasure and Commercial Cars, Electric Commercial Cars, and Foreign Cars, have been omitted. These two pages will be reproduced in next week's issue of THE AUTOMOBILE, with perhaps some additional pleasure cars.

PROCESS AND PRODUCT

CONSIDERING the dual display of automobiles as they appeared at the two shows in New York, it becomes something of a problem to decide as to the best descriptive matter to offer for the automobiles which will be exhibited at the National Show, under the auspices of the N. A. A. M. in the Coliseum at Chicago. In some ways the Coliseum Show is much more comprehensive than any other exhibition would prove to be, for the reason that there is a wider range measured in types of automobiles placed in a comparative relation there.

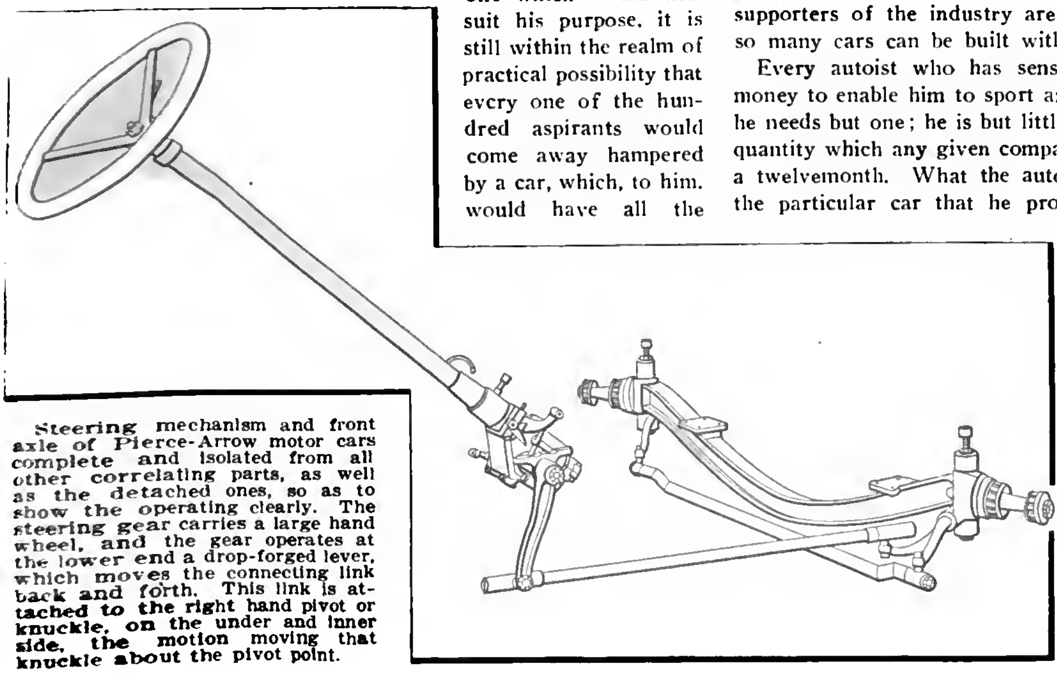


On the Cartercar the drive is by means of frictional discs, thence from the cross shaft to the rear axle by enclosed chain. The cut shows the rear axle construction, the chain-in-oil drive, and the friction transmission, as viewed from the rear. The single lever control is also noticeable, this making for simplicity of operation, as well as simplicity of mechanism. The friction drive allows of as many speeds as there are possible positions.

That exhibitions of automobiles may be of the greatest value to the patrons of the industry is a matter which has long been fairly understood, but it is not always true that these exhibitions accomplish the intended purpose. As an illustration of the point to be made, it is enough to indicate that were all automobiles exactly alike, an exhibition might well be reduced to a single representative of the whole flock, so that unless the display is on a basis which will show the extent of contrast between the several designs, the whole value of the idea will be lost.

The National Show, because it does include a wide variety of types, emanating from the several camps of designers, offers an excellent opportunity to buyers to compare the handiwork of the several schools of design and to determine for themselves the capabilities of the several ideas in view of their wants. It is a matter of absolutely no moment at all as to how good an automobile may be, viewing it in the abstract; its value must be measured in the light of the service required of it by the buyer.

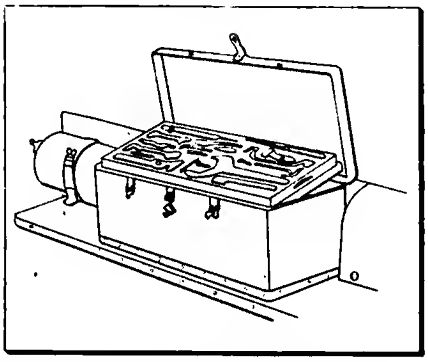
If a hundred separate buyers were to go to the salesrooms of a hundred different makes of automobiles, even conceding that each buyer might find in some one of the cars to be had the very one which would best suit his purpose, it is still within the realm of practical possibility that every one of the hundred aspirants would come away hampered by a car, which, to him, would have all the avoirdupois of a white elephant. Such is the position in which the average man stands toward the complications (as he thinks) of the average automobile, despite the maker's efforts educationally.



Steering mechanism and front axle of Pierce-Arrow motor cars complete and isolated from all other correlating parts, as well as the detached ones, so as to show the operating clearly. The steering gear carries a large hand wheel, and the gear operates at the lower end a drop-forged lever, which moves the connecting link back and forth. This link is attached to the right hand pivot or knuckle, on the under and inner side, the motion moving that knuckle about the pivot point.

IT IS SCARCELY ENOUGH TO EXAMINE THE AUTOMOBILES

Many of the makers of automobiles go to shows with a polished chassis, which is an excellent way of putting the best foot forward. This is not to say that the cars which are shown in the finished state are not provided with a "Sunday foot," but to the average buyer who has no money to waste, seeing is believing, to some extent, at any rate, and if the polished chassis is not to be seen, it becomes necessary to go back of the cars and ascertain how they are made in the shops.



All of the useful and dainty little accessories which appeal to the man and woman of refinement are to be found on the Packard cars. The cut shows the tool box as located on the running board of both the "Eighteen" and the "Thirty." It will be noted that the removable tray of the upper part of the tool box has formed compartments or spaces for each and every tool, making it possible to apply, "A place for everything and everything in its place."

In this treatment, in view of the apparent requirement, it is the idea to show some one feature of the respective makes of automobiles, with the idea of testifying as to the uniformity in the matter of the standard which has been set in the engineering offices of the makers of cars, taking them as a whole, and with the further intention of affording some accentuated detail, which may be found in the respective cars, in order that they will be more readily identified by the prospective buyers.

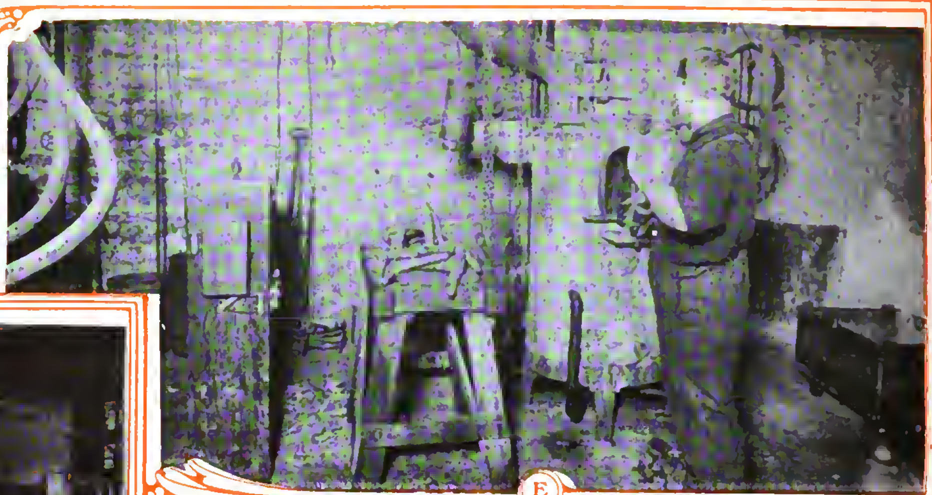
Beyond this point The Automobile has undertaken to illustrate very completely the methods which obtain in the plants in this country, partly with a view to disseminating knowledge of this sort, hoping, perchance, that it will bring to those who need them ideas which may be of more than a little service, and to some extent, perhaps, modify such practices as may not be quite up to the high standard on which the whole automobile situation rests at the present time. Then, in view of the large number of automobiles which are now being turned out at every hand, the supporters of the industry are entitled to know how it is that so many cars can be built without depreciating their value.

Every autoist who has sense enough to accumulate enough money to enable him to sport an automobile probably knows that he needs but one; he is but little interested in the question of the quantity which any given company may succeed in turning out in a twelvemonth. What the autoist really wants to know is that the particular car that he proposes to invest in will be good enough for his purpose, and low enough in first cost to be on a par with the legal tender which he must part company with when he rolls the car away and starts it on the road to history.

The illustrations of shop methods and practices as offered in these pages are the real means by which automobiles are made in a large way, they having been photographed in many plants under the eye of the Editor, taking some 15 weeks in the process, so that

PLATE I.

STOCK AND SELECTION



A—In the Thomas plant, showing drop-forged gear blanks in the foreground and annealing furnaces which are utilized for the purpose of relieving internal strains in order that the gears, after they are sized, gashed and planed, may be cemented, quenched and tempered with freedom from deformation. This cut shows the light, clean place which the modern workman has to work in, as compared with the dark, dingy holes common in earlier days. This is one of the results of a more accurate knowledge of the benefits accruing from hardening, and a more intimate technical knowledge of the processes themselves. They are now very generally practiced, nearly every shop having its hardening room.

B—In the Inter-State plant, showing a muffle-furnace to the right, with a counter-poised door, a quenching bath to the left, in front, and a pyrometer on a stand under the window.

C—Sand blast in the works of Wheeler & Schebler, blasting a batch of carbureter castings, which process removes scale and permits of machining at high speed under conditions which prolong the work between grindings of the cutters. If the carbureter bowls are not to be polished and lacquered a sand blast finish is allowed to remain.

D—In the Diamond Chain plant, showing how women are employed in the process, this particular illustration being that of a cutting-off tool which parts the specially formed bar, into 28 separate blocks, in three minutes.

E—In the Woods plant, using a barrium salt bath for heating parts as steering knuckles to a quenching temperature, utilizing a pyrometer, by means of which the temperature is definitely determined and the quenching temperature is fixed in view of the known quality of the material which is to be manipulated.

they are offered with a measure of confidence which is not dimmed by the fear that the dream of some ambitious publicity agent is taking expression. The illustrations, then, and the brief descriptions which accompany them, should serve a useful purpose is connection with the car descriptions attending, and the only source of regret lies in the absence of illustrations from every plant in the country.

In many of the plants, although they are fitted out after a fashion thoroughly up to date, they were so busy struggling with the output of the year that it was considered inexpedient to permit of photographing the processes, and the probabilities are that a further effort along this line will be undertaken a little later on, when the season's product is more nearly completed. For the present, then, and in view of the opportunities for comparison which the National Show at Chicago offers, the cars there to be exhibited are given brief space (each one of them) in this article, with an illustration of some one mechanical point, and for the rest, the shops behind the cars are exposed in analytical form, by means of reproductions front photographs in 10 double-page plates, with descriptive captions attending.

ALCO RETAINS PROMINENT BERLIET FEATURES

These well-known cars, which are the product of the American Locomotive Company, Providence, R. I., are listed in four regular models, the smallest of which is a 16 horsepower with a landaulet type of body which is obviously a good size for taxicab and town car service. In certain classes of service of the character as above indicated, preference is given to a somewhat more powerful motor in certain localities and the 22-horsepower model is then employed. In touring work, the 40-horsepower model is the most used car, although the 60 has its stout appearance among the "hurry" clan. The three first-mentioned models are four-cylinder, but the 60 is a six. The car which won the Vanderbilt Cup Race last fall, it will be remembered, was also a six. In fact, it was an exact duplicate of the standard and stock car, which any Tom, Dick or Harry can buy, if he but has the price. This, like all Alco motors, has a rather long stroke, that is, it is not excessively long, but on the other hand it is not short as compared with the bore.

F—In the Woods plant, showing a salt furnace which is long enough to take an I-section and raise it to the appropriate treating temperature, uniformly and with great precision, it being the case that the temperature of the bath is regulated by a pyrometer in conjunction with suitable rheostats, and the proportions of the salts are also suitable, in view of the desired temperature.

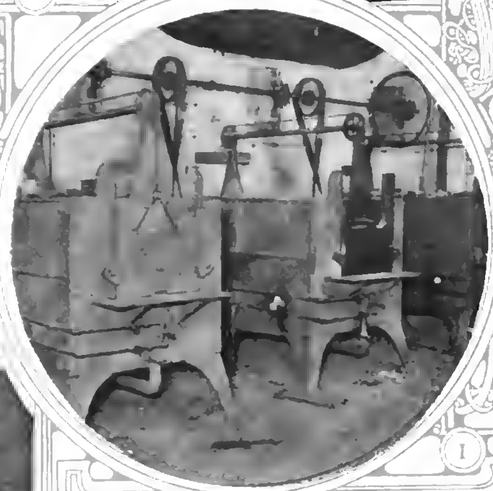
G—In the Diamond Chain plant, showing a woman operator hand-grinding links with such dexterity as to do the work in the minimum possible time, attaining a light surface finish of the hardened, close-grained alloy steel. Women are very widely utilized as employees in this modern chain manufacturing plant.

H—In the Woods plant, showing an open hearth with a salt bath, electrical means of heating, and pyrometer regulation. The operator hardening, short operating levers, while on the work bench at the right may be seen a lot of finished universal joint parts, showing at a glance the wide scope of usefulness of the hardening furnace.

I—In the Diamond Chain plant, giving a glimpse of a battery of muffle-furnaces, of which there are two rows facing, extending for the length of the heat-treating department.

J—In the Thomas plant, showing an operator with an electric buffing equipment, polishing the surfaces of cylinders used on Model M Thomas.

K—In the Rambler plant, making forgings under a press. This large and heavy hammer is seen turning out crankshafts in the rough, the operation being the very last one of the process. In this Wisconsin plant, hammers of the vertical type are extensively used, not alone for large, heavy work, but for smaller and lighter drop forgings.



Alco motors are made with a lengthened stroke as compared with bore, as the following will show:

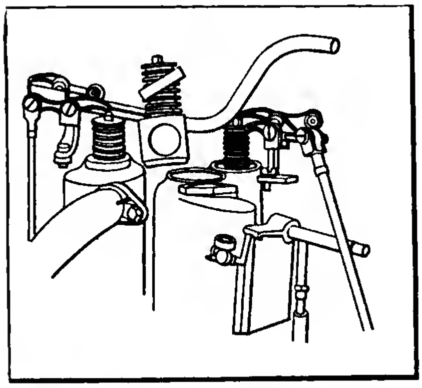
RELATIONS OF CYLINDER DIMENSIONS

Horsepower	Bore	Stroke
16	100	120
22	100	120
40	120	150
60	120	150

The difference in power between the 16 and the 22 is a matter of speed, the bore and stroke being the same in both cases. The difference in power between the 40 and 60 is due to the increase between four and six cylinders.

ANHUT SOLD BY CAR MAKERS SELLING COMPANY

Made in Detroit, and distributed by the Car Makers Selling Company, Chicago, the Anhut "six" is one of the relatively new automobiles which has rapidly forged to the front. The motor is a "Brownell" and was very completely illustrated in The Automobile in the number of December 16, last, with cross-sections showing, among other points, details of design which are at quite some variance from general practice, as a supplementary cam-roller lever which eliminates lost motion and noise from the valve lifts and promotes long life by preventing wear. The oiling system, in this type of motor, is very completely carried out, and the valves, which are in the head, are actuated by a system which is so closely fitted as to run noiselessly, with a special means of lubrication to abort the growth of noise, which is but a matter of defeating wear. The cylinders are cast in pairs, valves are in cages, and the crankshaft, which is of special steel, forged, and reduced from a billet, is flanged for the flywheel and is of excellent proportions. Ignition is by magneto, placed back of the carbureter on the left side of the motor, and the clutch is of the multiple disc type, within the same housing as the transmission gear, which housing is integral with the crankbox. The flywheel is in front and the unit power plant, which is its right designation, is suspended on three points; the rear suspension is centrally located and flexible. The price of the roadster model is $1,750 and the pony tonneau sells at $1,850. Although a comparative newcomer, the excellent impression produced at the start has had its effect, and factory additions are rumored.



One of the distinctive features of the Pennsylvania engines made by the Pennsylvania Auto-Motor Company, Bryn Mawr, Pa., is the use of overhead valves located in a different sort of a cage. This—the illustration not only illustrates it, but also shows one valve and cage removed—is an arrangement which allows of the rapid and ready removal of any or all of the valves and cages for the purpose of grinding in. When removed, the valve may be placed in a vise and ground in.

APPERSON JACK RABBIT ON SPEAKING TERMS WITH FAME

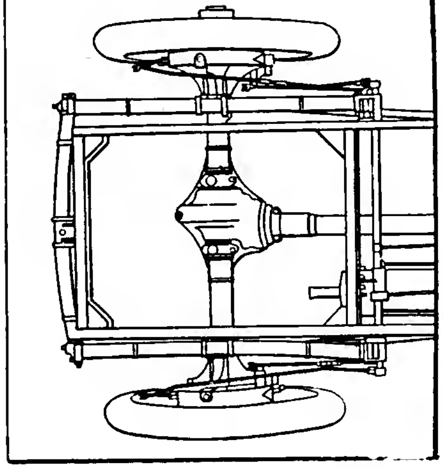
The Apperson cars are made in six models, with a price tag ranging between $2,000 and $4,200. The motors are all of the long-stroke type, and the model 6-40 has six cylinders with a bore of 4 1-2 and a stroke of 5 inches. The cylinders are individual, Bosch ignition is represented by a magneto for the running condition and a storage battery, in conjunction with a suitable coil, serves for cranking and should an emergency arise. In the Apperson cars the clutch is of the constricting band type, and speed changes are, with the transmission system, of the selective order, three speeds ahead for all but the 4-50. The Apperson idea from the economy point of view is to equip all of the models with relatively large tires, which is illustrated when it is said that the model 4-30 weighs 2,700 pounds and has 34 by 4-inch tires on the rear wheels.

BLACK CROW IS WELL KNOWN IN THE CENTRAL WEST

This car is priced at $1,200, has a 24-horsepower motor, is built for touring, seats five, is of the six-cylinder type, with 3 7-8 by 4 1-2 bore and stroke of cylinders, respectively. A Remy magneto is responsible for ignition, but a battery and coil occupy the supernumerary position, and the transmission is by the selective system with three speeds and a reverse. Ball bearings are employed at every point excepting in the motor, and the tires used are 32 by 3, front and rear.

CARTERCAR IS A FRICTION DRIVE AND WELL KNOWN

Model H Cartercar sells for $1,100 with a 25-horsepower, four-cylinder motor and a runabout body. The cylinders are 4 inches square, and the A. L. A. M. rating is 25.6 horsepower. The water cooling is through a tubular radiator, and ignition is cared for by a Splitdorf magneto in conjunction with dry cells and a coil. Lubrication is by a pump which is positive, and the friction drive gives an infinite number of speeds. In connection with the friction system a chain is used, and it is protected by a boot so that the silt of the road has nothing to do with the performance. The road wheels are fitted with 32 by 3½-inch tires all around, and the car weighs 2,000 pounds. The Model L car of the same make has a somewhat larger motor, and sells for $1,600, otherwise it conforms to the well-known Carter type of construction, the advantages of which are adequately proclaimed by many users.

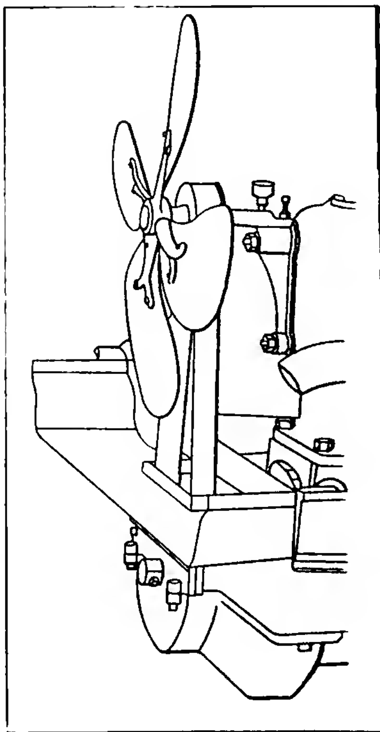


This year, Mitchell produces a "Six" for the first time. The cut shows a top view of the rear portion of the chassis of Model S, as the six-cylinder chassis is called. In this may be seen the arrangement and attachment of the rear spring suspension. As will be seen this consists of a platform spring, the center of the cross spring being firmly fixed to a bracket extension at the rear end of the frame. The side springs are clipped to the axles at the mid-point, and shackled at the front to the spring hanger, and at the rear. The net result is very easy and pleasurable riding.

CHALMERS-DETROIT THIRTY HAS BLOCK CYLINDERS

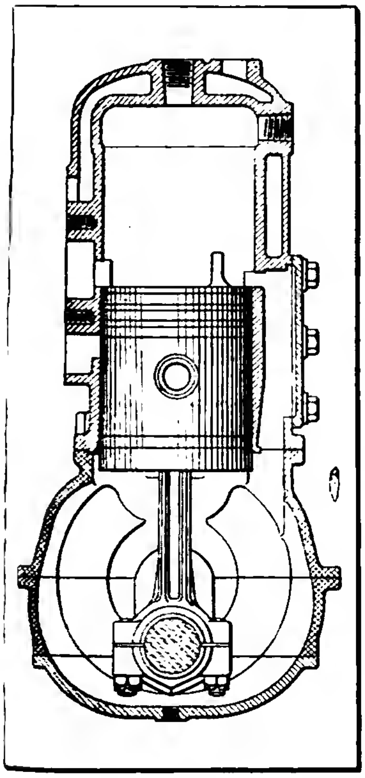
The crankshaft of this motor is short and stubby, which is possible, in view of the block method of casting the cylinders, and two annular-type ball bearings of a proven size are used to support the crankshaft effort. When this type of construction first came across it was questioned by some of the advocates of more bearings for a crankshaft, but the large number of cars which were put out in this way, in view of the excellent service by them rendered, rendered speculation unprofitable. This year the 30 is a considerably larger car than last, the bore of the cylinders being 4 inches and the stroke 4 1-2, is rated at 30 horsepower, and the car sells for $1,500. Ignition is by Bosch magneto at the extra cost, which means that the coil and battery ignition, as normally put on, is on a very substantial basis. The three-speed selective gear is in a case which is an extension of the motor case, thus bringing the power plant, multiple disk clutch and transmission gear into a single housing in conformity with the demands of a unit system. The wheelbase this year is 115 inches; tread standard; spring suspension is as before, which includes three-quarter elliptic springs of the scroll type, and ball or roller bearings are used at every point. The tires are 34 by 3 1-2 inches on all wheels, and the road performance, despite the excellent qualities of the car is on a distinctly improved basis.

Fan driving methods are various, but in clean lines and direct attack of the main problem, no one of the solutions excels that of Paul Gaeth, designer of the Gaeth cars. As the appended illustration shows, the forward extension of the crankcase has a slot through which a wide-faced, flat leather belt passes, connecting the driving pulley on the crankshaft extension and the fanshaft above with a continuous source of power. The case is not left open, but the lower part, below the driving pulley, is closed in completely so that no road dust or dirt may penetrate through openings there to the more delicate crankshaft parts within. The fan itself has four blades of approved shape, and is carried on a shaft extended from the front cylinder, and bolted to a projection thereon. The bolting up arrangement is such as to allow a rather extensive adjustment motion, so that no matter how much the belt may stretch, the adjustment is sufficient to care for it and maintain the necessary tightness. Other features of this car may not be seen in this view, but the thermo-siphon cooling system is very well worked out, the water pipes being unusually large in diameter.



CORBIN MODEL XVIII SELLS FOR $2,750

The motor in this car has four cylinders, works four-cycle, the bore is 4 1-2 inches and the stroke is 4 1-4 inches. The cylinders are cast individually, and a gear pump circulates the water from the jackets through a honeycomb type of radiator, it being designed for the right capacity and so made as to operate noiselessly. The Bosch ignition system is supplemented by a dry battery, and lubrication is positive through the good office of a pump. The cone clutch is of the latest and most approved design, serves in conjunction with a selective three-speed gear, and the shafl drive to a live rear axle is substantially straight lined. The chassis frame is strong, designed to work without perceptible deflection, notwithstanding the 120-inch wheelbase, which indicates a somewhat lengthened span. Ball bearings are used in the transmission and axle, and hand-hole plates are large and quick detachable, thus giving access to the crankcase, transmission gears, etc., so that on the road, should it be necessary to make a quick inspection, it is the easiest thing in the world to do. The schedule weight of this car is 2,780 pounds, and the load is carried by 34 by 4-inch tires front and rear.

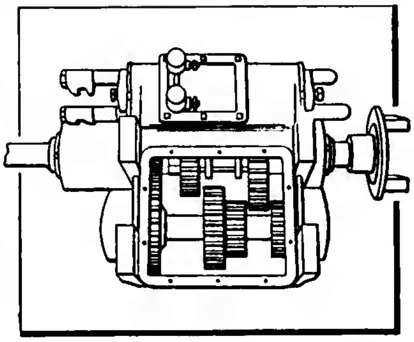


Simplicity is what we are all striving to attain, accomplishing this with as little loss as possible. In the Elmore cars this is sought for by the use of a two-cycle engine, a cross section of which is herewith illustrated. In this form of engine there are no valves, and the moving parts are thus reduced to a very few, and those of an indispensable character. The three port type of engine is used, the mixture being drawn into the crankcase, there compressed to several pounds pressure above that of the atmosphere, drawn into the cylinder from there by means of a by-pass or third port. In the cylinder, the operation of compression, explosion, expansion, and exhaust are completed in two strokes, that is, one revolution. This latter makes for a continuous and even torque, the power impulse occurring on every down stroke. To say the least, this is easy on the driving members, clear through the road wheels and their covering, the delicate pneumatic tires. One result should be lessened upkeep costs, which are interesting to every owner and prospective owner. This is a matter which cannot be given too much publicity or discussion, since every man converted converts others, the whole redounding to the good of the industry.

DEMOT CAR AS IT IS BRIEFLY DESCRIBED

Taking the most recent information to be had directly from the maker, through the Demot Car Sales Company, Detroit, Mich., the car, which is one of the newcomers of the year, is composed as follows: Roadster body on a chassis frame, of the channel section, has a seat for two, placed a little towards the rear axle rather than in the mid-position. The power plant has a motor which is rated at 10 1-2 horsepower, and is of the double cylinder type, with bore and stroke of 3 5-8 hy 3 1-2 in. respectively. The motor is of the 4-cycle, water-cooled type and a vertical tube radiator is used in the cooling process. Ignition is by Remy magneto, with an auxiliary system comprising a coil and dry cells of battery for the electrical energy. Luhrication is by splash, and a disc clutch connects the motor with the driven members. From the clutch to the road wheels is through a planetary gear system which gives two speeds ahead and reverse. The propeller shaft which connects the planetary gear with the live rear axle is provided with two universal joints, and the gear ratio is that which seems to best serve in view of the use of 30-in. diameter of pneumatics; they are 2 1-2 in. section—same in front as rear. The car is said to weigh 800 pounds and anti-friction bearings are generously used; this includes annular ball bearings for the crankshaft. New-Departure bearings in the transmission, and plain bearings in the journals of secondary importance, although worthy of brief mention. This size is ample in view of the work to be done, particularly when it is considered that the car is not essentially for racing work.

On the newest Apperson, the drive is by shaft, instead of chains, which are much affected by this company, and, in fact, are still used on a number of models. In the cut the transmission of one of the shaft-driven models is shown. Except on one model, three speeds are furnished. The gears are of wide face, and slide on large sized and stiff shafts of high-grade material. At the right can be seen the universal joint, while at the left is just a glimpse of the square driving shaft.



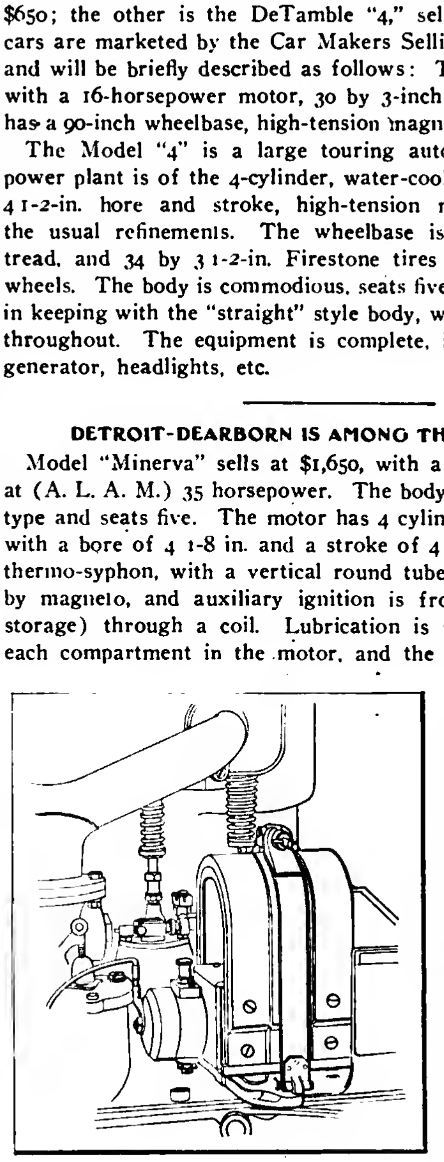
DETAMBLE CARS AS EXHIBITED AT DETROIT

This make of automobile is represented by two models, one of which is a roadster known as the DeTamble "2" and sells for $650; the other is the DeTamble "4," selling at $1,400. These cars are marketed by the Car Makers Selling Company, Chicago, and will be briefly described as follows: The Model "2" is fitted with a 16-horsepower motor, 30 by 3-inch Hartford pneumatics, has a 90-inch wheelbase, high-tension magneto, and a rumhle seat.

The Model "4" is a large touring automobile, in which the power plant is of the 4-cylinder, water-cooled type, with 4 1-2 by 4 1-2-in. hore and stroke, high-tension magneto ignition, and the usual refinements. The wheelbase is 115 inches, standard tread, and 34 by 3 1-2-in. Firestone tires are used on all four wheels. The body is commodious, seats five, and the upholstery is in keeping with the "straight" style body, with No. 1 m. b. leather throughout. The equipment is complete, including an acetylene generator, headlights, etc.

DETROIT-DEARBORN IS AMONG THE DEBUTANTES

Model "Minerva" sells at $1,650, with a motor which is rated at (A. L. A. M.) 35 horsepower. The body is of the new torpedo type and seats five. The motor has 4 cylinders, T-head, in pairs, with a bore of 4 1-8 in. and a stroke of 4 3-8 in. Cooling is by thermo-syphon, with a vertical round tube radiator. Ignition is by magneto, and auxiliary ignition is from a battery (dry or storage) through a coil. Lubrication is positive, two feeds to each compartment in the motor, and the clutch is a shoe type,



While any discussion of the subject of low versus high tension ignition would be foreign to these columns, it will serve the purpose well to call the attention to small, but well worked out ignition details, whether pertaining to the one or the other. Thus the cut shows the low tension magneto of the Locomobile, and the method of fastening it in place. This is by means of a flexible strap passing over the top of the magnets and jointed at the top. As it is hinged at the bottom of the side, opening the joint at the top allows of throwing the whole thing off to the two opposite sides.

internal expanding. The transmission gear is of the sliding type, selective, three speeds ahead and reverse, located under the toe-board, just back of the clutch. The wheelbase is 112 in., tread is 56 in., and the side bars of the frame are of the channel section with a double drop. The live rear axle is of the type using ball bearings, is stout but not heavy, and in the transmission system Timken roller bearings take the load. The weight of the car is said to be 2,200 pounds, and the tires used are 36 by 3 1-2 in. pneumatics on front as well as on rear wheels, that is, the same all around.

A—Shows a row of core boxes and the cores for Rambler individual cylinders, one of which is being placed by a molder. Cylinder casting is an art all by itself, and the work has developed to such an extent that molders taking up this work specialize in it to the exclusion of all other forms of molding. Frequently cylinders are molded on end, but in this particular case they are molded on the side and poured end up.

B—Finished crankshaft of a Simplex automobile which was made from a slab of chrome nickel steel and thereafter fashioned by machining processes, the final finish being by grinding on a special tool devised for the purpose.

C—In the Rambler plant, presenting a row of aluminum housings, showing steel tubes passing out from the housing extensions, which is the way the product looks after it comes from the foundry, as shown in C.

D—Heat treating furnaces as used in the Jackson plant, showing a pyrometer on a wooden stand between the two furnaces. This class of equipment is available for the many purposes which, in conjunction with a forge, permits the accentuation of kinetic qualities in materials as used in Jackson automobiles.

E—Is a view of the Rambler foundry, showing the teeming of aluminum into the mould in the process of casting the aluminum housing for the gears and the steel tube into place, one of which in the finished state is presented in the background.

F—A bulldozer used for cold pressing cross bars and other work in connection with chassis frames, showing in this particular case how tubing is bent in dies.


E

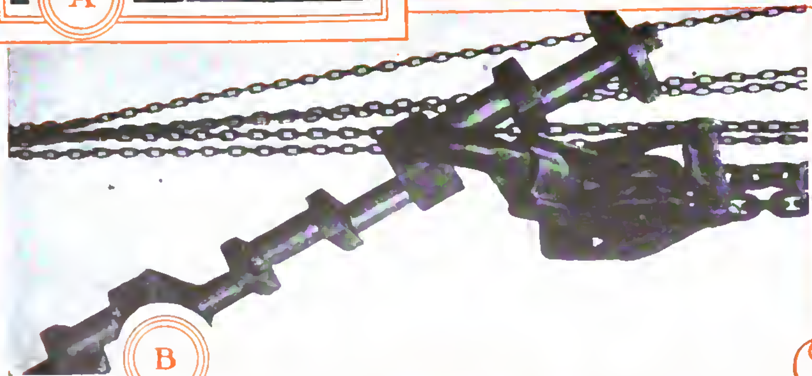

F

PLATE II.

IN THE FORGE AND FOUNDRY


A


C


B


D

DORRIS "E" IS THE EXPRESSION OF 1910 IDEA

This car which is known as Model E, has a motor with valves in the head, which has long been a Dorris idea, and the Atwater-Kent ignition system is employed with a view to economical and efficient work. The company also equips with a Bosch dual ignition system as an extra. The exhaust manifold and piping in Dorris motors are so nicely designed that excess intake depression, as well as exhaust back pressure, are done away with, thus increasing the power and

G—Large press in the Diamond chain plant blanking out links for sprocket chains as used on trucks, which branch of the chain making business has increased wonderfully of late, due to the renewed and greatly increased interest now manifested in the power vehicles. Nearly every manufacturer in the land is doing something in this line, and Diamond is representative of advanced practice.

H—Finished crankshaft for an Excelsior motor which originated in a drop forging, using special steel and modern methods.

I—In the National plant, presenting a quantity of aluminum castings as they come from the foundry of the character as used in the lower half of National automobiles.

J—Is a core which is used in moulding the upper half of a Rambler crankcase. The molder is slicking up the core preparatory to the baking operation, which is done in a special oven called a core oven. In this the core is baked as hard as a board, in which condition it is ready to go into the mold. Nowadays core making is as much of an art as is the molding itself and requires fully as much skill, else the whole result will be a larger percentage of wasters, the bane of every good foundry.

K—One hundred ton press making side bars in the A. O. Smith plant. The use of pressed steel has advanced apace in the past five years, until now it is used for nearly every piece of the automobile, even for crankshafts and crankcases. To make this possible it was necessary for some far-sighted manufacturer to install an unusual press equipment just like the one here illustrated.

L—How bar stock is stored in the plant of the Diamond Chain, each section being for a particular grade of steel and suitably marked for the purpose of identification.

K

L

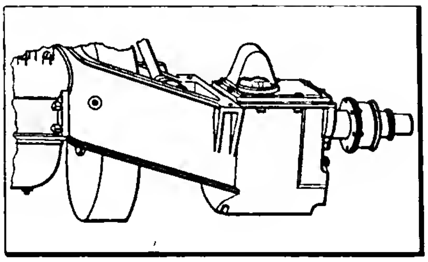
I

G

J

H

flexibility of the motor. A Stromberg carbureter operates in its customary efficient way, and has been found by the Dorris Company to co-operate with the motor, delivering a certain uniformity of mixture, which lends facility to the speed

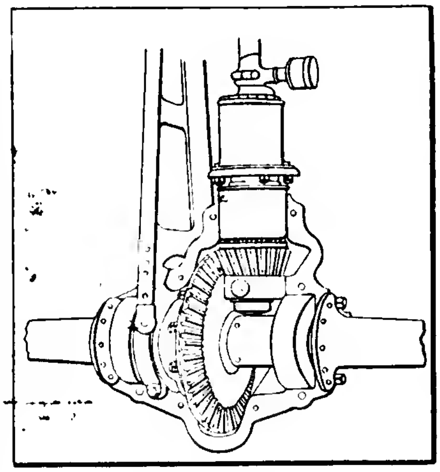


Unit construction has advanced much in the past few years, and the cut shows a sample—and a good one, too—of the unit form of power plant, as used on Moline cars. This has the advantage of reducing the whole chassis to a very small number of parts, the engine and transmission being removable as a whole.

changing process, thus, in some measure, accounting for the flexibility for which the Dorris car is noted. The propeller shaft on the Dorris has a universal slip-joint construction, which will be well worth examining. Nickel steel, in the machinery equipment, makes it possible to design for desired lightness.

THE ELMORE HAS NO VALVES AT ALL

There are two Elmore models, one of which is known as the 36 and the other as the 46. The first sells for $1,750 and the latter for $2,500. Both are touring cars, seat five, have four-cylinder motors, the bore and stroke being the same in both cases, *i. e.*, 4 1-2 by 4 inches. To some further extent the two models are on a common basis, but a change may be noted when the wheelbase is considered, it being 110 inches in Model 36 and 10 inches longer in Model 46. The weight of the Model 36 is 2,400 pounds, and the remaining model weighs 400 pounds more. On the lighter model the tires are 34 by 4 inches all around, but to carry the heavier weight of the big car the tires are 36 by 4 inches all around. The scheme of the motor is shown by illustration elsewhere, in which it will be observed that there are three ports which are uncovered in the right succession, thus eliminating the noise and uncertainty of an automatic crankcase valve,

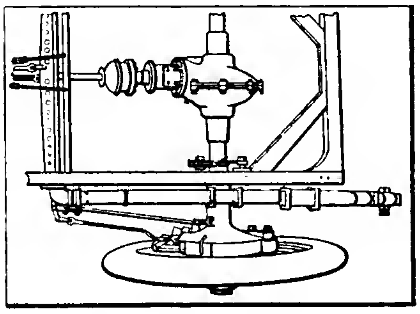


In the construction of the rear axle, proper provision must be made for the thrust of the bevel gears, and the torque reaction of the motor. In the Royal tourist car, both of these are adequately cared for. Ball thrust bearings take the thrust from both levels, back of which are located the radial bearings. To take the torque of the engine, a triangular form has been used, the material being pressed steel, and the shape, that of a channel, with the open side to the right. This channel shape continues throughout the entire length although tapering down to a small vertical height.

which, according to the Elmore staff, is likely to be noisy and may get out of order. In all other respects the Elmore motor furnishes all the earmarks of excellence in mechanical design and construction, while the materials employed are said to be selected with care in view of the work which experience has identified.

FAL CAR, A NEW ONE, IS MADE IN CHICAGO

Sells at $1,650, has an A. L. A. M. rating of 28.9 horsepower. s built for touring; the motor is 4 1-4 x 4 1-4 inches bore and stroke, cylinders are cast in pairs, and a tubular radiator serves for cooling. Ignition is by magneto and battery, with positive lubrication through the good office of a pump, and a cone clutch in connection with a three-speed selective transmission gear, is responsible for speed changes beyond the range of flexibility

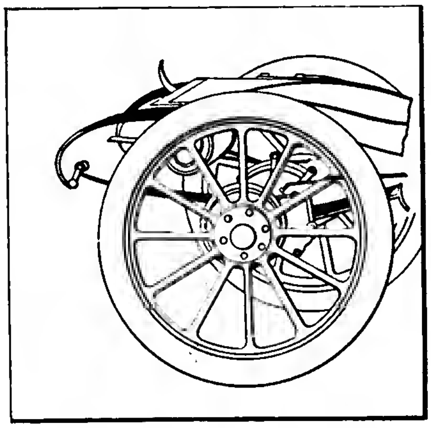


Knox Model R chassis, at the rear end as it appears from above. The equality in the pull at the two brakes is produced by the use of the flat equalizing bars shown here. These are very long, and extend through the side members of the frame, which act as guides for the bars. At the rear end, the frame is strengthened by the diagonal inset piece, this being of the same shape as the frame.

of the motor. The wheelbase is 110 inches, and the weight of the car is given as 1,900 pounds so that the 34 x 3 1-2-inch pneumatics are equal to every need. A detail of the torsion tube is given as the illustration accompanying this statement, and attention is called to the excellence of detail of the live rear axle, brakes, and methods of control, in which it is true that the brake system is inside of the line of the springs, and the part of the axle which carries the perch on each side, has arms extended, spider fashion, with bearings integral therewith to support the brake arms, and lend facility to the process.

FORD PROMINENT AMONG IMPORTANT CARS

Among the makers of touring cars no one is better known than Henry Ford, while the same might be said of his product. This little car, differing now in very few details as originally brought out in 1906, is a four-cylinder, water-cooled, four-cycle machine with bore of 3 3-4 inches and 4-inch stroke. The maker's rating is but 20 horsepower, while the usual formula would allow a rating of 22.5. Although formerly strictly a runabout, pressure from the buying public has forced the use of a touring body accommodating four. The wheelbase of 100 inches is ample, the tread is standard, engine cooling is by thermo-siphon, lubrication

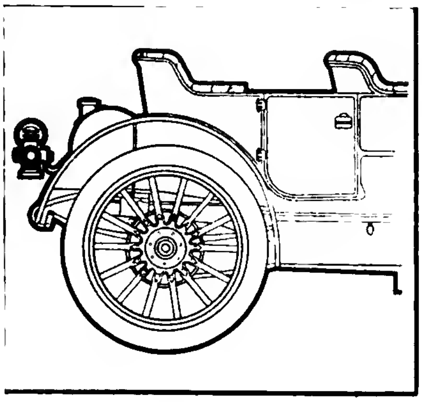


Among the newcomers, Hudson cars show many little points which savor of old experienced factory heads. Thus, the rear construction of the Hudson "Twenty" shows a decided upsweep in the frame, three-quarter, scroll ended, elliptic springs, a muffler set across the frame to look like a pressure gasoline tank, such as is used on cars of ten times the price. For the size, power, and weight of this runabout, the wheels and tires are of large, not to say ample, diameter. Rear wheels have twelve spokes.

is by splash, and other details are up to the standard of excellence of the big new Highland Park factory, just occupied. Any mention of this car would be incomplete without a terse statement of the use of vanadium steel, the anti-fatigue metal, which is used liberally throughout the chassis.

AIR-COOLING NOW AS EVER FRANKLIN'S STANDARD

With a consistency rare these days, the makers of the Franklin automobiles hold strictly to air cooling and light weight construction. Three models are made, differing in power, length of wheelbase and body styles. These are lettered G, D and H. The first is an 18.2-horsepower car, with engine of four cylinders, 3 3-8-inch bore by 4-inch stroke. The wheelbase is 91 1-2 inches, tread is 53 1-2 inches, tires are 32 by 3 1-2 inches front

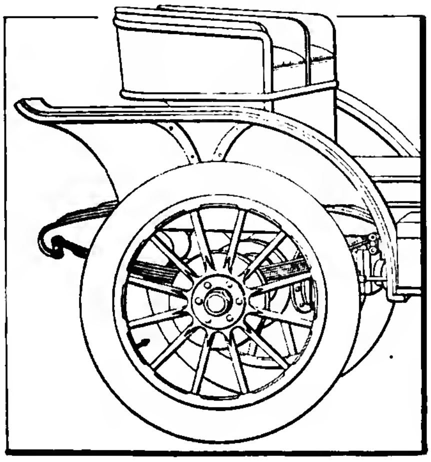


The sides of this body look low, but they are not. The low impression is conveyed by the comparison with the wheels, which comparison is deceptive for these are forty-two-inch wheels, and the car, the Oldsmobile Limited. The large diameter wheels swallow up small road inequalities much more readily than would those of smaller size, making the car as a whole ride much easier. This is one of the features of the big Oldsmobile which is being advocated widely as advanced automobile construction.

and 32 by 4 rear. In the next larger model, D, called 28.9 horsepower, with a 4 1-4-inch bore and short stroke of 4 inches, the wheelbase is increased to 106 inches with touring body and 114 1-2 inches with enclosed bodies. Tread remains the same, but larger wheels and tires are used, 36 by 4 front and 36 by 4 1-2 rear being the exact figures. Model H is the only six, and the biggest and best of the line. The engine is of 4 1-4-inch bore and 4-inch stroke, rated at 43.8 horsepower. A wheelbase of 127 inches and typical Franklin springing makes riding easy, while the large tires, 36 by 4 1-2 and 37 by 5, make maintenance expense low.

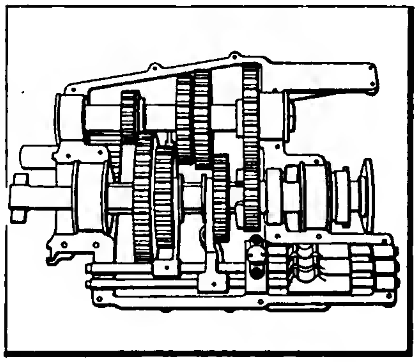
GAETH AUTOMOBILE MOTOR IS EXTREMELY SIMPLE

In this motor, as it is applied to Gaeth automobiles, the upper half of the crankcase, instead of having individual arms reaching out to the chassis frame, is so flanged that all the space between the face proper and the frame is engaged, with the result that the under pans or sod aprons, as they are sometimes called,



Black-Crow is the name of this newcomer from the West and showing a full line at the Chicago Show. The small view illustrates the rear end of the Model D roadster body. This shows two rumble seats, but also comes with but one, or without any if desired. In combination with the low, comfortable seats in the back, the very high fender adds to the comfort of the occupants by shielding them from the mud of the road. The leg room between the rear seat and the back of the front framing is ample. Just a glimpse may be had of the rear end of the large and roomy tool box.

do not have to be used. The magneto is placed on the left side of the motor, and is protected by the case flanging, so that it is not only accessible and directly attached (without driving through a pump), but lost motion and other possible troubles are eliminated. The exhaust manifold is especially designed for reducing back pressure to a nominal value, and as the exhaust sweeps out of the transfer ports the shape of the manifold is such that it is swept upward and then away by easy curves, and the working space around the motor is increased by this shape as well. The water piping on top of the twin cylinders is especially well designed, and it tapers from the small diameter at the rear cylinder to a sufficiently large diameter for the front cylinder to compensate for the differences in volume of water, and the distribution is, therefore, on a satisfactory basis. It is very likely that the Gaeth make-and-break system of ignition is more inter-

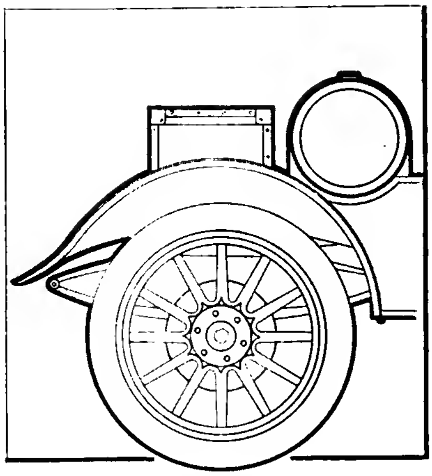


Four speeds forward and one reverse are provided in the Stearns gear box. The gears and shafts are made from chrome-nickel steel, which is the strongest and toughest material available. Annular ball bearings are used throughout. The gears are shown in the high speed position, this being effected with a series of jaws on the forward end of the one gear, which mesh with a similar series of jaws cut into the main driving gear.

esting than some of the other points which might be mentioned, but this system has been quite fully described heretofore, and space is here too limited to indicate a repetition. The motor has four cylinders with a bore of 4 7-8 inches and a stroke of 5 1-4 inches, which brings it into the long-stroke type. The A. L. A. M. rating is 38 horsepower, and with a touring body the car sells for $3,500.

THE HUDSON "TWENTY" IS MAKING HISTORY

The price of this car is $1,000, and the A. L. A. M. rating of the motor is 22.5 horsepower, with a four-cylinder, water-cooled motor, a bore of 3 3-4 inches and a stroke of 4 1-2 inches; cylinders cast *en bloc*. Cooling is with a tubular radiator of the McCord type, and a centrifugal pump circulates the water advantageously. Ignition is with a dry battery and coil, excepting that a magneto may be had as an extra. The wheelbase is 100 inches, with a 56-inch tread in the roadster type, but the same car when put out as touring type has a wheelbase of 110 inches. The chassis frame is pressed steel of nice design, and plain bear-



In place of the usual single rumble seat, the Oakland Model M, forty-horsepower car has a very large gasoline tank and a big, broad trunk. The seating capacity is, of course, but two, still the added convenience given by the increased mileage per tank full of gasoline, and those due to the capacity of the trunk more than make up for this. The tank is held in place by several wide metal straps, and has a very large central and accessible filling cap. Fenders are wide and deep, to afford maximum protection, while the seats are low and comfortable. The long fenders give the impression of speed.

ings are used in the crankshaft and other places, excepting for the axles. The cylinders are cast from a special grade of gray iron, and ample means is offered for the escape of gas in the foundry process. The crankcase is supported by four sturdy arms and the crankshaft is of a special grade of crankshaft steel in which the tensile strength is minimum at 100,000 pounds per square inch, and the elastic limit holds to a high point, due to proper heat treating, which is done under well-defined conditions. Accuracy is due to grinding as the final operation, and the methods in vogue in the shop are all with a view to producing a car which will be suitable for all around and strenuous road work.

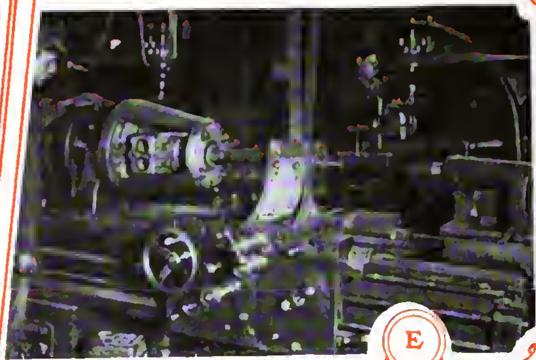
PLATE III.

RAPID LATHE PROCESSES

D

A

B



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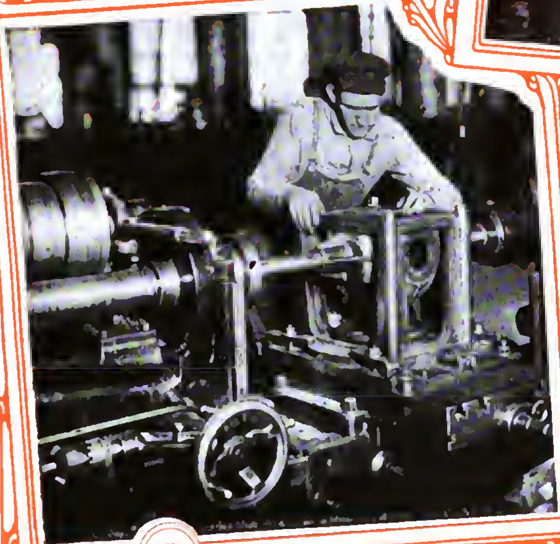
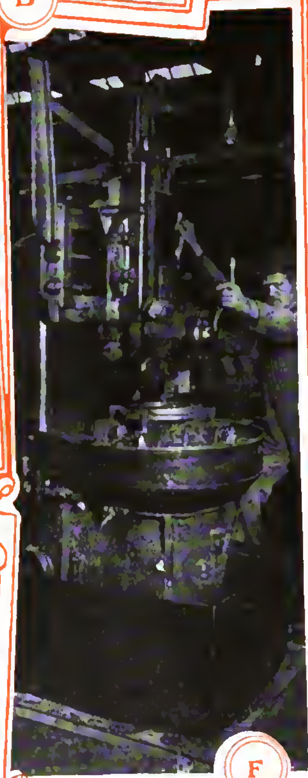


C



F

G

H

A—Represents a vertical turret boring mill finishing the cone face of a flywheel as used on National motors. This method of finishing flywheels is quick, accurate, and has the further virtue of making them interchangeable. It is something of an advantage to be able to assure purchasers that a flywheel will not have to be sent out if, for some cause, it is necessary to replace a crankshaft, and this will be a condition when the flywheel work is done on a machine which eliminates the personal equation.

B—Is a small Bullard (vertical) mill with a turret attachment, which is the latest substitute for a lathe as used in the process of machining flywheels for automobile motors. This view was taken in the Excelsior plant.

C—Represents a horizontal boring mill finishing a housing for use in a National transmission system. When special fixtures are properly made it is quite an easy matter to take the fullest advantage of lathes, it being a well recognized fact that this character of tool is very nimble, delivers good accuracy and lends facility to the process in view of the skill of the men who have to do the work.

D—Represents a special cutting off tool photographed in the Rambler plant, showing the method of parting piston rings from the turned up casting after it was machined to the correct bore and outside diameter.

E—In the Rambler, showing a special fixture for holding individual T-head cylinders and method of rough machining in a lathe rigged up for this specific purpose.

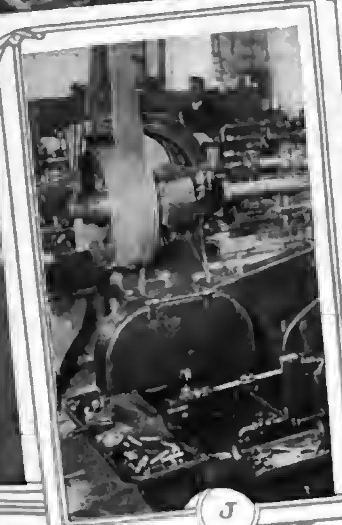
F—A vertical mill with a turret head finishing bevel gear blanks as used in the bevel drive on Rambler automobiles. In the making of bevel gears it is something of an undertaking to do the work of blanking, then machining, and considering the use of alloy steel, accomplish the operations quickly, keeping cost low.

G—In the Moon plant, showing a turret lathe fitted with a face plate and a suitably shaped mandrel over which a piston is pressed, and the grooves for the piston rings are being finished.

H—Making Diamond chains—a battery of automatic screw - making machines turning out alloy steel rivets.

L

I

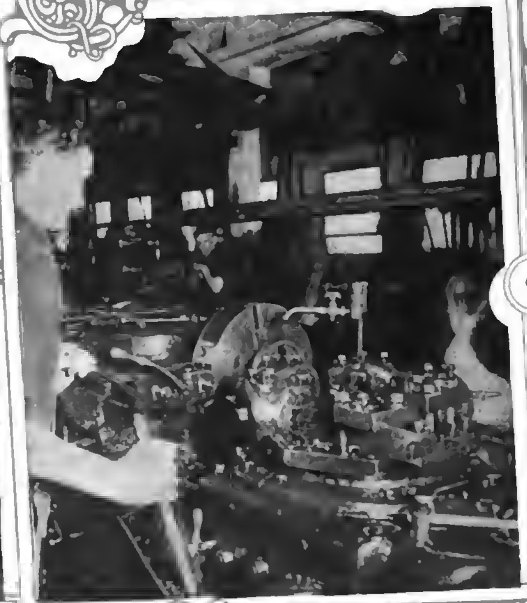


J

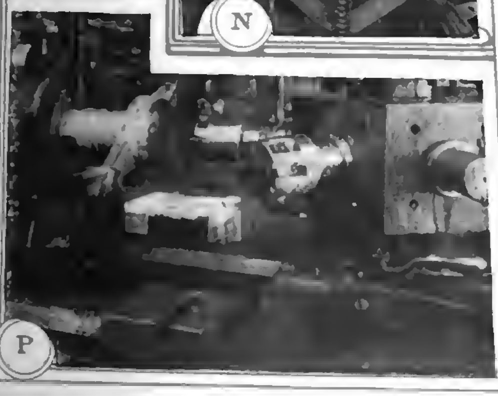
M

K

N



O



P

I—In the Excelsior plant a multiple cutter lathe finishing cam shafts with a cutter working between each pair of cams. A cutter for each round portion, working in unison with the other similar cutters, is like subtracting a man from the payroll for each additional cutter in actual use on a given tool.

J—Acme four-spindle automatic tool, working on small concentric round parts as used on Excelsior motors in which a single workman takes care of a battery.

K—No. 4½ Bardons & Oliver turret lathe in the Excelsior plant, on semi-automatic work, depicting the rapid and accurate production of small concentric round parts as used in Excelsior motors.

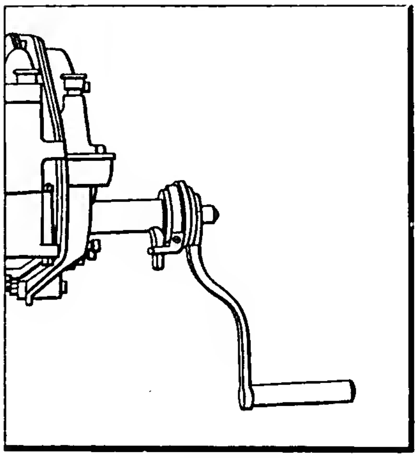
L—Turret lathe in the Excelsior plant finishing gear blanks at high speed on a double setting. The work which is being done is a fine illustration of the value of turret lathes when they are properly fitted out with special fixtures in view of the shape and character of the parts to be machined, and it is hardly to be supposed that any other generic type of machine tool would lend better to the undertaking.

M—Hollow spindle automatic machine tool drilling out concentric round parts and cutting off as exemplified in the Rambler plant.

N—In the Rambler plant, making helical springs, utilizing a small special tool which has substantially the characteristics of a lathe, the reel of wire showing in the foreground.

O—Jones & Lamson turret lathe in the Excelsior plant, working on gear blanks.

P—Heavy turret lathe in the Pierce-Arrow plant, machining the brake spider and sleeve as used in Pierce-Arrow live rear axles. This is a very interesting example of the use of a machine tool with a hollow spindle, in which the round bar is placed and shoved forward as the parts to be made are finished. In this way the feed is as rapid as the occasion demands, and the time which is usually taken in setting up the work is avoided. As a rule mistakes are most likely to happen during the setting up operation, and it is in this process that the most time is consumed.



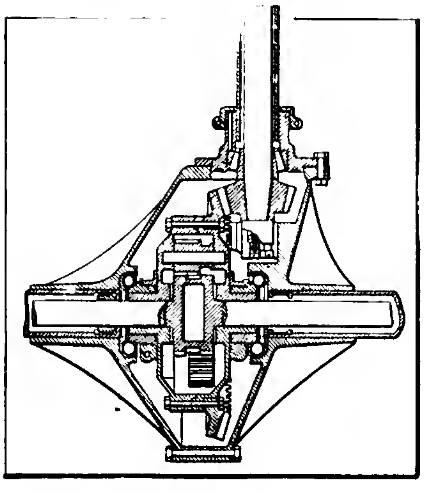
Alco is showing a starting crank which prevents back kicks and troubles of this sort are eliminated beyond any doubt. The method, as shown, is so compact as not to alter the front appearance of the car, and, by a reverse motion, which is housed in, the finger which is the only part which extends out from the housing, intercepts a dog on the crank, by means of which the reverse motion is thrown into gear and the crank is thereby disengaged within about a quarter of a revolution of the crank. The device is so simple that to get out of order is quite out of the question.

MORE POWERFUL INTER-STATE LOOKS GOOD

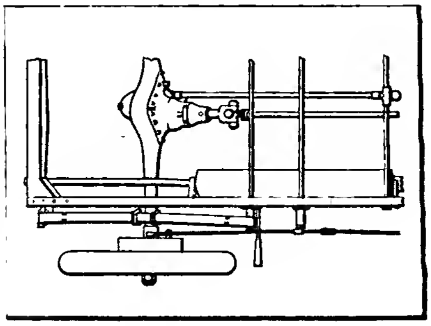
Among the new cars, no one looms up better than does the Inter-State "Forty," which is made in three models, designated as 30, 31 and 32. These are but the methods of indicating the differing body styles, for all three rest upon the same chassis. Thirty refers to the touring car body with standard equipment, ready for five large people, and with plenty of leg room. Passing on to Model 31, it is the demi-tonneau or short coupled body as some prefer to call it. In this the rear seat is just above the rear axle, and although the capacity is reduced to four persons, the feeling of roominess is unchanged. Model 32 is the runabout, the same designation applying whether no rumble, single, or double rumble is used. The chassis is powered with a motor of four vertical cylinders, of 4 1-2-in. bore and 5-in. stroke. It is rated at 40 horsepower by the makers. All engines' parts are finished by the grinding process. The wheelbase is 118 in. and the tread standard. All wheels are made interchangeable by the use of the same sized tires all around, 34 by 4 in. In touring form the weight is given as 2,700 pounds, which is reduced 50 pounds by the use of the smaller capacity bodies. Among the parts or qualities featured by the makers are: Transmission and disc clutch in a unit; two distinct ignition systems; very efficient lubrication; unusually large steering wheel; well selected springs, making riding easy, and very complete equipment without extra charge.

THE JACKSON LINE INCLUDES THREE MODELS

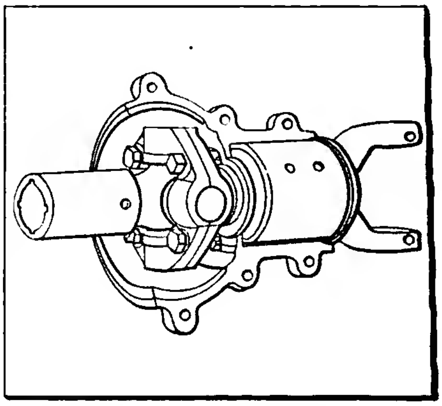
Perhaps the most conspicuous new idea in the Jackson line of cars will be found in the method of transmitting the power from the crankshaft to the superimposed camshaft on the 30 model. The next point of unusual merit, which will he found in all Jackson models, lies in the method employed in housing the walking beams which actuate the valves in the head in response to the lifts as they reciprocate under control of the cams. The walking beams, and, in fact, all moving parts are housed in, accessible by means of covers, and the bearings swim in oil, which is replenished continuously in response to the demand. The valves are set at such an angle that the gas, due to combustion, has a direct passage as it whisks away to the muffler, and back pressure is reduced to a mere suspicion because of this fact, which is furthered by the proper use of a well-designed muffler. In the Jackson models, excepting the 30, a plate clutch is used, there being three discs under control of a toggle system and means of adjustment renders it a simple task to take up for such wear as there may be in time. Jackson cars are swung on full elliptic springs fore and aft, and the springs are so designed that the mass of material is in sufficient presence, considering the energy which must be absorbed to snub the vertical bounce as it is induced by the speed of the car as it negotiates road inequalities. In the Jackson plant, as is generally well understood, the equipment includes everything from drop forgings to the finished article: even the springs are made in a nearby shop which owes its allegiance to the same deity.



Rambler live rear axles, in view of the service they render, are worthy of reproduction in section in order to help purchasers to understand how they are assembled. The differential gears and pinions are especially well made, and roll on ball bearings which are placed at the ends of the shells. The bevel gear is integral with one-half of the differential housing, and the meshing pinion is supported at the end of the torsion tube hy means of a tapered roller bearing which is of the Rambler make. The same pinion is supported at its outer end by a plain bearing, which is sectioned.



Timken roller-bearing axle as used in a considerable number of automobiles which will be at the show. This axle has a special-shaped drawn - steel shell, which houses in the differential gear, bevel drive, and shafts. The differential gear system, as well as the bevel drive, are in a separate unit which may be removed from the steel shell for inspection or repair, and in reassembling, trouble is eliminated.



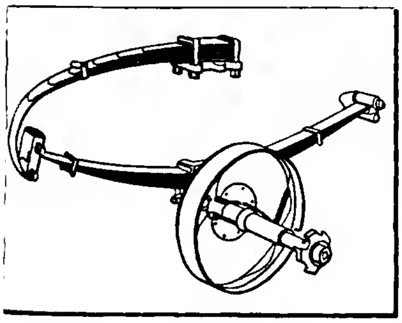
In the Regal automobiles, while there are many points of mechanical merit to be examined closely, it is the purpose here to call attention to the universal joint at the motor end of the propeller shaft, and also to the presence of a nickel steel Hyatt roller bearing of extra proportions to take the work. This bearing is supported by a crossbar of rigid design, and the machinery is thus relieved of any of the shock which comes from the road in contact with the wheels. This plan adds to the transmission stability.

KNOX R CHASSIS IS A MECHANICAL MASTERPIECE

The Model R chassis has a 40-horsepower motor, and is built for touring, with a body which accommodates five comfortably. The cylinders are 5 by 4 3-4 bore and stroke, respectively, of which there are four, cast separately, with valves in the head, and a silent rocker system by means of which they are actuated through the good office of a single camshaft which resides in the crankcase below. In order to get at the valves quickly for any purpose, the head is made separable and may be unbolted by a novice with small effort. The transmission gear is in an extension of the crankcase which forms around, leaving a rectangular space in which the flywheel spins, with room enough besides for the clutch, pedals and relating parts. The cellular radiator is sufficiently large for the purpose, and proper cooling is further assured through the suitable use of a centrifugal pump. A Bosch high-tension magneto furnishes ignition on a high plane, but for purposes of cranking and in an emergency a coil and storage battery are employed. Lubrication is positive through the use of a pump, and the clutch, which is a three-plate system of the dry type, co-operates with the selective three-speed transmission gear and shaft drive to a live rear axle of undoubted quality, utilizing a pair of universal joints, one at either end of the propeller shaft. The wheelbase of the car is 117 inches, and standard tread, with a well-shaped special steel channel section set of side bars, reinforced at the narrowing point on which the body rests.

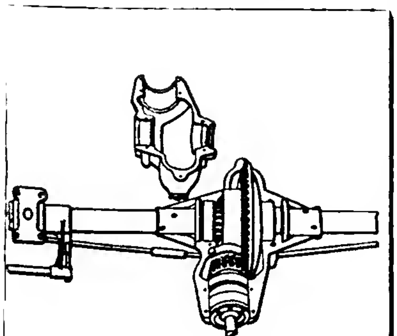
KRIT IS A NEW MODEL FROM AN OLD DESIGNER

Model A of this make came out this year and is built by the Krit Motor Car Company, Detroit. The price is $800 and the body is a runabout type seating two. The power plant comprises a 4-cylinder, 4-cycle, water-cooled motor, with cylinders 3 3-4 by 4 inches bore and stroke, respectively. The cylinders are cast



In the Chalmers-Detroit 30 there is probably no point which attracts more attention than the easy-riding qualities of the car, and in looking for the reason it is probably necessary to examine the rear spring suspension. The springs are 3-4 elliptic (scroll), with wide plates, and so designed that the period of the oscillations is properly regulated. The fastening at the chassis frame is well made.

en bloc, and a tubular radiator is connected for thermo-syphon work so that the water is circulated without the use of a pump. Ignititon is by a magneto, which is included in the selling price;



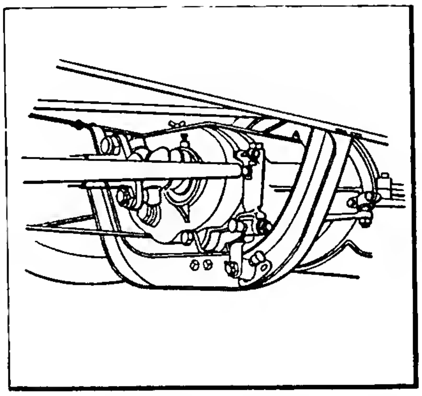
In the Corbin Full Jewel it is believed that the live rear axle is well worth the attention of the discriminating buyer, and for the purpose of reflecting something of what will be found in the axle this view is offered. The bevel pinion, which meshes with the gear to constitute the bevel drive, is supported most rigidly between bearings, and, in view of the torque which comes on this part, the designer made sure of his ground by spreading the bearings far enough apart to produce the desired result with certainty.

the clutch is multiple disc, and a 2-speed sliding gear system is connected between the motor and the live rear axle. The wheelbase is 96 in. with a 56-in. tread, and 32 by 3-in. tires are used on all road wheels. The weight of the car is given as 1,200 pounds, and ball bearings are placed in road wheels, excepting in the live rear axle, which has roller bearings as well. The crankshaft, however, centers on a pair of annular ball bearings. The side frames are of pressed steel.

LOCOMOBILE MODEL I IS A SHAFT DRIVE AUTOMOBILE

The A. L. A. M. rating of the motor in this model is 32.4 horsepower, and has a four-cylinder motor, 4 1-2 by 4 1-2-inch bore and stroke, with the cylinders cast in pairs. A honeycomb radiator is supported in the cooling effort by a centrifugal pump, and ignition is by low tension with a magneto; the illustration showing the simplicity of the wiring system, method of holding

Stevens-Duryea cars, in view of the unit power plant construction, are enabled to take advantage of the principle of the three-point suspension to the dregs, as it were, and as the illustration shows, the rear end of the power plant case rests at its center on a depressed crossbar of great strength. Considering the fact that this motor is a "six" and that the case must be long enough to accommodate this many cylinders, the designer has seen fit to protect the case from all outside influences.



the magneto in place, and a high degree of mechanical protection. The transmission gear is the selective four-speed system, with a cone clutch, and lubrication is by positive mechanical methods. The wheelbase is 120 inches, and the channel section frame is designed for adequate strength utilizing a fine grade of material, considering the span of supports. Ball bearings are used at all points, excepting in the motor, and the tires on the wheels are 35 by 4 inches front and 34 by 4 1-2 inches for the rear, a rather unusual combination.

In addition to this model the side-chain drive Locomobile of 40-horsepower rating is still in brisk demand, and is put out this year as one of the standard models of the company. The motor in this model is 5 by 6 bore and stroke, respectively; has four cylinders, cast in pairs, and the general construction all along the mechanical line checks up with that which obtains for the shaft-drive model, with the exception that the wheelbase is 123 inches and the tires are 36 by 4 in front and 36 by 5 in the rear, not forgetting, of course, that a side-chain drive is placed in the transmission instead of a shaft.

MATHESON OFFERS 2 MODELS TO DISCRIMINATING BUYERS

Model M is sold at $3,000; is rated at 48.6 horsepower; has a touring body. Model E is sold at $5,000, is rated at 40 horsepower and is rigged out for touring. Referring to Model M, which is a six-cylinder motor, with cylinders cast in pairs, that the rating is conservative is reflected in the bore, which is 4 1-2 inches, and that the company believes in the long-stroke idea, is brought out by the fact that the stroke is 5 inches in this model. Cooling is done by a honeycomb type of radiator, with a centrifugal pump for circulation, and ignition in the main is by means of a Bosch magneto with a battery auxiliary. There are 53 discs in

In Matheson automobiles, while there are very many points to be given serious consideration, the fact remains that the multiple disc clutch as here illustrated is so well designed as to demand more of the purchaser's time than is ordinarily given to a detail or a unit of an automobile. The clutch, as a whole, centers on annular type of ball bearings, and the spring, which is also shown, is so designed as to deliver its quota of work after a fashion spritely. The discs are so made that they seat readily; this is due to the small radial distance across them. The oil, which issued as a lubricant, has but a short distance to travel to get away, and allow seating.

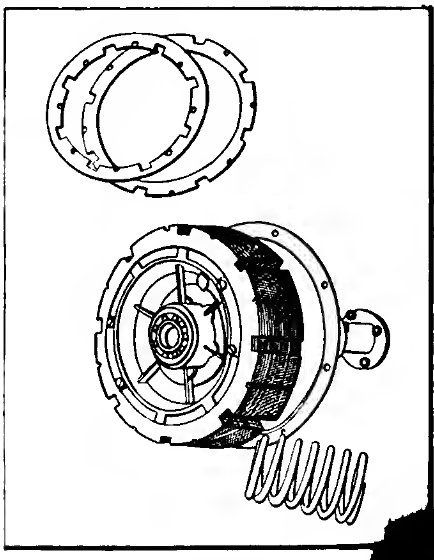
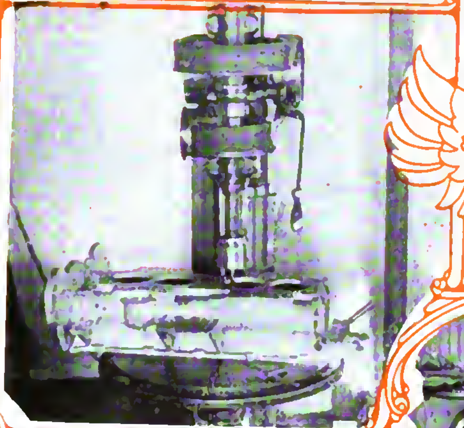
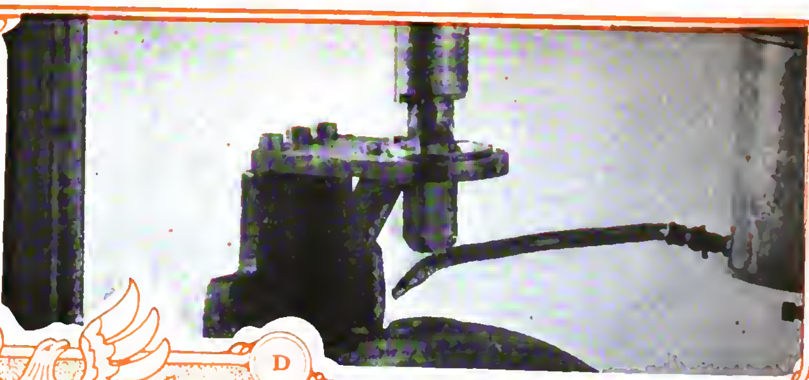
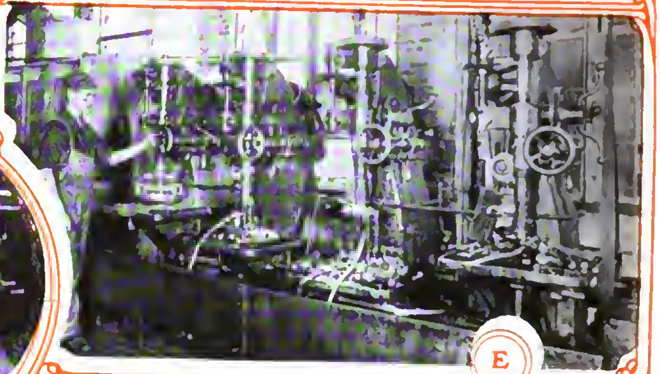


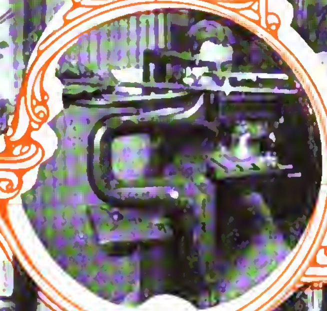
PLATE IV.

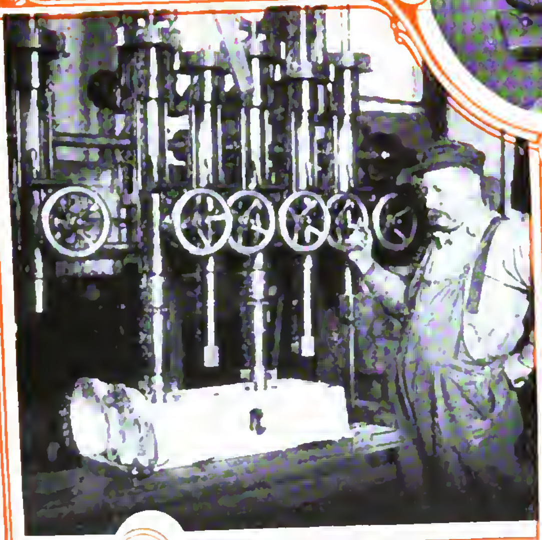
DRILLPRESS APPLICATIONS

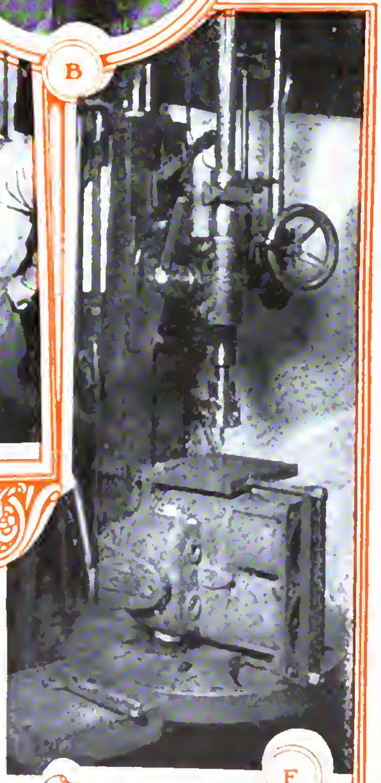


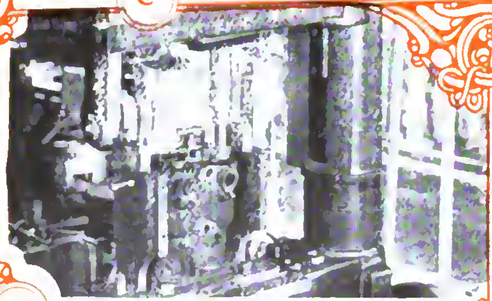


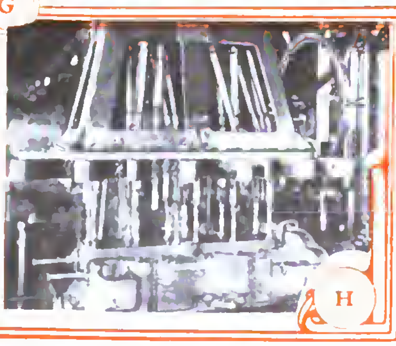












A—Drillpress used in the Moon plant for drilling holes in the aluminum crankcase after they are spotted. This is a small, sensitive drill, whose speed of output is governed only by the operator's ability to hustle. The table swings freely, so that the work is not even bolted down to it.

B—A form of sensitive drill as used in engraving name plates for hub caps on Rambler cars. This tool takes the place of a high-priced engraver. In operation the generating tool is guided by a formed plate which may be seen at the left of the picture, the operator holding the guiding point down to it with his right hand.

C—Multiple spindle drill used in the National plant for finishing crankcases, using wing cutters and reamers as illustrated.

D—Drillpress used in the Marmon plant in connection with a fixture which holds the cover W in line with the tap D which in turn is guided by the hardened bushing B which is bolted through the jig plate G.

E—Battery of drill presses as used in the Rambler plant working on yokes, levers, and other drop forgings under conditions of high speed utilizing special drills.

F—Drill press used in the Premier plant in connection with a special fixture for drilling holes in cylinders, the arrangement being such that the cylinders are automatically centered and the drill is guided through a jig hole with a hardened bushing.

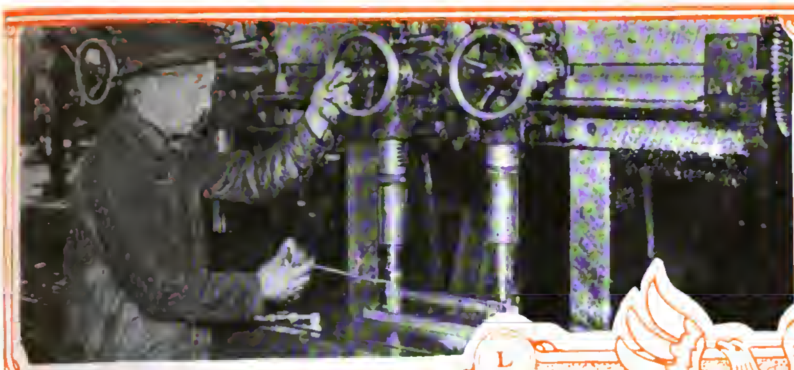
G—Radial drill in the Moon plant finishing valve cover holes in cylinders of the valves in the head type.

H—Multiple spindle drill working in connection with a jig plate on the upper half of a Premier cylinder, drilling twelve holes at one time with the accuracy which is inherent in the jig, and with speed due to the use of high speed drills kept in excellent condition.

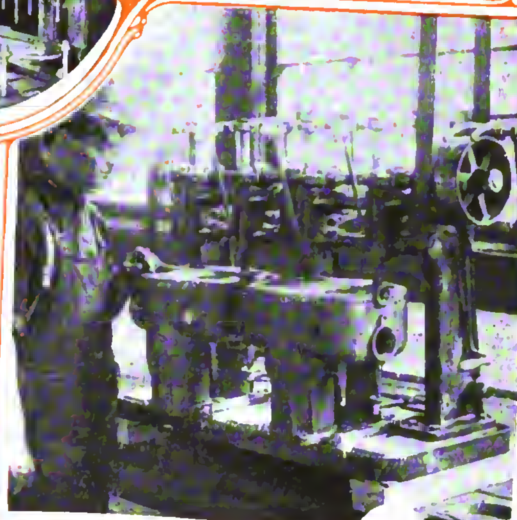
the clutch, and the transmission gear is selective with three speeds and reverse, which connects to the live rear axle by a straight-line drive and a shaft suitably provided for from the point of view of flexibility. The wheelbase of this model is 125 1-2 inches, with a 56 1-2-inch tread. The channel section frames are of special steel of adequate section, showing the earmarks of the designer. The crankshaft rolls on plain bearings, but all other bearings are of the ball type, large for the work and suitably installed. The road wheels have 36 by 4-inch tires all around, which, for the weight of this particular model, are very liberal indeed. A sketch of the multiple disc clutch is given elsewhere in this article, and will prove of more than a little interest to those who follow up the details in design as they relate to automobiles, because the discs are of large diameter, but the distance which the oil has to travel to get away is but slight.

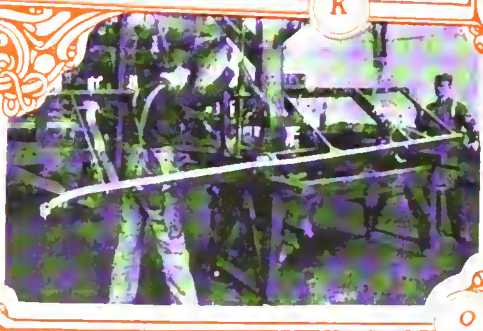
M'INTYRE ADDS AN AUTOMOBILE WITH PNEUMATICS

In addition to the line of high-wheeled cars built by the W. H. McIntyre Company for several years past, this season









I—A special multiple spindle drill used in the Moon plant in cylinder work involving a special fixture. The particular feature of the tool lies in its ability to drill under conditions of close centers as illustrated. This is brought about by gearing the spindles.

J—Multiple spindle drill used in the Excelsior plant in the manufacture of Excelsior motors, working in conjunction with a jig drilling flange holes for a motor end-plate.

K—Special multiple spindle equipment used for grinding valves in cylinders for National motors so contrived that the grinding spindles reverse on a third of a revolution, and the grinding discs lifts off of the valve seat at the dwell point of reversal thus preventing scoring of the valve seats.

L—Multiple spindle drill used in the Excelsior plant in the manufacture of motors, shown in the process of drilling holes in the enlargements of the connecting rod with a special contrived wing cutter which faces off the enlargements simultaneously.

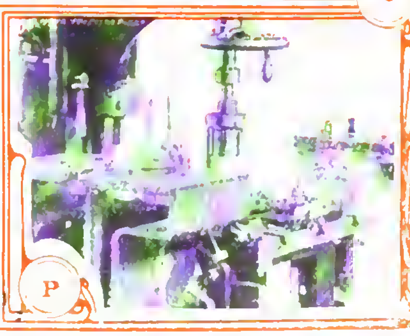
M—Sensitive drills as used in the Diamond chain plant for drilling sidebars and other work in connection with the manufacture of Diamond chains as employed in side chain drives on automobiles.

N—Drill press in the Premier plant rigged up for grinding valve seats of Premier cylinders so arranged that the spindle reverses on a third of a revolution and the grinding disc lifts off of the seat at the dwell point during each reversal.

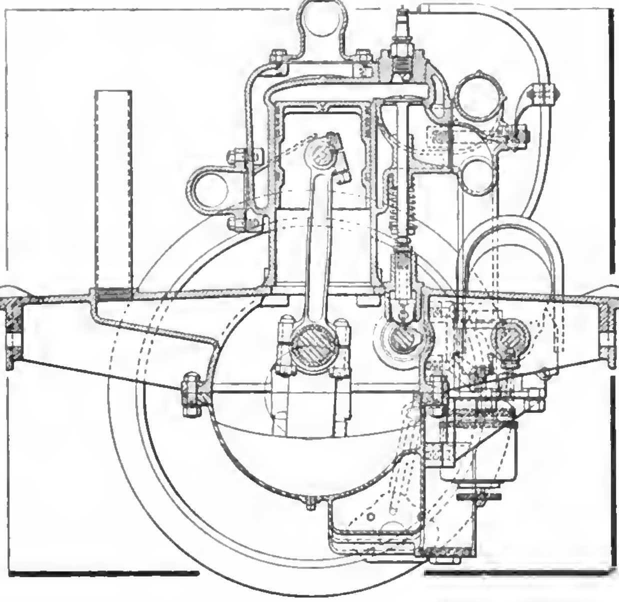
O—Improvised drill in the Premier plant drilling holes in crossbars during process of assembling the chassis frame.

P—Radial drill used in the Marmon plant in connection with a fixture with hardened bushings in the holes showing an end mill T in the socket held in the spindle S. The top portion of the fixture shows the bushings.

will see the production of a machine resembling standard automobiles more closely than does the long-legged critter. This latest addition to the family shows another change, to water cooling, the four-cylinder 4 1-4 by 5 1-2 engine being of this variety. The length of stroke relative to the bore puts this prime mover into the long-stroke class, which produces the power required at comparatively low speeds, this being conducive to long life. The cylinders are cast in pairs, with the T-head form, while the crankshaft is ably supported by long bearings of Parson's white brass. Three body forms conclude the line, a two-passenger runabout, a four-passenger runabout or roadster, and a five-passenger touring car. The former is designated as Model M-10, the second as Model M-15, and the last as M-20. The engine power rating is taken as forty, which at the gear reduction of 4 1-2 to 1 would produce sufficient speed for anyone. Added to long lively springs, a wheelbase of 115 in. makes life worth living in the car, while the tires have the most unusual size of 37 by



5 all around. Considering the weight of the complete car, this tire equipment is one of the most liberal on the market.



Section through National engine, showing the sump for the oil to collect in, and which acts as a source of supply at all times. The dotted lines indicate the pump at the rear end.

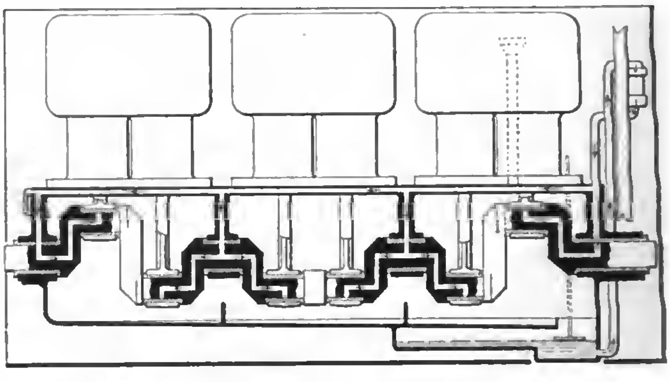
MICHIGAN MODEL D IS A STEAMER COMMERCIAL

Made by the Michigan Steam Motor Company, this model, as it is displayed at the show, may be briefly described as follows:

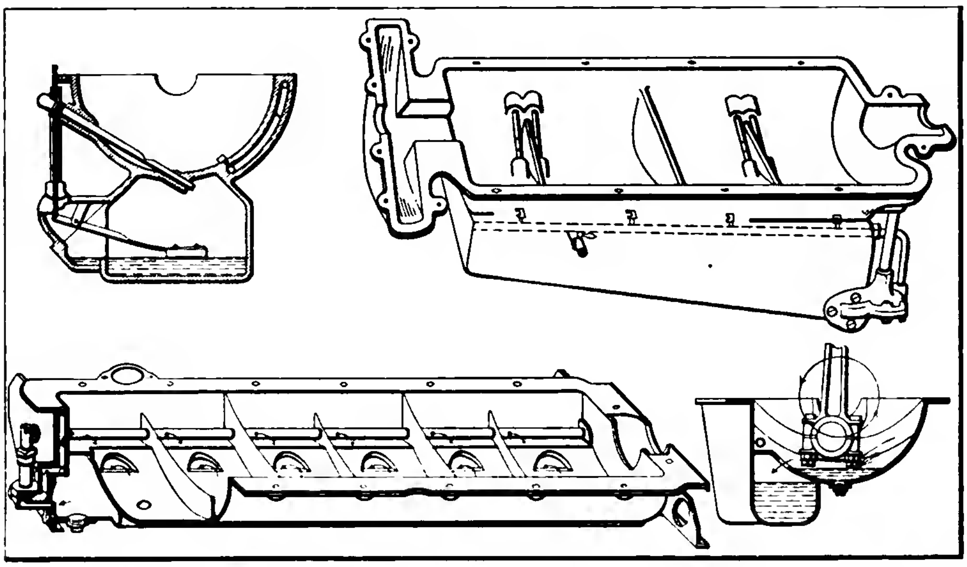
It is a 3-ton truck; body work to order; price $4,000. The power plant has eight cylinders of the type known as twin quadruple compound, with a three-inch stroke. The engine is located under the foot-board, and the steam boiler, which furnishes the energy in acceptable form, is located under the driver's seat. The type of boiler is designated as semi-flash, and a flat tube condenser is used in conjunction with the system. Water is maintained at a constant level, and compactness as well as economy is the aim of the designer. Lubrication is by splash, control is substantially automatic, and one speed change is provided in the transmission gear system. A double side-chain drive transmits power to the rear (traction) wheels, and the wheelbase is 140 in. with a 66-in. tread. The chassis frame is of the channel section, reinforced, and Timken axles are used at front and rear. The weight of the truck is 4,500 pounds, according to specifications, and 4 1-2-in. front tires (solid) are used in conjunction with the same size "dual" tires on the rear traction wheels.

ONLY TWO MIDLAND MODELS, K AND L

No attempt will be made by the makers of the Midland to cover the entire field with a line of cars as long as your arm, but rather, the factory will concentrate on two models, to be known to the trade as Models K and L. A short and rather hurried mention of the salient points of the design of these two will serve to put them in the position of speaking for themselves, as they are well able to do. Model K is a 50-horsepower car, with an engine of four cylinders, 4 3-4 by 5 1-2, cast in pairs, and of the L type. The wheelbase 118 in., the tires 36 by 4, the body well upholstered, and the price $2,250. Passing on to Model L, that is a car of 115 in. wheelbase, and 34 by 4 tires, equipped with a 4-cylinder engine of 4 1-2-in. bore and 5-in. stroke. The makers rate it at 40 horsepower. These cylinders are of the T-head type, differing from the larger ones, but like them, cast in pairs. The clutch of this car, both models, will be remembered as one of the first of the three ring metal-to-metal clutches. The same form is used to-day. This model sells at $1,800. A very light weight for the complete car is claimed. Frictional losses are lowered to the minimum possible point by the liberal use of ball and roller bearings throughout. Ball-bearings are used in the clutch, front, and rear axles, while the transmission is mounted upon tapered rollers. The material used in the crankshaft, transmission gears, shafts and other parts which have to take the brunt of the work, are selected for high kinetic qualities, and, in order to accentuate these qualities the parts are suitably heat treated before use.



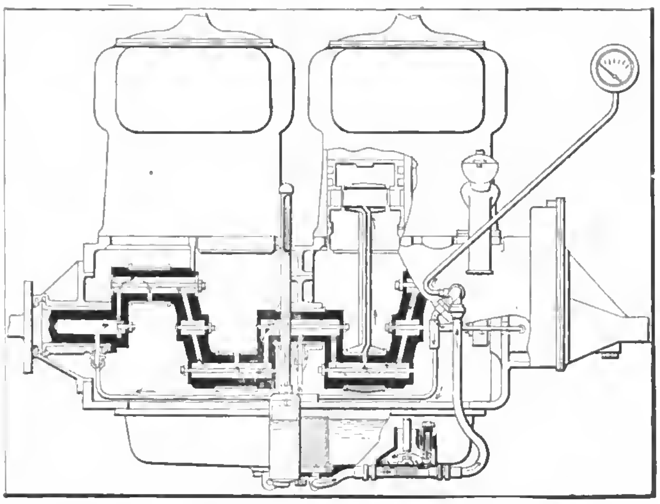
Oiling system of Lozier Light Six, the path of the lubricant from the pump to dashboard, to bearings and return being indicated by the small arrows.



Above, new Columbia lubricating scheme, the diagonal rod adjusting by its position the amount of overflow, and thus, the level in the case. Below, the Oldsmobile lower half of crankcase, showing overflow ports and at the right, the way the connecting rods dip in the oil.

MITCHELL MODEL S IS A "SIX"

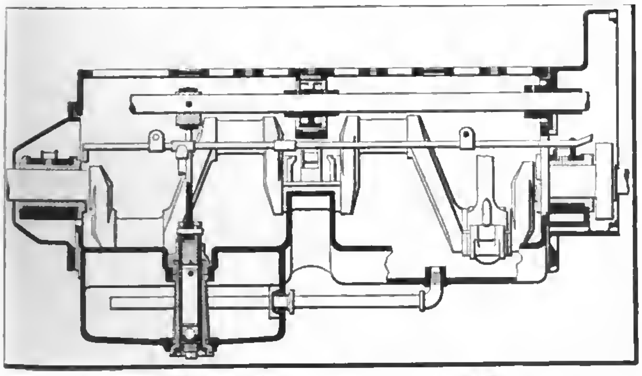
While there is a certain similarity between the respective models of the Mitchell, even so, differences in engineering detail are instituted in accordance with the designing requirement. In the six, for illustration, the frame, which has to do duty with a long wheelbase, is prevented from sagging by a heavy reinforcing plate which is riveted to the side bars at the point of narrowing and for a considerable distance along the frame; this reinforcing plate adds rigidity to the bars and fully offsets the cranking moment. The cylinders of the Model S are cast in pairs; they are nested symmetrically on a well-designed crankcase, and straight-line designing obtains throughout the work. The rear suspension is through a three-quarter platform type of springs with a lateral member faced to the rear, and the support is by means of a stout bracket which is riveted to the rear cross-bar of the chassis frame, which bar is especially designed in view of the work it must do, and the corner fastenings at the intersections of sidebars are also strengthened. The brakes, of which there are two sets, in conjunction with a pressed-steel drum for each rear wheel, connect by means of straight-line rods to the operating shaft which crosses in front of the spring suspension, and between this shaft and the pedal control an equalizer is placed for each set of brakes, thus assuring equality of pressure at the instant of application, and skidding at this critical moment is thereby thwarted. In Mitchell cars, pressed steel is utilized to a very considerable extent, and castings are, therefore, not employed. The life of these cars is lengthened in view of the character of the kinetic materials used, and what is equally to the point, the cost of upkeep becomes a negligible quantity.



Marmon is well known for the bored-out crankshaft, this being done to furnish a channel for the lubricating oil to circulate through. The arrows show its progress to the bearings.

MOLINE $1,500 MODEL IS POPULAR

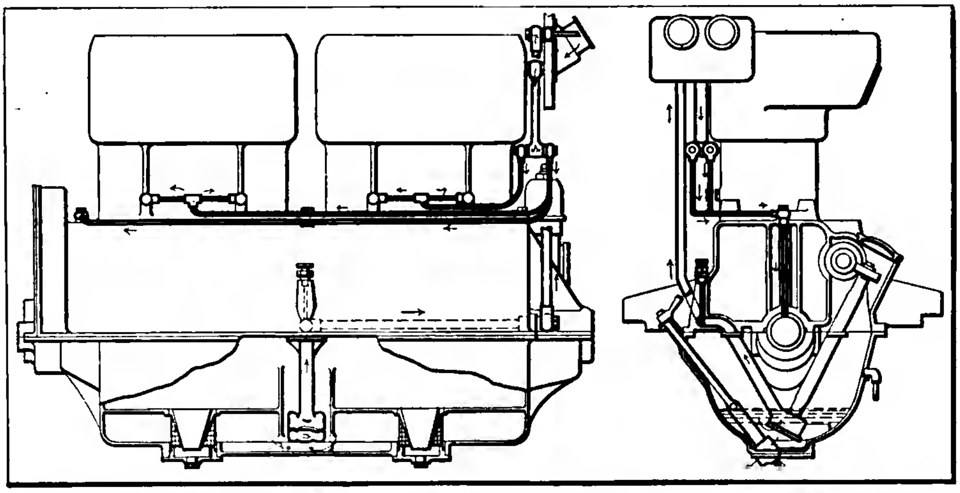
This model has a four-cylinder motor which is rated at 25.6 horsepower (A. L. A. M.). An illustration given elsewhere shows how the transmission gear is connected with the motor case by a pair of I-section arms which sweep around the flywheel. The cylinders of the motor are in pairs, with a bore of 4 inches and a stroke of 4 1-2 inches, which puts the motor in the long-stroke class. The radiator is of the tubular type; ignition is by a Splitdorf magneto and a battery auxiliary, and the power is transmitted by a cone clutch through a three-speed selective transmission gear and propeller shaft with suitable universal joint to a live rear axle of becoming characteristics. The motor bearings, including the crankshaft, are plain, but roller bearings take the exacting work at all other points. This car weighs 2,100 and has 34 by 3 1-2-inch tires on all wheels. Among the features which make it possible to class this automobile in standard practice is an I-section front axle, which is die forged and heat treated, the special steel channel-section frame, with scroll full elliptic springs in the rear and half elliptic springs in front. The cooling belongs to the thermo-siphon class, of which there is a large school, and the control for the carbureter and ignition are properly nested on the top of the steering wheel. Accessibility attains at every point in the construction of this car, and the character of the workmanship which is displayed in the power plant and elsewhere, is up to a fitting standard of Moline work.



Crankshaft lubricating method used on the new four-cylinder Reo, the plunger pump in the oil well furnishing a supply to the bearings through horizontal tubes. Pump drive is by eccentric.

MORA PRODUCES A NEW LIGHT FOUR

Besides the favorably known Mora Forty, this company will this season produce a new light car, to be known as the Mora Twenty. Besides being small, of comparatively small power, it has the merit of not being very high in price. The motor is of four cylinders, cast in pairs, water-cooled and by the thermo-siphon action. Cylinder sizes are 3 1-4 bore and 3 1-2-in. stroke. It is a very neat little power plant and attracted much favorable attention at the Palace Show, where it was seen for the first time. Ignition is by both magneto and battery. The transmission, located at the rear axle, affords two speeds and a reverse, operating selectively. The wheelbase is 84 in. for a two-passenger runabout body, while the tread is standard. Engine bearings are plain, but elsewhere rollers are used liberally. Thirty-two by 3-in. tires are used for both front and rear wheels, which size is ample in view of the fact that the weight is but 1,300 pounds. To add to the attractiveness of the mechanical features taken as a whole, a Renault type of sloping bonnet is used with a dashboard radiator. This gives a very Frenchy effect, while actually adding to the effectiveness of the cooling system. Model Forty is about the same as last year, with the



On the American motor, the oil pump is set on an inclined shaft, which is worm-driven from the crankshaft. Besides the bearing leads, there are two for the cylinders, each one dividing and supplying two cylinders. The usual telltale on the dash is used.

exception of more power, brought about by an increase in the bore of the cylinders, which now measure 4 1-2 in. in diameter. Aside from the cooling system, in which a centrifugal pump is used to circulate the water, the details of the larger car are like the smaller one just described. The little car sells at $1,050, while the price of the Forty is $2,500.

OAKLAND FROM THE BIG PLANT AT FLINT

The product of this plant is divided into two units, one of which is a popular priced car, at $1,250, and the second sells for $1,700. The smaller of the two cars has a four-cylinder motor, with a 4-inch bore, and like stroke. The cylinders are cast in pairs and cooling is done by water, which is handled

A—Shows a Cincinnati milling machine in the Excelsior plant with a large inserted milling cutter facing off the bottom flange of a T-head twin cylinder.

B—A milling machine in the National plant, mounting straddle mills and facing off the crankpin enlargements of four connecting rods, the latter being held in place by clamps against the face of an angle plate.

C—Special heavy milling machine in the Premier plant, with large inserted tooth, cutting discs, facing off port bosses on Premier twin cylinders. The milling cutters are set to straddle the cylinder, thus completing the facing on both sides simultaneously.

D—A heavy vertical mill in the Inter-State plant, with an inserted cutter head, facing off the aluminum top half of an Inter-State motor crankcase.

E—A No. 4 Cincinnati milling machine of the vertical type, with an inserted cutter milling head facing off enough cylinders for one time as used in Excelsior motors.

F—Special milling attachments on an Ingersoll milling machine as used at the Rambler plant for facing off the bottom flanges of enough cylinders for one motor at one time.

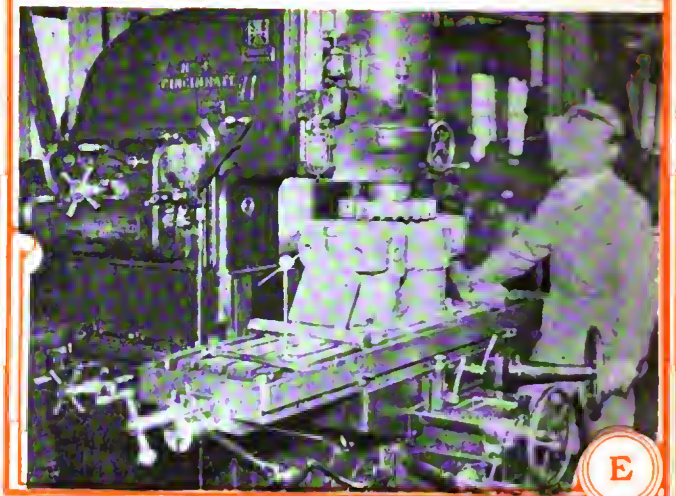
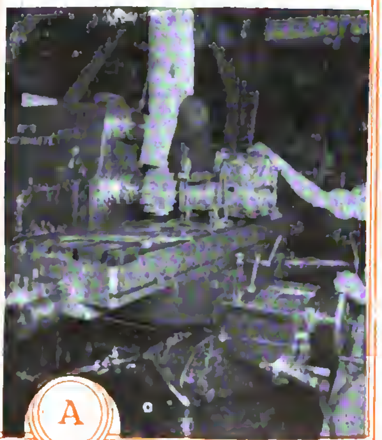
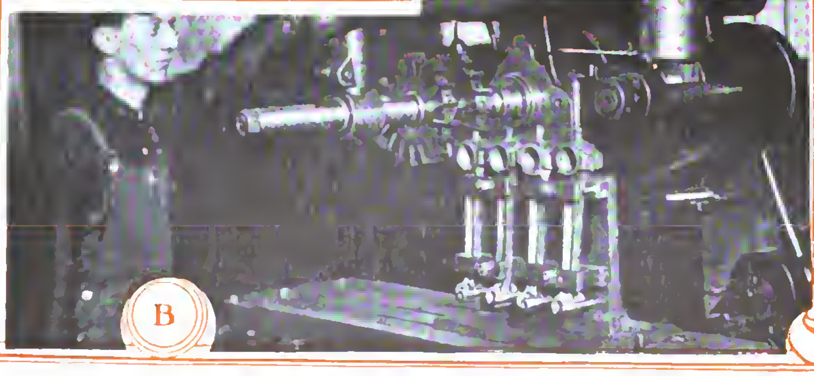
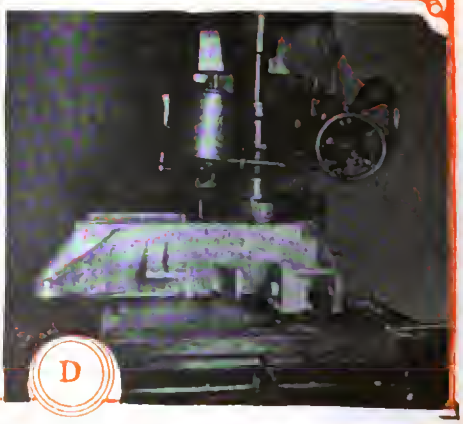


PLATE V.

ACCURATE AND QUICK MILLING







K

by a centrifugal pump through a tubular radiator. Ignition includes a magneto, and oiling is positive, a pump serving for the purpose. In the mechanical control, a disc clutch co-operates with a selective three-speed sliding gear and the 100-inch wheelbase, with a 56-inch tread, adds to the good performance of the car. This car rolls on anti-friction bearings, weighs but 1,800 pounds, and 32 by 3 1-2 inch tires on all wheels have an easy time of it. The plant, which has assumed enormous proportions of late, is one of the large undertakings of the year, and a visit to this establishment makes one of the most pleasant surprises which a newcomer is likely to experience in the rounds of this big infant industry. Elsewhere in these pages is to be found a cut of the rear end of the Oakland runabout, showing rumble seat and gas tank.

G—Special milling machine of the Ingersoll type as used in the Metzger plant for facing Everitt motor cases in gangs. This is an excellent illustration of the most modern practice.

H—Special vertical mill as used in the National plant for reaming connecting rods to an exact size and other precise work of an equivalent character.

I—Vertical mill in the Excelsior plant, with a large inserted tooth cutter, used for facing off motor cases and kindred work.

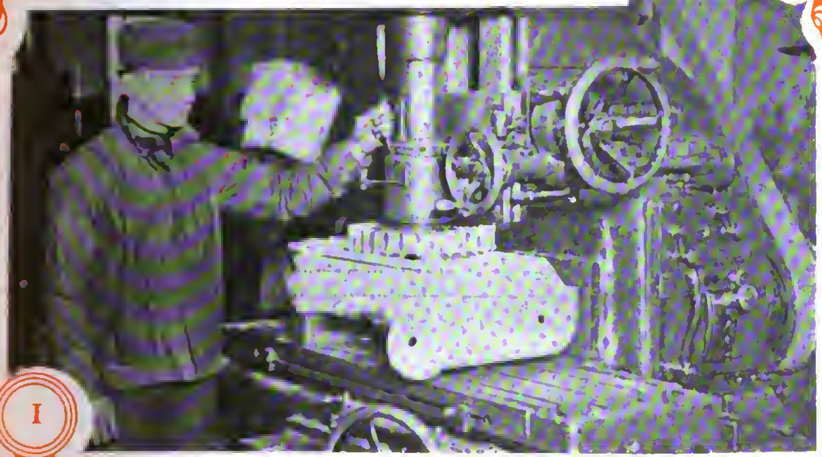
J—Garvin mill in the Moon plant with a large inserted tooth cutter facing off the upper half of an aluminum crankcase.

K—Brown & Sharpe gear cutting milling machine as used in the Moon plant, shown in the process of cutting half-time gears employing the fixed cutter principle.

L—Special cylinder boring machine with four spindles so arranged as to fix the centers and bore cylinders of the block type as used in Everitt motors made by the Metzger Manufacturing Company. This is the type of design and type of machine tool which may truly be characterized as right up-to-date, the tool allowing of the rapid and very economical production of the motor as turned out by the designer of the car. Without a doubt this skillful workman knew of the possibilities.

L

G



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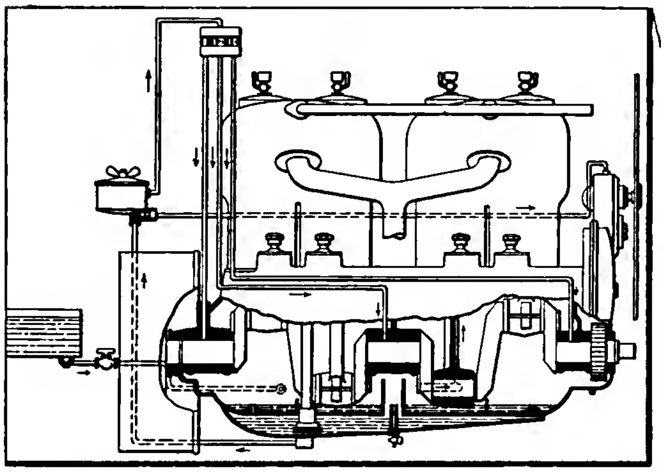
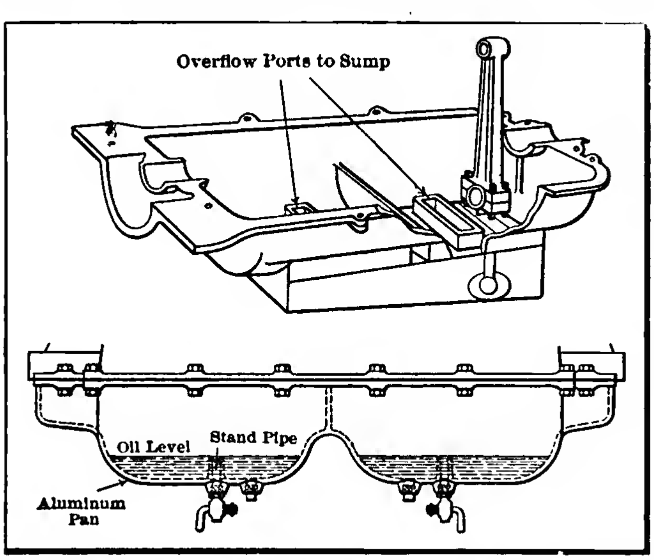


Circulating system of lubrication as adopted by the Royal Tourist. The pump forces oil through sight-feeds on the dash to the three main crankshaft bearings, and also to the timing gears; the strainer is very accessible.

CLOSE COUPLED OLDSMOBILE LIMITED POPULAR

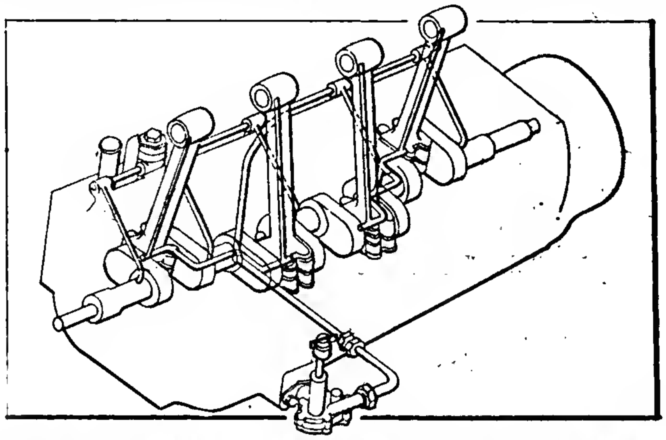
This car, which is listed at $4,600, has a wheelbase of 130 inches, standard tread, and the distinction of using 42 by 4 1-2-inch tires on all wheels. The brakes for the foot-lever control are external on the rear wheels, and the brakes, which are under hand control, are internal extending on the rear wheels. This car has a six-cylinder motor with a bore of 4 3-4 inches, and a stroke which brings it into the class with the squares. A cellular radiator in conjunction with a pump maintains a sufficient cooling, and the ignition under working conditions is by means of a Bosch magneto; since the dual system is employed, emergency ignition is cared for in the same system. The transmission is a selective type with four forward speeds and reverse, so that in road work the car performs under the best conditions of economy, with the added advantage of a high rate of acceleration, due to the fourth speed in the transmission system. The leather-faced cone clutch is of the latest and most approved design, and easy riding is assured by the application of semi-elliptic springs in front, and three-quarter elliptic springs of great capacity on the rear axles, they being 54 1-2 inches span, and the plates are 2 1-4 inches wide. This car has the further advantage of a baggage rack, coat rail, foot rest, top, speedometer, glass front, Prest-O-Lite tank, and 9-inch headlights.



Two ideas of lubrication contrasted: Above is shown a crank-case in which a separate trough is provided for each connecting rod big end; below is the Locomobile idea, in which two big ends share the same trough.

FOUR PACKARD MODELS TO A DISCRIMINATING PUBLIC

From the "Eighteen" which is a runabout at $3,200, to the "Thirty" as a touring car at $4,200, is the normal span of Packard endeavor, which is not taking into account any of the body creations as limousines and landaulettes, of which the Packard plant has produced many noteworthy examples. The "Eighteen" as well as being a runabout of distinction, is also fitted out with a touring body for such of the Packard clientèle as expresses a preference for more seating capacity. The "Eighteen" motor is a characteristic design, with four water-cooled cylinders, 4 1-16 by 5 1-2 inches bore and stroke respectively, the cylinders being cast in pairs. Cooling is accomplished effectively by Packard honeycomb type of radiator, and the water is circulated by a centrifugal pump. The main ignition system consists of an Eisemann magneto, and for auxiliary work, a coil and storage battery is employed in each of the models. The transmission gears for all the models, as well as the "Eighteen" is a three-speed selective with reverse, mounted on the rear axle, of which it becomes a unit. The rear axle construction in cars of this make, has become famous as a Packard idea, and the germ has propagated until to-day the scheme is broadly used. The "Eighteen" as a runabout, has a wheelbase of 102 inches, but as a touring car, the wheelbase is



One pump may give a positive feed to thirteen points, as is explained by the diagram showing the Knox practice. From a manifold the oil passes to the five main bearings, thence to the big ends and finally, the piston pins.

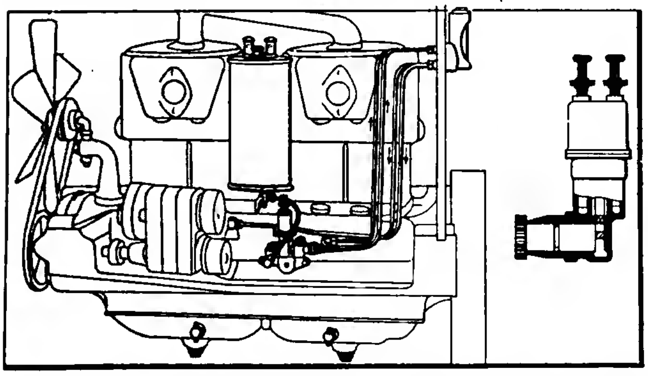
increased to 112 inches. Ball or roller-bearings are used at all points except in the motor, and in the "Eighteen" runabout model the tires are 34 by 3 1-2 in front and 34 by 4 for the rear.

PAIGE-DETROIT IS A TWO-CYCLE ROADSTER

The price of this automobile is $800, and it is provided with a 2-cycle, 3-cylinder, water-cooled motor (valveless), of rather novel design, suspended at three points on a channel section chassis frame. The bore of the cylinders is 3 3-4 in. and the stroke is 4 in. The power rating is 25 horsepower, and ignition is by a magneto. An automatic force feed oiler is used to attend to this important matter and cooling is by thermo-siphon with a radiator which is represented to be adequate for every need. The wheelbase is 80 in. and 56-in. tread, while the road wheels are fitted with 32 by 3-in. pneumatic tires. A sliding gear gives two forward and reverse speeds, the clutch is leather faced, of the cone type, and the side-bars of the frame are said to be nickel steel. The brakes are all on the rear traction wheels and consist of a working and an emergency set, the one internal expanding and the other external constricting. The car is swung low; rear cross spring is half-elliptic, and is so suspended as to enable the frame to come as close to the ground as flywheel clearance will permit of. The general appearance of the car is very much in line with advanced designing.

PALMER-SINGER LINE INCLUDES FOURS AND SIXES

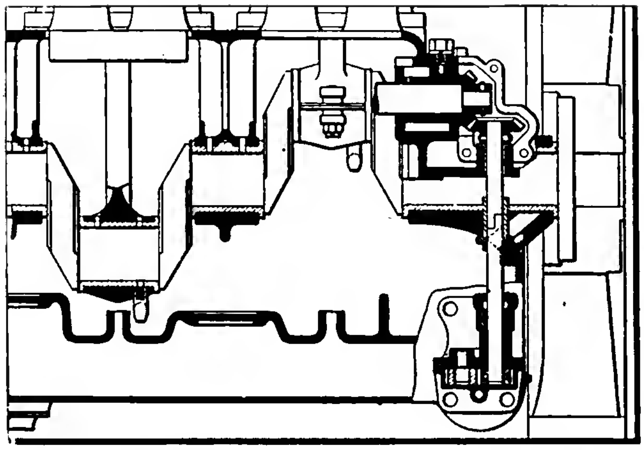
Many models at many prices, in both four and six cylinders, make the Palmer-Singer line of 1910 cars a very complete one. This must not be taken too literally for the company has abandoned the season and yearly model habit. However, the list at present includes the following models: XX, LXI, LXII and XXX enclosed bodies. The first-named is a chassis with a 115-in. wheelbase, standard tread, 34 by 4 in. tires, which for use with heavy enclosed bodies is altered to 120-in. wheelbase, while the tire equipment remains the same. The power is supplied by a four-cylinder, 4 1-4 by 4 1-2-in. engine, of which the cylinders are cast in pairs. A Bosch magneto furnishes current for the high-tension ignition system with batteries in reserve. Cooling is by water with a centrifugal pump and honeycomb radiator. Disc clutches and four-speed selective transmissions are used on all models. The price of the XXX with touring body is $2,250, and with landaulet body, $3,650. Both other models are higher powered, LXI having a six-cylinder 4 3-4 by 5 1-2 engine, rating at 54.1 horsepower, while on Model LXII, the bore of the six-cylinder engine is slightly greater, 4 7-8, and the stroke the same as before. This may be had in any body form, being supplied as a three-passenger runabout (LXI) for $3,250, and as a five-passenger touring (LXII) for $3,500.



Packard has a nicely worked-out lubrication system, employing two pumps, of the plunger type; these deliver oil through sight feeds to the two compartments of the crankcase. A reserve supply is in the tank between the cylinders.

PATERSON THIRTY AND WHAT IT SHOWS

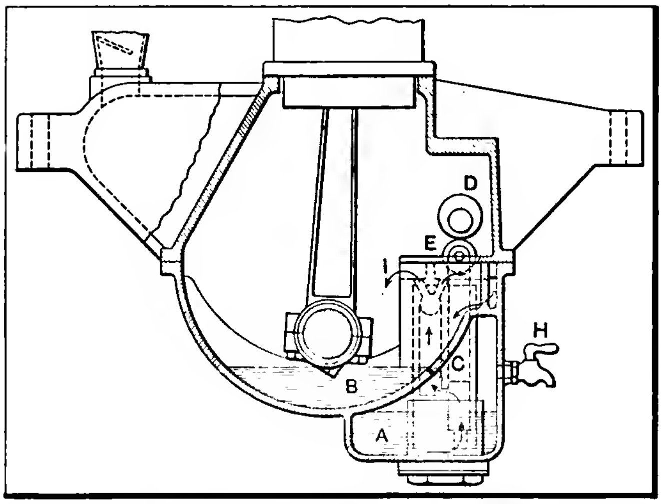
A 4-cylinder water-cooled motor, of the 4-cycle type, with cylinders cast in pairs, 4 by 4-in. bore and stroke respectively, giving an A. L. A. M. rating of a trifle over 25 horsepower. Instead of a pump being used to circulate the cooling water, a suitable radiator for thermo-siphon cooling is used, and the water piping is made accordingly. Ignition is by a double system, which includes a magneto, coil and battery. In lubricating, a constant level splash is maintained by means of a plunger pump type of lubricator. A Schebler carbureter takes up the feeding of the fuel to the motor, and control includes a type of cone clutch which is leather faced, and springs press the leather into good engagement. The transmission includes a three-speed (and reverse) sliding gear system, which is selective and engages a carbon steel propeller shaft through universal joints. The rear axle to which the propeller shaft runs is of the semi-floating type, using roller bearings; the front axle is also tubular, but the bearings are of the ball type. All brakes are on rear wheels and comprise a working and emergency system, the one being internal expanding and the other is external constricting. The gear ratio is optional within practicable limits, and the road wheels are of the artillery type, fitted with demountable rims, which take 32 by 3 1-2-in pneumatics. The wheelbase is 104 in. with a tread of 50 in., and the springs are full elliptic front and rear. With a motor of this rating and state of mechanical perfection, it is not too much to expect that the speed of the automobile will range between 5 and 50 miles per hour, and, as for appearance, it is that due to black leather upholstery, blue body, yellow gear, or certain options. It is made at Flint, Mich., by W. A. Paterson Company, a newcomer in the business.



Cross-section of Overland oil pump, of the gear type, driven by a vertical shaft and bevel gears from the camshaft. The lower half of the crankcase, with the pump, can be removed without disturbing the drive.

PEERLESS DESIGN FEATURES ARE CHARACTERISTIC

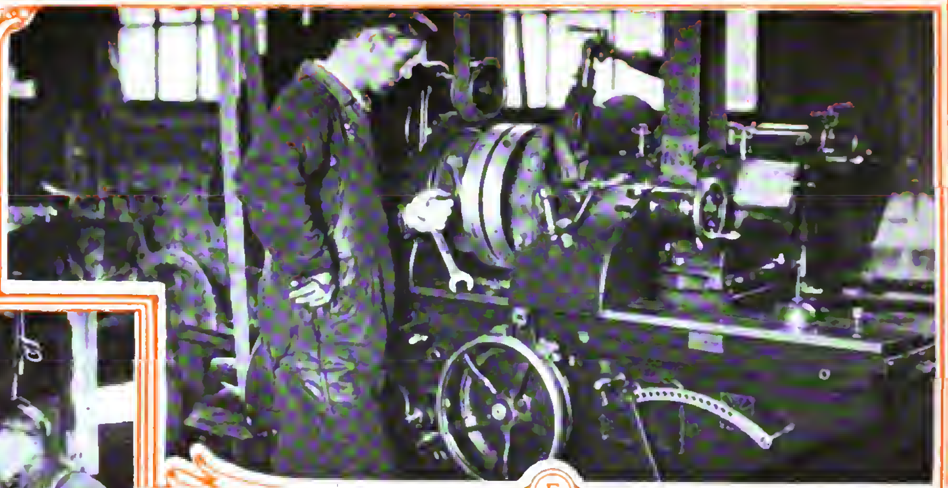
From the Model 27 at $4,300 to the Peerless "28" at $6,000, runs the gamut in the matter of size with no suspicion of a change in the standard fixed by this well-known company. These models when placed alongside of each other are excellent illustrations of consistency, in which, as the spectator is bound to observe, the things which are good in one car are equally representative in another. Model 27 has an A. L. A. M. rating of 38 horsepower, has a runabout body, with a rumble, and the motor is a 4 7-8 by 5 1-2 inches bore and stroke respectively, cylinders cast in pairs, and cooling is done with a honeycomb radiator and gear pump. A Bosch magneto serves in the main, for purposes of ignition, with a storage battery and suitable coil for the rest. Ignition is positive with a mechanical force feed, and the Peerless expansion band form of clutch is continued. All Peerless models are equipped with a selective four-speed transmission, are shaft driven, and the runabout has a wheelbase of 118 1-2 inches, with standard tread, and among other designed features which take on standard characteristics,



The Johnson Service Company uses a plunger oil pump, actuated by an additional cam on the camshaft, whereby a constant level is maintained in the crankcase. The pump is easily removable from below without complication.

PLATE VI.

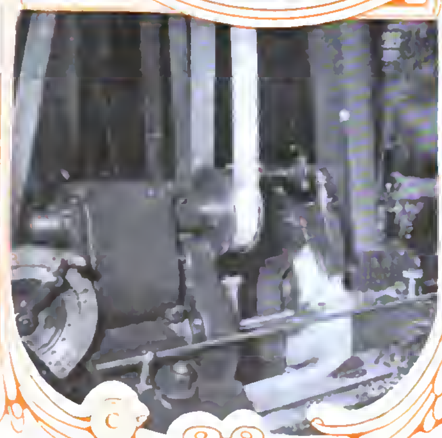
Grinding Methods Obtain



E

A

B



C

D

A—Excelsior method of grinding crankshafts, in which speed and accuracy are definitely aimed at. This is a Landis No. 24 grinder, which is much used in this class of work. In grinding crankshafts it is the practice to allow about 0.010 of an inch to be ground off, and the rough machining work is done at high speed on special low swing lathes, using Novo or other grades of high-speed cutters. The fact that the grinding is done as a final operation enables the lathe man to dig in at a rapid pace, and if the shaft does deform (back away from the tool slightly) in the process of roughing, it makes no difference in the final operation—the work will come off of the grinder properly finished.

B—In the Excelsior plant at Chicago, showing a grinder on piston rings, using a magnetic chuck on a flat plate to hold the rings during the grinding operation.

C—In the Excelsior plant, showing a new type of Landis grinder, working on integral camshafts grinding over the faces of the cams as well as between them on the round of the shaft. This tool is of the greatest advantage in this class of work, and the accuracy of the cams is much nearer than in any other way. The attachment is set up in the grinder centers, and swings away towards the work in conformity with the shape of the cam, a master cam of the required shape being responsible for the travel of the work in its relation to the grinding disc.

D—In the Rambler plant at Kenosha, showing a Besley grinding machine in the process of grinding off the ends of spiral springs, which, in turn, are placed in holes in a fixture which was contrived for the purpose.

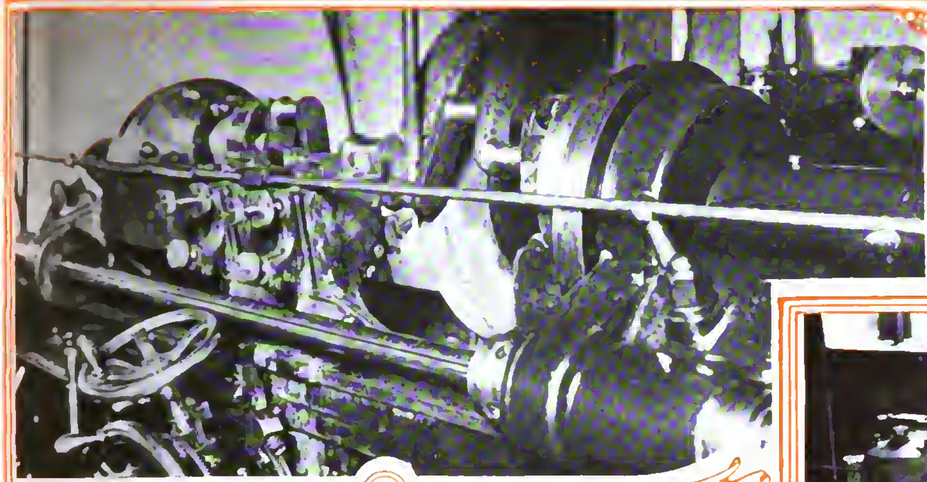
E—In the National plant, grinding the faces of expanding brake shoes.

plain bearings are used in the crankshaft, but ball-bearings obtain for the rest, they being of the annular type. In all Peerless cars the tires are 36 by 4 in. front and 36 by 5 in. rear.

A new little car has just been brought out, which has all of the best features of the larger cars, and a number of little individual characteristics of its own. Thus, the driver, with all control levers is located on the right-hand side.

PENNSYLVANIA HAS VALVES IN CAGES

The illustration which is given of the motor under discussion shows how the valves which are in the heads may be readily removed for inspection and grinding, or they may be ground in place. There are four Pennsylvania models with power plants ranging from 28.9 to 54.1 horsepower, and the larger size is a "Six" with a 4 3-4 by 5 1-2 inches bore and stroke of cylinders respectively, cast in pairs, water-jacketed, cooled by circulation from a gear pump through a cellular-type radiator, and the ignition is by Bosch magneto with a battery auxiliary. The magneto is placed on the left side of the motor back of the gear pump, and the pump in turn takes its power from a gear which meshes with one of the half-time gears. All gears are in a grease-tight housing at the front end of the motor, and the magneto, which is on a shelf extending out from the top half of the crankcase, is flexibly mounted so that it may be removed and inspected without causing annoyance in the act of replacement after inspection, or if repair becomes a necessity. There are many other points of mechanical merit, as the full floating clutch type of rear axle, selective three-speed and reverse transmission gear, with the gears of nickel steel—the spindles float on annular type ball-bearings. This maker is one of the few—the list includes Packard, Glide, Moon, Mora, Otto, Overland, Stearns, Sterling, Watt, Welch, and others—locating the transmission as a unit with the rear axle, the differential case housing the gears and shafts.



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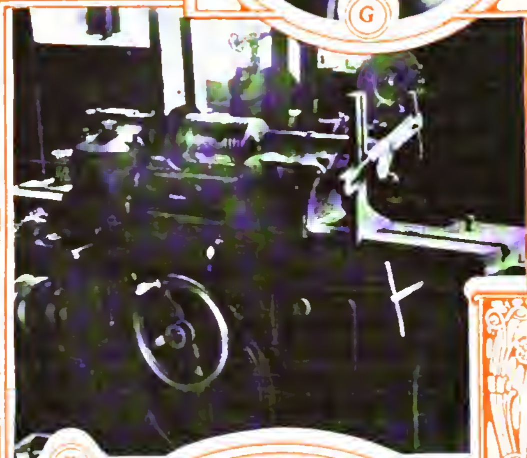


F

F—In the Moon plant, showing a grinder working on pistons to bring them to exact size. Grinding pistons is a special process or operation, which is conducted in the plants which are doing work of the very accurate sort.

G—In the Thomas plant, showing an application of a flat grinder fitted with a magnetic chuck.

H—In the Inter-State plant, showing a grinder on crankshaft work.

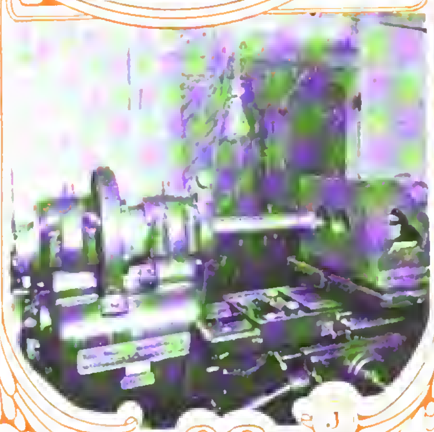
I—In the Metzger plant, showing an application of a surface grinder, facing plates to make the joints tight, and eliminate the use of packing.

J—Heald grinder on cylinder work in the Excelsior plant, showing the cylinder bolted to an angle plate and the grinding disc on the end of a long, tapered spindle, which is eccentric to the bore of the cylinder. The result is very accurate as respects the character of the work, and the time required is much shortened over that of other methods. The method of setting up the cylinders is not the same in the several plants, and, in some cases, a turntable is employed, it offering the advantage of allowing the workman to set-up while the grinder is working.

K—Pratt & Whitney surface grinder in the Excelsior plant finishing (by grinding) plates as used on Excelsior motors, the idea being to make all joints tight by grinding rather than by the use of packing. A magnetic clutch holds the work in place on the platen of the grinder. This grinder is normally available for all classes of surface grinding work and the magnetic chuck is very useful in making quick and accurate adjustments of the work in the setting-up process. In some shops this form of grinder is used for facing off manifolds, and, since the facing is done with great accuracy, it is unnecessary to employ packing under the faces of the manifolds, so made, to maintain tightness.

I

K



J

PIERCE-ARROW STAGES SIX SIXES

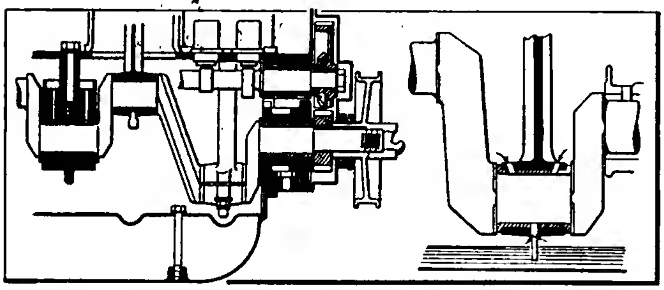
There are two models of the "Thirty-six," as many more of the "Forty-eight," terminating with an equal number of the "Sixty-six." Possibly the runabout "Thirty-six," at $3,850, is the popular type for the man with red blood in his veins, but for real comfort, and touring under pleasurable conditions, a selection from the more pretentious models offers wide possibilities. The runabout "Thirty-six" has six cylinders, 4 by 4 3-4 bore and stroke respectively; they are cast in pairs, and a honeycomb radiator, aided by a centrifugal pump, is responsible for the cooling. Ignition is by Bosch magneto, with a storage battery and suitable coil auxiliary, while lubrication is on a most ambitious basis, as illustrated elsewhere in this paper. All Pierce models are shaft-driven, and the runabout model under discussion has a wheelbase of 119 inches, with a tread of 55 inches, pressed steel frame, plain bearings in the motor, Timken roller-bearings in the road wheels, and annular type ball-bearings elsewhere. The tires on this model are 36 by 4 all around, in fact, this maker is addicted to very large tires, which will be found on all models, regardless of power.

POPE-HARTFORD OF MANY UNEXCELLED FEATURES

Model T sells for $2,750, has an A. L. A. M. rating of 29.7 horsepower, and is built for touring. The power plant includes a four-cylinder motor with cylinders 4 5-16 by 5 1-8-inch bore and stroke respectively, cast in pairs, water jackets integral, and cooling is accomplished through circulation by a centrifugal pump, feeding a characteristic type of Pope-Hartford radiator. Ignition is by Bosch magneto, with a storage battery and coil as supernumerary, and lubrication is positive through the good office of a pump. The cone clutch is of such excellent design that flywheel effect is eliminated and strength obtains to an adequate extent. Speed changes are depended upon primarily, due to the excellent flexibility of the motor, and then, by suitable manipulation of a three-speed selective type transmission gear, with reverse of course. The I-section frame of special steel is shaped to sustain under the conditions imposed, taking into account a 118-inch wheelbase, and a tread of 56 inches. The motor has three plain bearings and for the rest roller-bearings are used, and an illustration, which is afforded, will show how thoroughly well the straight line·idea in designing obtains throughout the cars of this make.

FOURS ONLY FROM YORK PULLMAN FACTORY

Four four-cylinder models will comprise the entire output of the Pullman factory at York, Pa. These are styled O, K and M, selling at $1,650, $2,000 and $3,500 respectively. There is another newer model also a four, which sells at $3,000. The motor on the lowest priced of the lot is of 4-in. bore and 5-in. stroke, while that of Model K is larger, being 4 1-2 by 4 3-4, a larger bore but a shorter stroke. The newer model has a still more powerful engine, the dimensions of which are 5 by 5 1-4, a still shorter stroke relative to the bore. In the highest-priced car, Model M, a 45-horsepower engine is utilized, the sizes of which are 5 1-4 by 6, which is again a long stroke as compared with the bore. In all of these models, the cylinders are cast individually, the ends being given up to a very large core opening. The ends, too, are flanged and these flanges are finished so as to bolt up close to one another. When set into place, each cylinder thus is bolted fast to the one on either side, making the whole as a block casting, yet insuring clean, accurate castings

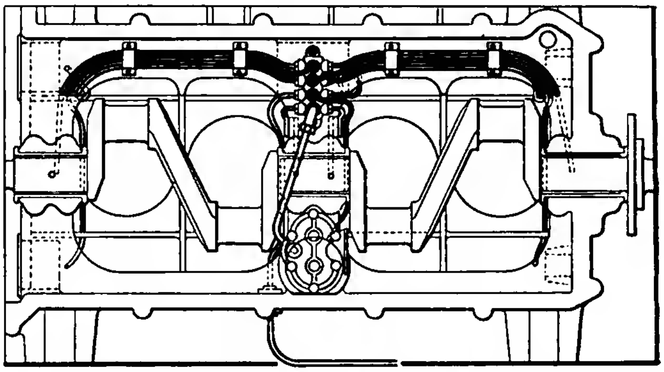


Inter-State uses flattened scoops on the caps of the connecting rod big ends to secure for these their supply of oil; National, as shown on the right, has in addition two oil holes drilled through on the upper side.

and no trouble with cores. The water—circulated by centrifugal pump—passes in at the rear core plate, thence around the last cylinder, into the third through the very large opening at the end of the cylinder casting, and then on through the other two cylinders in a similar manner, to the front, where it passes up and out to the cellular radiator. All models have standard tread, the wheelbases increasing with the power and price as follows: 108 in., 112 in., 110 in. and 124 in. Engine bearings are five in number, one between each pair of cylinders and one at each end, and of the plain type. All transmissions run on balls, while for the axle, rollers are used exclusively. Weight, always an important question, has been well cared for and properly proportioned. The weights vary upward thus: 25.6-horsepower touring, 1,800 pounds; 32.4-horsepower touring, 2,400 pounds; 40.0-horsepower roadster, 2,600 pounds; and 44.1-horsepower seven-passenger touring, 3,500 pounds.

THREE BIG-VALUE RAMBLERS FOR 1910

Figures have been utilized to designate the three models, which the immense Kenosha factory will produce in large quantities during the present season, these being Models Fifty-three, Fifty-four and Fifty-five. Of the three, the last-named, Fifty-five, is the big car. This is rated at 45 horsepower and has a three-speed transmission, operating selectively, of course. It is a big roomy touring car, seating seven comfortably. The selling

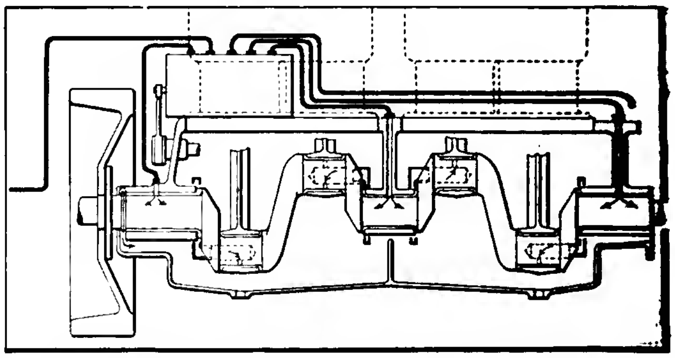


On the Stoddard-Dayton the oil is distributed through individual pipes from a manifold in the middle of the case; the pipes are accessible for inspection on removing the lower half of the crank-case, which may be done readily and quickly.

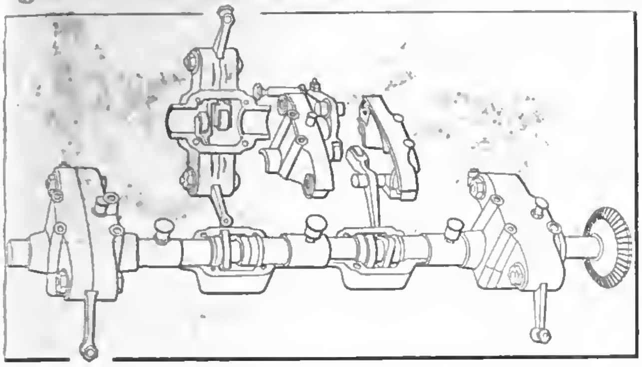
price is $2,500, at which figure is included magneto of the high-tension type and from a reputable factory, full set of five lamps, gas tank for the headlights, and tool box containing a set of tools. This, it will be remembered, is one of the Rambler cars which carry the spare wheel with fully inflated tire on the right-hand side, handy to the driver. The running board is notched to let the lower part of the spare wheel rest in it, thus saving space, and insuring a tight hold on the wheel. In case of tire trouble, punctures, or any simiuar emergency, it is a matter of but a few moments' work to remove the defective member, substitute the extra one, and go on one's way.

REGAL A WELL-KNOWN THIRTY HORSEPOWER CAR

This make is delivered in three models, B, F and E. The price is $1,250, and the rating is (A. L. A. M.) 30 horsepower. Model B is a runabout; F is a touring car, and E is a baby tonneau. The power plant is common to all and comprises a motor of the water-cooled 4-cylinder type, using a patented thermo-siphon system, and the cylinder dimensions are 4 by 4 inches. The cylinders are cast in parts, ignition is by Remy magneto, with a coil and battery as auxiliary. Lubrication is by regulated splash, bearings for the crankshaft are a special grade of white metal, and the method of scraping in and inspection is thoroughly good in every way. The clutch is of the cone type, and the transmission gear is a three-speed (with reverse) selective, placed on the chassis frame in a mid-position. Two universal joints are placed in the propeller system which lead to the live rear axle, and Hyatt nickel steel roller bearings are used at all important points, including a special bearing which is placed at the axis of the universal joint on the end of the shaft tube to resist the loading at that point and relieve the clutch mechanism of any but its normal work. The weight of the car is 2,000 pounds, body work is of steel on stout, well ironed, wood framing and special



Pennsylvania retains the time-tried individual pump system; in this case the feeds are to each of three crankshaft bearings, from which the big ends are supplied, another to the timing gears and a fifth to the gearcase.

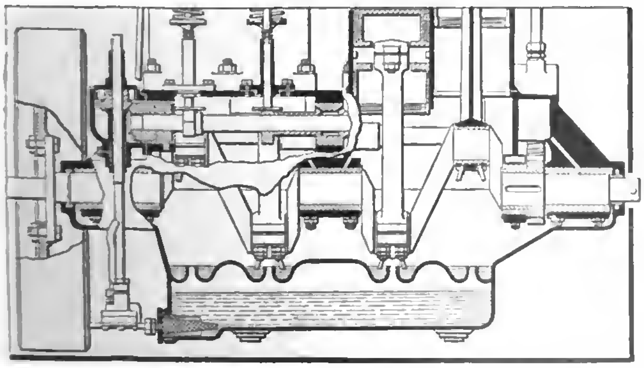


Overhead valve systems are hard to lubricate properly, but in the Jackson the problem has been satisfactorily solved. The parts are completely inclosed from dust, and oil and grease cups are liberally employed.

means is provided to eliminate noise in the body work as well as in the machinery. The tires used are 32 by 3 1-2-in. pneumatics front and rear, and the earmarks of skilled designing is to be seen at every point. Made by the Regal Motor Car Company, Detroit.

CONCENTRATION THE ROYAL TOURIST KEYNOTE

The new Model M will occupy the attention of the entire factory of the Royal Tourist Car Company, this year, being the only car put out. This has a four-cylinder, water-cooled, fourcycle engine of large size. The cylinder bore is 5 1-2 in., and the stroke, 6 in. This gives an unusual power output, although rated at but 48.4 horsepower by the usual formula. At to detail, the cylinders are cast in pairs, with valves on opposite sides. Those for the inlet are placed on the left, as is also the Bosch high-tension magneto. To the right are to be found the exhaust valves and pipe, as well as the gear-driven pump. For varying the speed of the car, four forward speeds are provided in the transmission, these operating selectively. The transmission has a mid-location, and drives to the rear axle through a very slightly inclined shaft. Motor reactions are well cared for in the bridge-constructed torque rod, while the alignment of the rear axle is maintained by means of distance rods, stout dropforgings. Brakes are unusually large and efficient, five in number, and assisted by sprags, which are attached directly to the rear brake drums, so that it is impossible to back down a hill when the sprag is in use. The wheelbase is very long, 126 in., while the springs, too, have good length. Moreover, the latter are of alloy steel, selected for this purpose. The front springs are short and very flat, while in the rear, a platform type of suspension is used. The 12-spoke front wheels are 36 in. in diameter and carry 4 1-2-in. tires, while the 14-spoke rears are of the same size, but carry 5-in. tires. The price varies with the body, being $4,500 for the touring, close-coupled cars, and roadster, $5,700 for the limousine, and $5,900 for the landaulet.



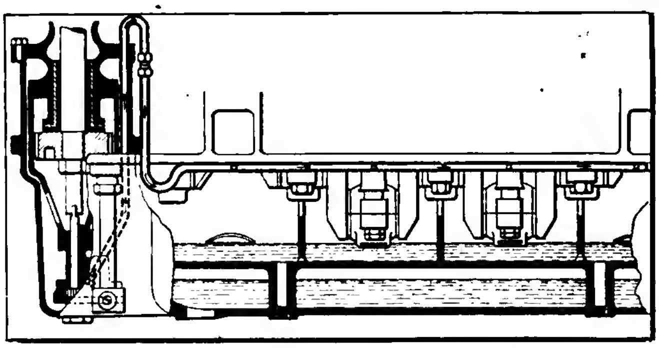
The circulating pump system of lubrication is used by Haynes, with an unusually large reservoir in the crankcase base. Each big end has its individual oil trough with overflow hole to prevent an excess of lubricant.

TWO MODELS--TWO CHASSIS FROM FATHER SELDEN

In the modest-priced class, are to be found two models, of which "The Father of Them All" is justly proud. These are the two Selden products, known as Models 35 and 29. Just as one would think, the higher numbered model has the higher powered engine, but the lower price. The former is rated at 36.1 horsepower with four 4 3-4 by 5-in. cylinders. The latter, on the other hand, has a similar number of cylinders measuring but 4 1-4 by 4 1-2 in. Both engine cylinders are cast in pairs, cooled by water circulated by centrifugal pump, ignited by storage battery with magneto as an extra, lubricated by splash and an oil pump, each utilizes a cone clutch, a three-speed selective gear set located on the main frame midway between engine and rear axle, shaft drive, pressed steel frame, plain bearing engine and roller-bearing transmission and axles. The higher-priced car is Model 29 at $3,000 for a six-passenger limousine. This has a 114-in. wheelbase, standard tread, and 34-in. wheels, with 3 1-2-in. front and 4-in. rear tires. The price of Model 35 is $2,000 for a five-passenger body. The wheelbase is 116 in. and the tires are the same as the larger model. The weight of Model 35 is given as 2,650 pounds.

STEARNS IS MADE IN FOUR DIFFERENT MODELS

In the Stearns line of automobiles the range is between $3,200 for the Model 15-30 and $6,500 for the Model 45-90. The 15-30

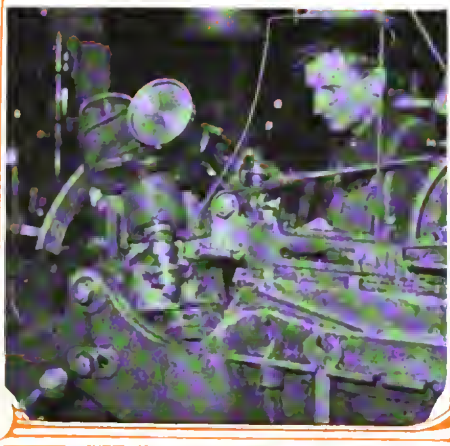


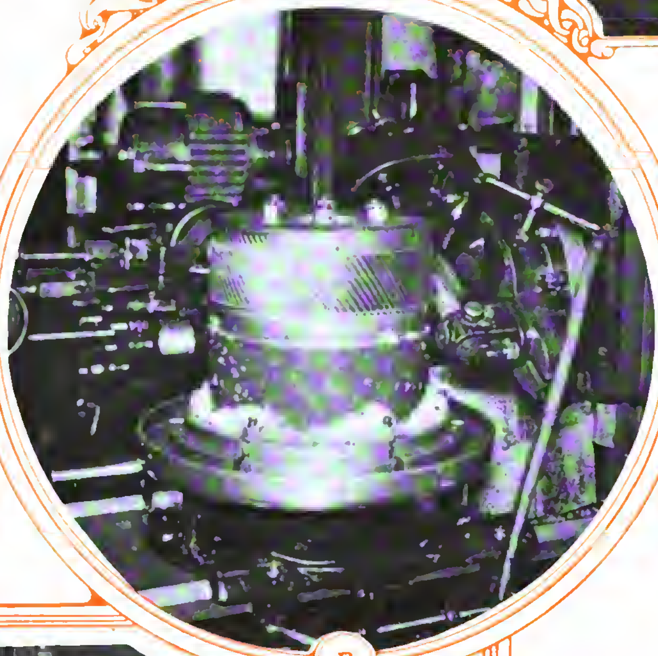
Rutenber motors, which are used on many well known cars, rely for lubrication on the splash from the connecting rods; the compartments are kept filled by a gear pump driven by a vertical shaft from the camshaft.

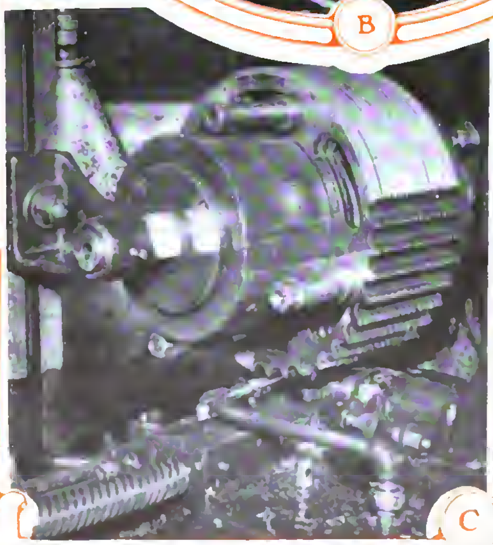
has an A. L. A. M. rating of the motor of 32.4 horsepower, is built for touring and seats five, and the power plant is a four-cylinder type, the bore and stroke being 4 1-2 by 4 5-8 inches, with the cylinders cast in pairs, placed vertically in the conventional way. Ignition is by a Bosch high-tension magneto, with a dry cell and coil auxiliary; lubrication is positive with a pump, and a multiple disc clutch serves to regulate the power control between the motor and the three-speed selective transmission gear, while the axle, which was previously illustrated in The Automobile, is of a special I-section with two branches mounting the gear system in the bow thus formed. The wheelbase is 116 inches, with a 56 1-2-inch tread; ball bearings of liberal sizes are used at every point, and the weight of the car is 2,650 pounds, supported by 34 by 4-inch tires on all road wheels. The character of the work as it will be found in Stearns cars involves the use of alloy steel to a very considerable extent, and selected grades of "special heat" carbon steel are employed in such parts as experience dictates. The springs upon which the chassis frame suspends are, with wide plates, made of alloy steel, and eyes at every point are reamed, bushed, and provided with grease cups. As a further indication of the character of the Stearns work, reference may be had to the transmission elsewhere in this article.

PLATE VII.

How Gears are Fashioned







A—Bilgram bevel gear shaper cutting teeth on a differential gear. This type of tool was utilized in many plants for the purpose of making accurate bevel drives and free working differentials. This photograph was taken in the Woods plant.

B—In the Woods plant, showing a German system of hobbing gears, the particular example being that of the spiral gear as used in the transmission system on Woods Electrics.

C—Showing sprockets being cut on a Gould & Eberhardt automatic gear cutter. This is another example from the Woods plant, and indicates the method by which a gang of sprockets are cut simultaneously.

D—This is another example from the Woods plant, and illustrates a La Pointe broacher, which is used in many shops for broaching square holes in gears, sprockets, and other transmission parts.

E—Excelsior motor in the process of having the half-time gears assembled.

FOURS AND SIXES IN STEVENS-DURYEA LIST

These well-known advocates of the three-point suspension as a sure cure for all automobile ills will turn out just two models in four cylinders and two in six cylinders. These are Models XXX and X, fours, and Models AA and Y, sixes. The first has a 4 3-4-in. bore but a short stroke of only 4 1-2. The same engine is used in Model X, also. This has the cylinders cast in pairs, as do also the larger engines. On Model XXX, the wheelbase is 109 in. and on Model X it is 124 in. The former, called a 36.1 horsepower unit, is regularly equipped with a three-passenger body, and in that form sells at $2,850. The same price covers Model X, which is had with a five-passenger touring body. Large wheels are used on both, in fact, on all models, those on the two larger types being 36 by 4 1-2 in. all around on Model AA, and 36 by 4 front and 36 by 5 rear on Model Y. The last is powered with a six-cylinder engine 4 3-4 by 4 1-2, rated at 54.1 horsepower, and has a 142-in. wheelbase for a seven-passenger touring body, in which shape it sells at $4,000. The only other model not described is AA, which has a six-cylinder engine with a bore of 4 1-4 in. and a stroke of 4 3-4 in., the only engine built by this firm not having a "short" stroke. This is rated at 43.8 horsepower, and the chassis when fitted with a five-passenger body sells at $3,300. It has a 128-in. wheelbase. On all models engine bearings are plain, transmission bearings ball, while axles run on balls also. All four models have a progressive gear box giving three forward speeds, this form of a gear having been used by this company continuously. The driving shaft of these cars presents much of worth, in that it is a continuous series of tapered squares and squared holes.

I

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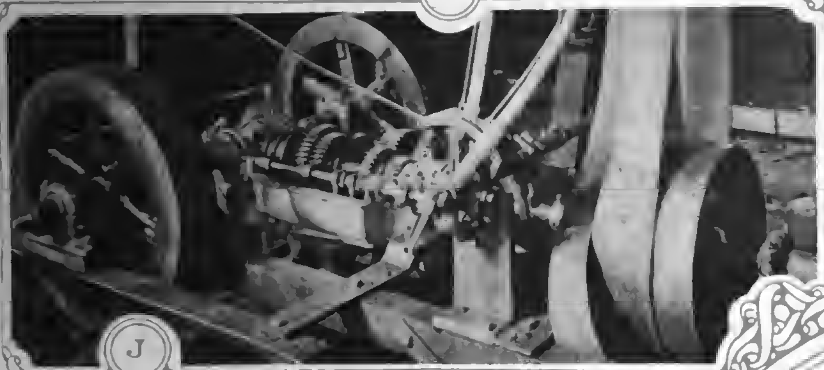

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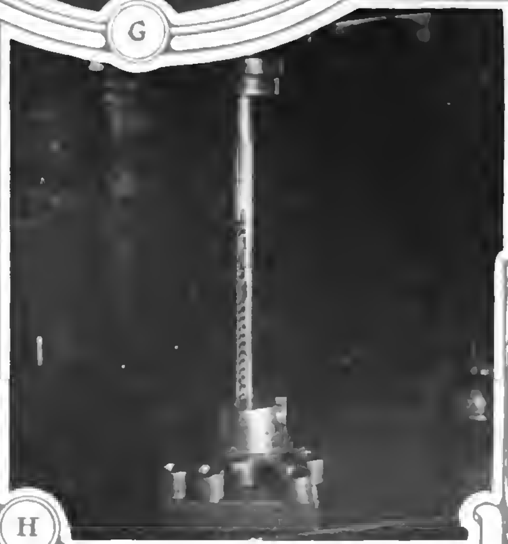


H

F—Hill Clark hobbing machine working on half-time gears as used on Excelsior motors.

G—A battery of gear cutters at work in the Rambler plant. In addition to the tools shown the Rambler plant is fitted out to handle the entire situation from the drop forging of the gear blanks to the gashing, planing, hardening, etc., the equipment being the most modern in all respects, including special measuring instruments which enable the inspectors to come close to the mark.

H—In the Premier plant, showing a special splining tool which is used for fashioning keyways.

I—Woods Electric transmission system, showing differential gears, one of the two sprocket pinions, tumbleshaft, and universal joints.

J—In the Thomas works, testing a transmission gear set on a special machine which was devised for the purpose of loading the gears to the maximum safe limit, permitting of the adjustment for the purpose of eliminating noise.

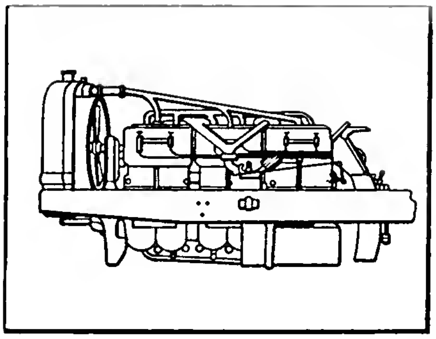
WARREN-DETROIT IS MADE IN TWO TYPES

Model 10-A is a roadster, and Model 10-B is a demi-tonneau. Excepting as to body work, tires and weight, both models will answer to common specifications. The weights, as given by the maker, are 2,000 and 2,100 pounds for the roadster and demi-tonneau respectively. The motor is rated at 26 horsepower, is a 4-cylinder, 4-cycle, water-cooled (*en bloc*) type with a bore of 4 in. and a stroke of 4 1-2 in. A vertical tube radiator is used in the cooling system and a centrifugal pump for water circulation. Ignition is by a Volta magneto, assisted by a battery and coil. In the lubrication system a self-contained pump is utilized and auxiliary splash aids in the process. A cone clutch takes the torsion of the motor and hands it to a unit three-speed (and reverse) selective sliding-gear system located just back of the motor. The drive is continued through a shaft with a single universal joint. The live rear axle is fitted with roller bearings and 32 by 3 1-2-in. pneumatic tires are used on all four wheels. The wheelbase is 110 in., tread is 56 in. and a channel section frame is the foundation for the body work. Excepting for the anti-friction bearings which take the work at all points of greatest friction, the remaining journals revolve in Parson's white metal; this metal is also used in crankshaft brasses.

It will be noticed in the detailed specifications of this car, as in the case of many other newcomers, that the features adopted are much alike. Thus, this car has a block motor, a comparatively long stroke, and self-contained lubrication. All these are featured which have been much discussed in the last year, the discussion ending with their final and universal adoption, as proof of their inherent worth.

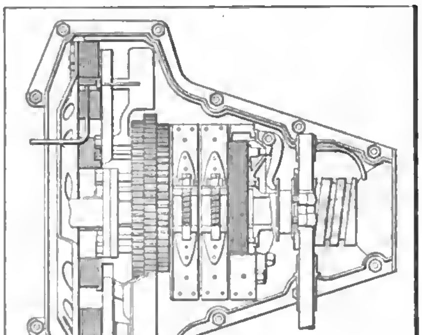
WHITE LIST EQUALLY DIVIDED--STEAM AND GASOLINE

In addition to the well-known White steamer, which is made in two models, this firm will this year make two models of gasoline cars, all four of which will be exhibited at the Chicago Show. The steamers are called O-O and M-M, while the gasoline cars will bear the alphabetical designations of G-A and G-B. The steamers are respectively a five-passenger touring model of two



View of the Winton six-cylinder, 48 horsepower motor from the left shows the position of the carbureter and the Y-shaped pipes leading therefrom across the cylinder heads to the inlet manifold on the right-hand side. The piping shown, leading to check valves on each cylinder, is for the compressed air starting device, an exclusive Winton feature which allows the crank to be carried in the tool box.

compound cylinders, double acting, and sized 2 1-2 and 4 1-4 by 3-in. stroke, and a seven-passenger, two-cylinder, double-acting compound of 3 and 5-in. bore by 4 1-2-in. stroke. The former rates at 20 horsepower and the latter at 40. Both models use the Joy type of valve gear, both have the engine located in front under the bonnet, and both utilize a flash boiler in connection with a condenser. Both models agree on the transmission, which is of the sliding type with two forward speeds, driving the rear axle by shaft, the latter having two universal joints. Engine, transmission and axles all turn on ball bearings. Turning now to the gasoline cars, these are alike with the exception of the wheelbase and the body, as well as the price. G-A has a 110-in. wheelbase and a five-passenger touring body to sell at $2,000, while

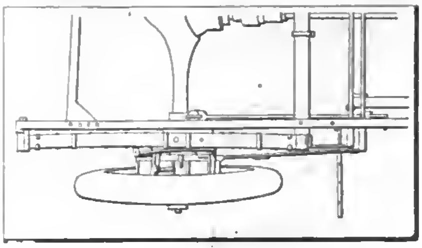


Planetary change-gear and flywheel magneto used on the Ford model T. The magneto has no commutator or brushes, no gearings, no contact points. The rotating member is a part of the flywheel. The coils in which the current is generated corresponding to the armature of an ordinary magneto, are stationary and are enclosed in the flywheel casing. The magnets, on the other hand, are on the flywheel and revolve. The electrical principle is the same, only requiring that the magnetic lines of force be cut by the armature coils.

G-B has a 120-in. wheelbase and a more roomy five-passenger body, selling at $2,500. The motor in each case is a four-cylinder unit, of 3 3-4-in. bore and a very long stroke of 5 1-8. Cylinders are cast in a block, cooling is by water, centrifugal pump circulated, ignition by Bosch magneto only, cone clutch, four-speed selective transmission rolling on ball bearings, as do also the two axles. The engine bearings, too, are ball. Other details follow standard gasoline engine practice. The power rating of this size engine is 22.5 horsepower.

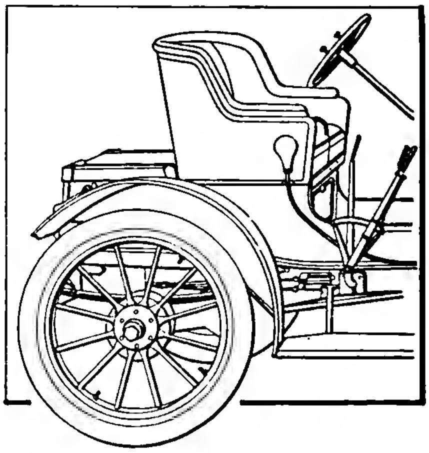
WINTON'S MODELS SIXES AND SIXES ONLY

Unless you want a six-cylinder car, you cannot have a new Winton, for the output of the Cleveland factory will be confined to a limited number of this type, in two differing powers, however. These two, both of which will be shown at the Chicago



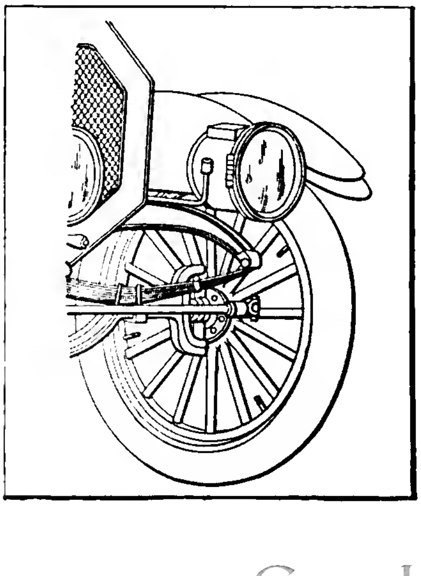
Unusual form of platform spring suspension used on the Pullman. From the external appearance of the car no one would suspect the existence of the platform spring, which is at the forward ends of the side springs, instead of at their rear ends. This makes a very neat construction.

Show, are known as Models 48 and 60, after the rated power of their engines. Except for engine sizes, wheelbase and tire sizes, the two models are nearly identical, barring, of course, the slight changes in sizes of shafts, etc., necessary to take care of the additional power to be transmitted in one case. The 48 has cylinders 4 1-2 by 5, while the large car is powered with an engine of 5-in. bore and stroke, respectively. The smaller car has a wheelbase of 124 in., which becomes 130 in. on the other. Tire equipment in one case is 34 by 4 front and 34 by 4 1-2 rear,

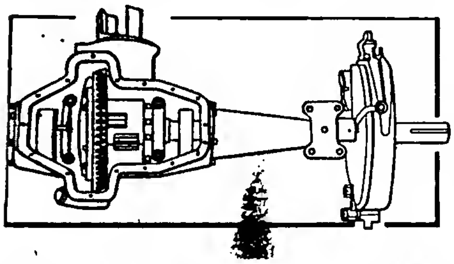


Neat body work of the new Mora 20-horsepower runabout. The large wheels and the deep seats give a comfortable appearance, and the trunk on the rear shows that thought has been given to the passengers' comfort in other ways. The car was designed to meet the requirements of the discriminating buyer who desires a small car built on smart and up-to-date lines. Control is by the standard levers, operating internal expanding brakes on the rear wheels and a two-speed progressive sliding transmission. Spark and throttle levers are on top of the steering wheel.

with option of 36 by 4 all, and 36 by 4 1-2 all in the other. Cylinders are cast in pairs, with all valves on the right-hand side, and all enclosed. The carbureter is placed on the left, and piped across to the right side, while the magneto and centrifugal water pump are both conveniently located on this same side, the right. The crankshaft is offset, and supported by four plain bearings. As always, the crankcase is split vertically along the center line, instead of the more usual horizontal split. A feature of which the makers make much, and which is worthy of close examination, is that of the self-starting device. This consists of a collector tank, which collects and stores gas under pressure from



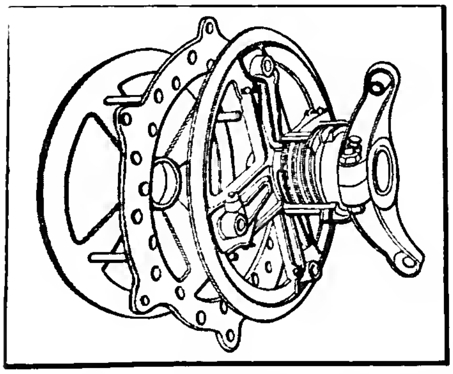
Large wheels are becoming more and more popular, even on low-priced cars, for which it was formerly claimed that the cost of large diameter tires was prohibitive. The illustration shows a 27.2-horsepower McIntyre, which sells for $1,250. All four wheels on this car are shod with 36 by 3½ inch pneumatics. The wheels themselves are unusually robust, having sixteen spokes instead of ten or twelve. The steering knuckles are arranged to bring the center of the knuckle as near as possible above the point of contact of the wheel with the ground, to facilitate steering; this is a feature which has been much neglected of late.


Peerless rear axle construction, showing means for allowing the camber of the rear wheels. The floating live shafts do not slip into the differential, but connect with universal joints, one on either side of the differential. Thus it is possible to incline them downwards.

cylinders one and six, during the power stroke. This is piped back to the whole six cylinders through a rotating distributor and a starting valve on the dashboard. When it is desired to start the car, pressing the starting button allows the gas access to the distributor, which permits it to flow into the cylinder, which is in the starting position. The gas drives this piston down and tbe engine starts with no manual effort by the driver.

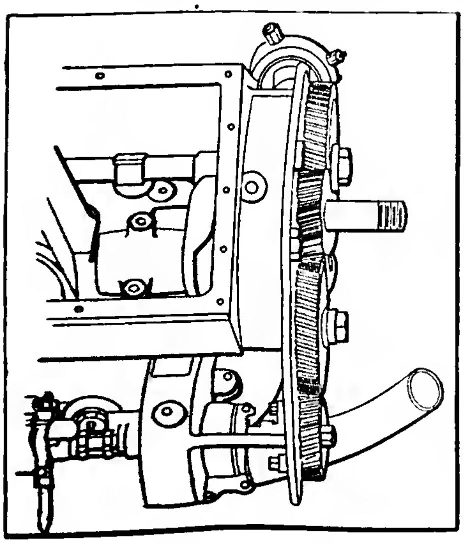
MANY REFINEMENTS MUST BE LOOKED FOR

Curiosity, while it is at the bottom of many discoveries, will be beset by difficulties in its migration through the automobiles of the year, before it will be in a position to measure up

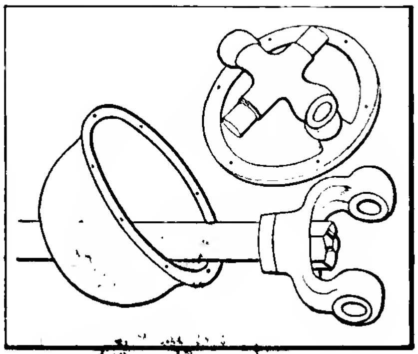

Three-plate clutch used by the Midland. The middle disc does the driving; it is mounted on studs on the rear edge of the flywheel, being made of phosphor bronze and fitted wtih cork inserts. The other two discs are of steel, floating on roller bearings on an extension of the crankshaft. They are forced into engagement with the central discs by spring pressure, applied by the medium of toggle levers. The clutch is easily adjustable and is smooth in action.

divers of the refinements which actually do obtain and which are important to the well-being of the designer, the maker, and the ultimate consumer or user.

Metallurgy, while it has done much for all industries in which steel plays an important part, was a sleeping giant before the coming of the automobile, and four or five years ago the engineers who struggled with the rickety machines which then passed currency for cars, were much perturbed when the parts after being laboriously processed, went asunder within a hundred


View from beneath of the forward portion of the Inter-State crankcase with the lower cover removed, showing the spiral timing gears. The crankshaft actuates the camshaft on one side, from which the timer shaft is in turn driven by bevel gears; on the other side the crankshaft drives the pump and magneto, which are both on the same shaft, through the medium of an idler pinion. The spiral gears are cut with little more difficulty than the ordinary spur type, and are noiseless in operation, owing to the sliding nature of the contact of their teeth. In a construction such as this they balance their own end thrust and so require no special bearing construction.

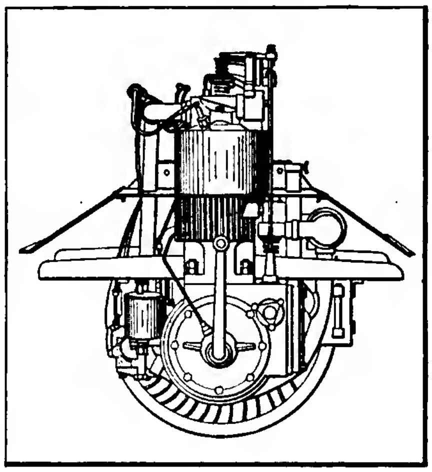
miles from home. In the haunts of steel, when the question of the kinetic qualities of materials was broached, the barefaced vendors declined absolutely to consider any further increase in quality unless as a matter of petty routine, under which conditions, should there be a sufficient incentive, a more


One end of the propeller shaft of the Palmer-Singer, showing the cross type of universal joint and its cover. The yoke on shaft end, the cross, the back plate, and the back plate studs which are shown holding the cross are all steel drop-forgings, the material being a chrome nickel alloy. This type of axle is ordinarily believed to require the services of a radius rod or rods and a torsion rod, which are in this case provided with much care.

promising product might be delivered, but it was pretty generally understood that there was to be no question about the additional price, the addition being very considerable.

Automobile engineers, not being satisfied with the life, considering service, of the materials which they were able to procure, delved deep into the lore of the subject, worked long and faithfully in the laboratory, argued the points with the fabricators of steel, and convinced them in the long run that what they were furnishing was as junk in comparison with the character of steel which would have to be put into automobiles, in order that they would operate sufficiently long to pay for oats.

Makers of cars are now in a position to get everything they require by way of steel, at prices which are consistent with quality, and the facilities available for fashioning parts are on a plane which is beyond the dream of the most advanced forge


Novel air-cooling system brought out by the Franklin, to insure equal cooling of each cylinder. The view shows the front end of the motor, with a section through the sheet metal hood which encloses all of the motor except the tops of the cylinders. The cylinders are shown with their sheet-metal jackets on the portions projecting above the hood; beneath this the cooling flanges, which run longitudinally, are visible. The regular Franklin concentric valves, which are continued for this year, may be discerned in the cylinder heads, and at the back is the suction-fan flywheel of a familiar type.

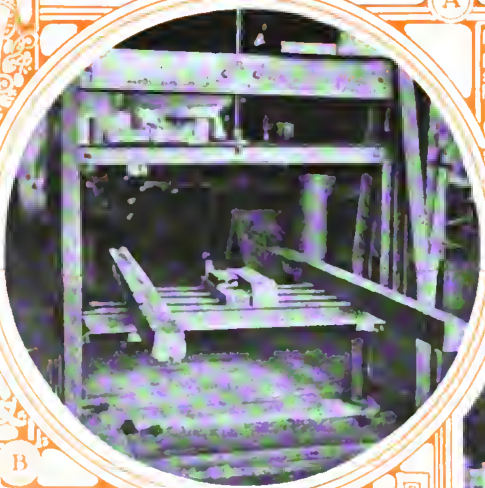
masters of even two or three years ago. One of the process illustrations, as given in this edition, shows a one hundred ton press, cold pressing a side bar of the most intricate shape, using alloy steel, and the operation is completed within a few minutes time, whereas in some of the earlier productions of side bars for cars, it took seven men with beatles and clamps nearly five hours to produce a single frame.

There is more in quality than will be found in the raw material which may be delivered at a plant. If the process demands several reheatings of the steel, each one of the ope[illegible] tions offers dangers, and the chances are, even with [illegible] greatest skill, that a goodly percentage of the [illegible] damaged beyond repair, under such conditions

PLATE VIII.

Machine Methods of Upholstering

A



B

C

D

E

A—Preparing the work for the press, which requires the adjustment of the holes in the material to match up.

B—Is a view of the press, which will be observed in operation in view D.

C—Shows the upholstered back and sides of a Woods Electric.

D—In the press in operation with the cushion being formed between the top and follow board.

E—Upholstering department in the Pierce-Arrow plant, showing disposition of men, stock and work.

can be raised to a definite temperature in a furnace suitably contrived, and if a pyrometer tells just what the temperature is, danger will be a remote contingency if only the press is large enough, and the entire operation can be performed without any reheating at all.

True, when a part is finished, either by pressing or in the forge, it is necessary to correct the structure, which is a matter of annealing under simple conditions, heating, quenching, and tempering under other conditions, varying the operations to suit the qualities of the materials employed and the work to be done. The plants of to-day include these facilities, they are on a basis of certainty, and they are definitely contrived for the very work which has to be performed, so that the results are equally definite, and compromise measures receive but scant, if any consideration.

Castings are now reduced to their legitimate zone of activity; they are no longer used as a substitute for forgings merely because casting methods are lower in point of first cost. This question of overhead charges is reduced to the infinitesimal increment when a large number of automobiles are built under a single roof, and the mere fact that patterns in wood may be cheaper than dies in steel, does not have to be taken into account. These castings, as they are used in the automobiles of the present time, are reduced to the level as follows:

(A) Gray iron for cylinders, pistons, crankcases, flywheels, and gearcases.

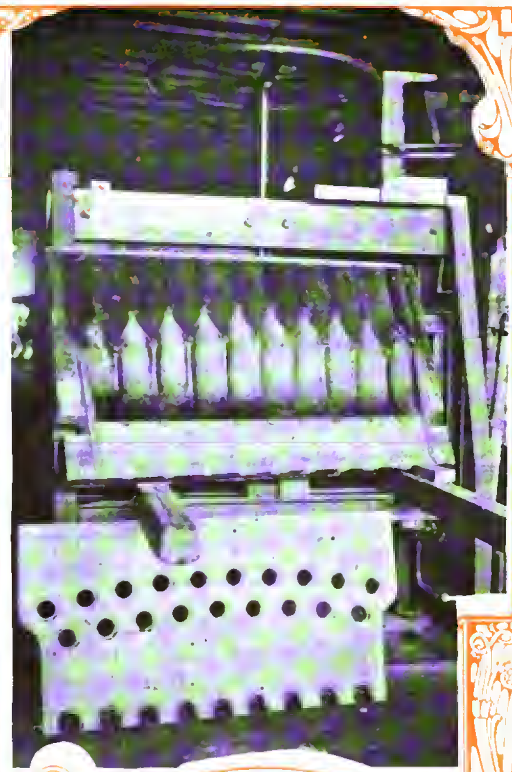
(B) Aluminum for crankcases, gearcases, and control housings.

(C) Steel castings for brackets, brake drums, clutch members, etc.

Cylinder castings, while it is admitted that they were parts which gave serious difficulties for several years, are now so readily made in many foundries, that, with just a little care, there is almost no reason why defective castings should be found in any motor. In some of the finer examples of cylinder work, castings partake of the characteristics which are not uncommon to semi-steel, and the grain is so close that under hydrostatic test of 500 pounds per square inch "spraying" is an unlooked-for contingency. This is a condition which is very different from some of the former practices, in which if a hydrostatic test was the venture none had the hardihood to extend it beyond 100 pounds per square inch as the absolute limit, and if some of the foundries were able to enforce their way at that time, it is almost certain that they would have preferred to eliminate the hydrostatic test.

This year many of the makers of cars, having tried out both aluminum and gray iron for crank and transmission cases, have evidently reached the conclusion that gray iron, all things considered, is the preferable metal to employ. There is no gain-

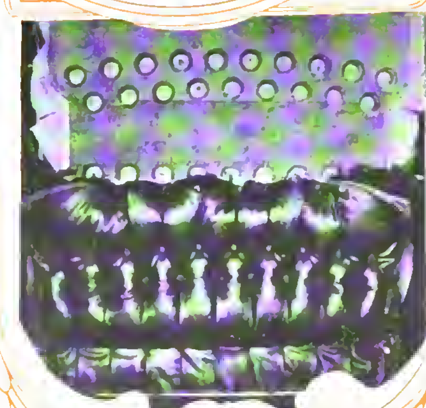
I



F

G

J



H

F—How the work looks on the side opposite to that shown in view E.

G—Picker in the process of preparing the hair before it is definitely weighed out for use in the cushions, backs and sides.

H—An intermediate condition in the tufting process.

I—Creasing the leather which is placed over a form, and the operator with a special tool traces the configuration in the manner as shown.

J—After the hair is in place, and before the follow board is adjusted in position.

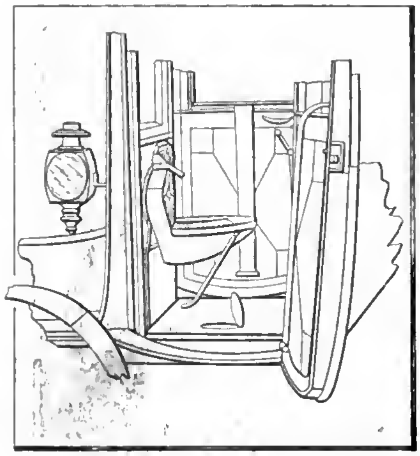
saying the fact that the gray iron is considerably heavier than the aluminum, but it is also a certainty to proclaim that it is as much stronger as it is heavier, hence the designer, if he takes advantage of his opportunity may realize a distinct advantage by employing the gray iron in many of the examples, at any rate. That this change is one of the distinct characteristics of the year, and that it has been carried to unusual length is a matter which will be readily ascertained by closely inspecting the automobiles as they will appear in the National Show.

Crankshaft work is now not only good, but the price has been sufficiently reduced by perfecting the process, so that the "toughhard" crankshafts in alloy steel do not now have to be slabbed out, and that there is a gain in favor of drop forgings, is one of the points to be made. Likewise, when reference is made to camshafts, they will stand the light of critical inspection, and it will be found that they are much improved in many ways. The new method of grinding the hardened camshafts, takes into account the presence of integral cams, and in addition to the great accuracy which is obtained, speed is so much increased that there is almost no difference in the time required between grinding a shaft when the process is impeded by the presence of cams, and grinding a round shaft of the same length.

Grinding processes have been brought into the greatest prominence, primarily, because some of the materials now used are so nearly glass-hard that they beat the cutters of ordinary characteristics, and are only managed when resort is had to high tungsten steel for the cutters, provided the work is carefully annealed. It is undoubtedly advantageous to be able to use the harder grade of steel; its kinetic qualities are on a superior basis, and the grinder is so thoroughly capable, that if there is any difference at all, it works the better if the steel is relatively hard.

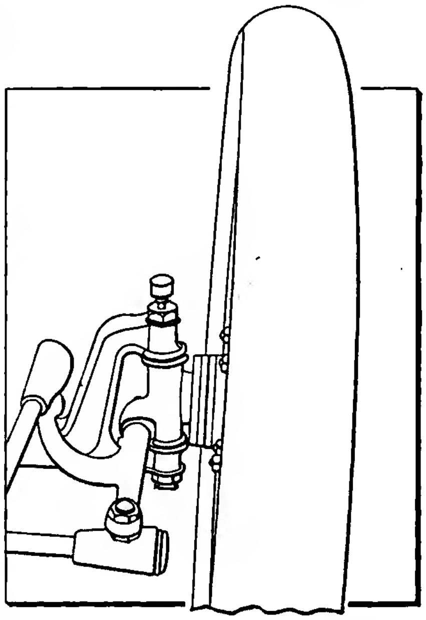
Noise, which once was looked upon as a necessary evil, is entirely absent in many cars, and as the merest suspicion in a very few. The quality of an automobile is measured to-day partly by its road work, but to a very considerable extent by its noiseless performance. Autoists instinctively reach the conclusion that beyond its disagreeable aspect, it represents undue wear, and instinct, in this case, seems to be as near right as anything can be. Noise, if it represents anything, is due to vibration, and metallurgists have long ago reached the conclusion that the life of steel oozes out in direct proportion to the vibrations, considering given fiber strain, so that the absence of noise, unless it is due to a muffling process, counts the favorable condition which comes from aborting vibration.

To some extent, noise is muffled, and it is very likely that this muffling process is one which is favorable to the life of the



View of the interior of a Rauch and Lang electric coupé, showing the small folding seat in the front, which may be utilized in an emergency. This is not a skimped seat, but of full width and depth. The car is essentially one for but two or three people, whichever the rear seat will accommodate, but it is often necessary to carry another. In just such an emergency the little refinements like this, found only on the best cars, are appreciated at their full worth. Not only are the enclosed cars the source of much thought, but equally as much gray matter is expended upon the victoria, brougham, and other open cars.

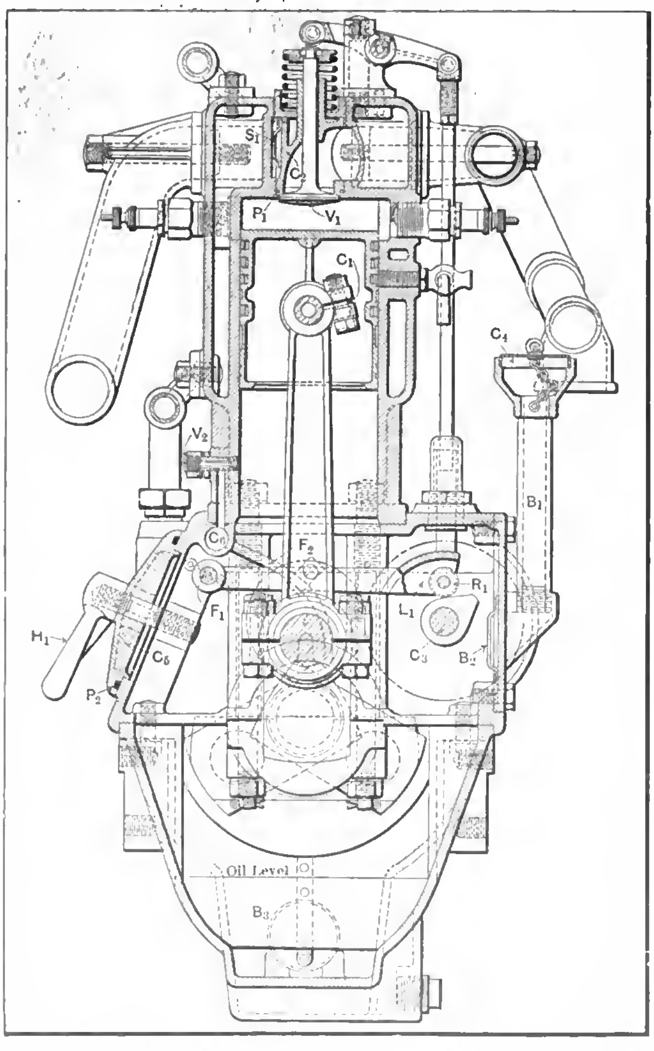
Steering pivot, connecting link, and end of cross connecting rod on the Pope-Hartford car. On this car the steering is strictly irreversible, of the worm and sector type, enclosed in a dust proof case and fitted with a 17-inch mahogany steering wheel. The steering joints are provided with spring buffers to relieve road shocks. Steering cross rods and connections are located behind the axle and are thus protected from road obstructions. The front end of the fore and aft rod is, in 1910, located above the axle, instead of underneath as formerly. The rear end is also raised, giving about three inches more clearance than on previous models. The steering column is arranged on an angle which makes the driver's position a most comfortable one. The road wheels, too, have the customary gather.



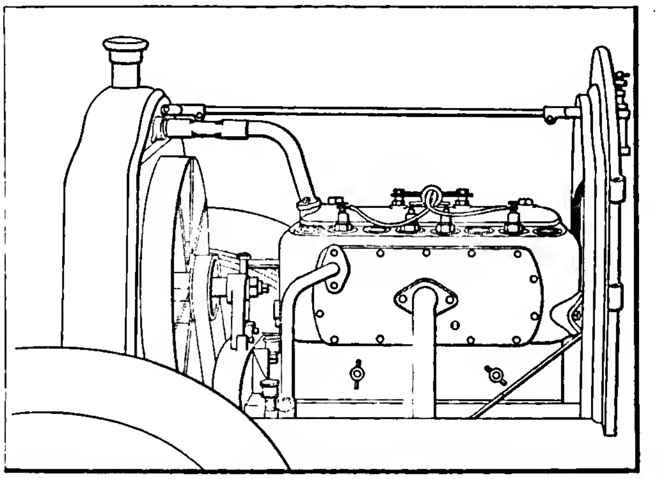
parts. Meshing gears, for illustration, if they run on the pitch line, are accurately cut, and properly lubricated, will be quite noiseless in their performance. To some extent, this noiselessness may be traced to the muffling effect of the housings which enclose the gears, and in the same way, the motors are muffled. As a matter of fact, the near presence of a suitably contrived bonnet over the power plant adds its quota in the noise-killing process, particularly if shaped with this idea in view.

It has always been especially difficult to so design the half-time gears of a motor as to eliminate noise. The cars this year seem to be well in hand in this respect. In some cases, the gears are shrouded, in others, they are of the helical cut, and in a few instances the webs are leaded. In one car (the Brush runabout) the motor is of the vertical single cylinder type and in order to eliminate secondary vibrations, a balanced gear meshes with a pinion on the crankshaft, and a relation of the balancing weight is so established that the motor is permitted to operate at a sufficiently high speed to deliver its maximum power without showing anything of the vibration which would follow under the conventional conditions of design.

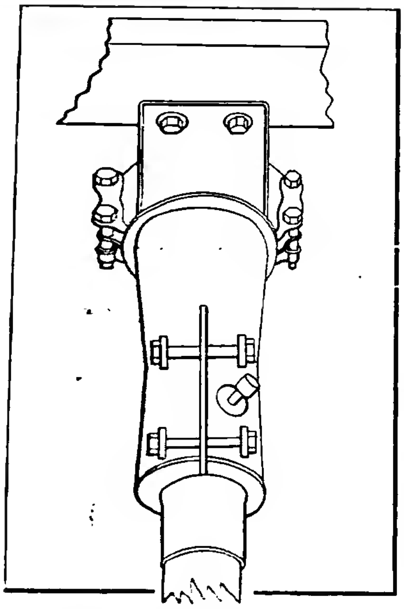
Ignition is now by magneto for the regular work in almost every automobile, and while the high-tension system obtains in the majority of cases, the fact remains that low-tension types of magnetos are employed in certain well-known makes of cars. It has always been self-evident to autoists of skill that the low-tension system is thoroughly efficient, delivers a spark with maximum energy, and is free from possible high-tension troubles, with a further advantage that the wiring system, especially those parts of it which are near the motor, is reduced to the absolute limit of simplicity, and ready removability.



Section through the engine of the Anhut car, which motor is a Brownell product, made in Rochester, N. Y. The overhead valves will be noticed as well as the operating mechanism for them. Below is seen the extension of the crankcase, which forms the oil well.

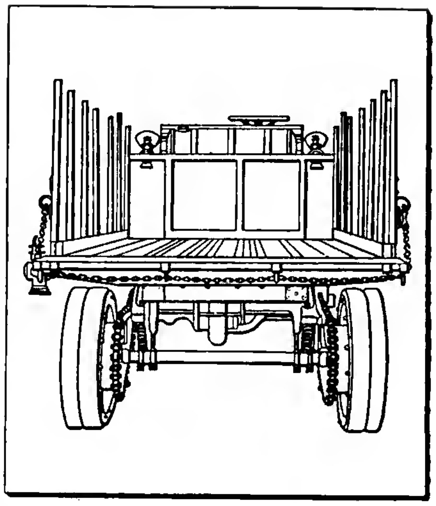


View of the engine and forward part of the chassis of the White new gasoline car. This block motor has a very long stroke, while as the cut shows, the piping for exhaust, and both water inlet and outlet is reduced to an absolute minimum.



This illustration shows the terminal of a torsion tube of a Fal car, and as will be observed, the terminal is universal in its action, of great strength, presents an adequate bearing surface, and is anchored to a substantial crossbar of the chassis frame. The torsion tube extends out from the terminal, and is bolted into intimate relation. The propeller shaft, which is enclosed, is centered on Hyatt roller bearings, is large for the work considering the character of the material used, which is selected for torsional ability. The universal action of the joint is assured by the spherical shape of the ring, which is closely fitted in a case, and the bolting to the cross member is secure. The propeller shaft is long, it is practically horizontal, and when the automobile is carrying its full complement of passengers, it is designed to afford all the advantages of a straight line drive. The transmission gear is selective.

In the Knox exhibit, while the pleasure cars will attract a wide measure of notice, it is believed that the question of commercials is now forging to the front, and the illustration here offered is of a Knox truck looking at it from the rear. This is Model 18, is rated at five tons, and the character of the workmanship is that which is characterized as fitting for this class of service. The rear traction wheels are fitted with dual solid tires. The front wheels are fitted with single solid tires and the record this truck is making is sustaining the Knox reputation in a manner highly satisfactory to the maker.

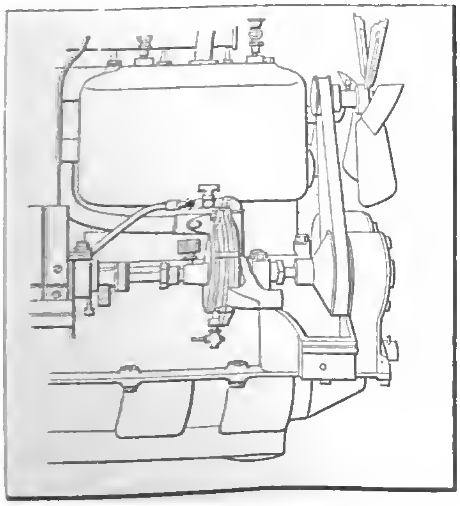


The besetting sin of the low-tension system lies in the mechanical difficulties which will confront the novice, or the half-baked artisan who fails to take into account the terrific speed with which the hammer is required to attack the anvil, and these low-tension systems, by virtue of this mechanical demand, are necessarily confined to the shops which are capable of doing this class of work. Among the cars which hold to this method are the Premier, Locomobile, Columbia, Gaeth, and others.

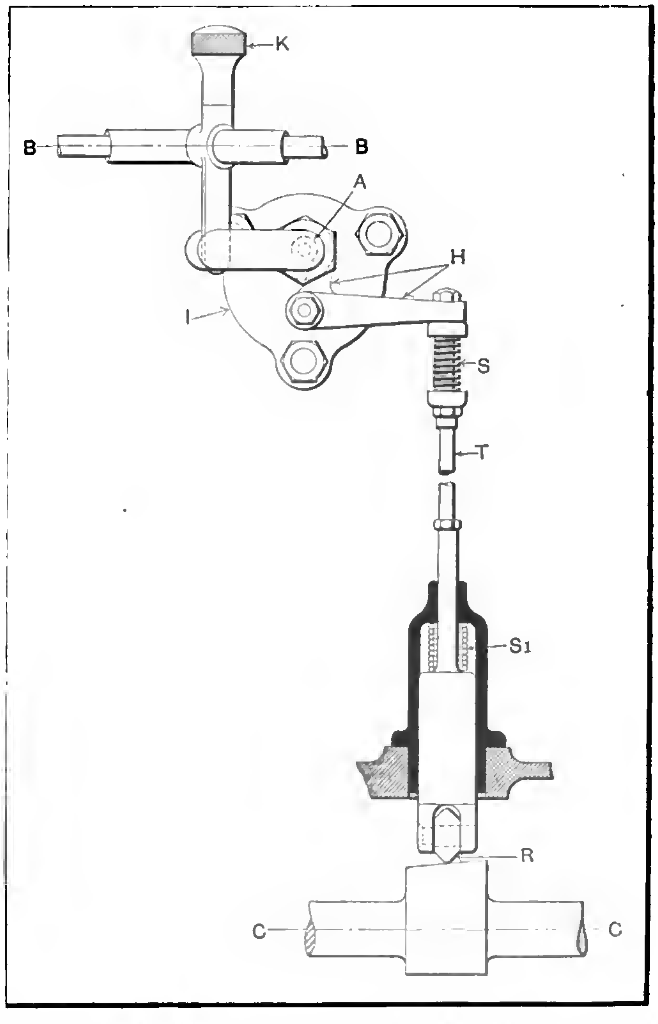
The fuel problem has been much simplified, largely because carbureters now conform to the plain requirements, and many of the auxiliary attachments which were once considered essential to success are being eliminated on the ground that while they may have been of some use, they were very troublesome by way of befogging the notions of the autoists whose mechanical inclination was severely limited.

Simplicity is present to a marked extent, all through the cars of the year, and accessibility, which was once a dream, now reaches the point where there is little to complain of.

While the low-tension systems of ignition hold their own with more or less tenacity, the fact remains that high-tension jump-spark systems are used in the majority of new cars. This high-tension work includes a magneto in almost every case, with the understanding that batteries and coils are employed in an auxiliary capacity. Uni-sparkers and other like means are frequently introduced as the main method of sparking, with the understanding that the owner of the car in such cases may have a magneto as well paying the difference. In modern coils, the energy component is on a much more substantial basis than heretofore, and the economy with which the battery energy is utilized is on a fitting basis. It is also true that storage batteries as they are now made for sparking service, are free from the old sulphating troubles, and serve extremely well for the purpose. Dry batteries, in view of their considerable capacity, low



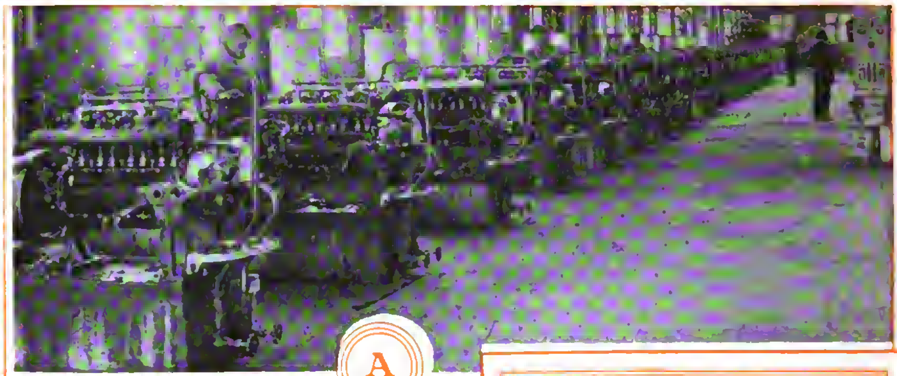
This illustration is of the front end of the Selden motor, showing the manner in which the half-time gears are enclosed, the drive for the fan, and location of the water pump and magneto. The evidence afforded is in favor of compactness, and accessibility is one of the strong points which the company makes for this motor. The motor is rated at 36 horsepower, is of the four-cylinder, water-cooled type, works four-cycle, and ignition is on an efficient basis (see table). The cylinders are cast in pairs, are 4 3-4 x 5 inches bore and stroke, respectively, and the character of the workmanship which is put on the motor is high.



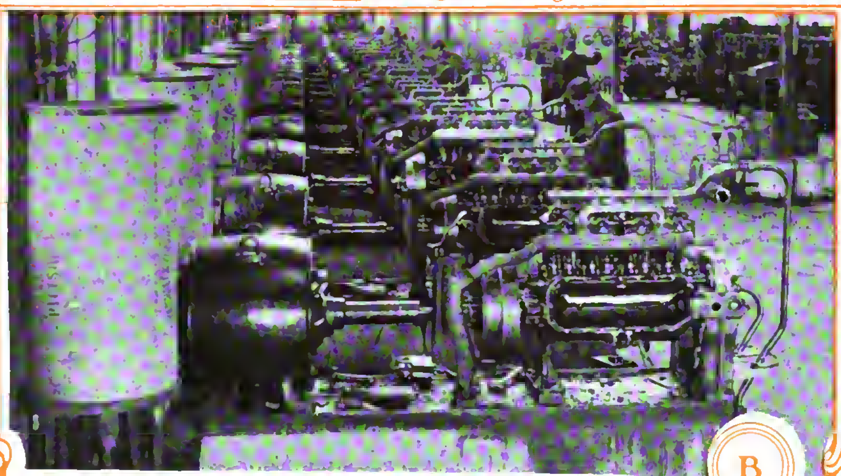
Mechanism as used on Locomobile low-tension ignition systems with a sliding cam to manipulate in adjusting the spark advance.

PLATE IX.

Testing Equipment Utilized

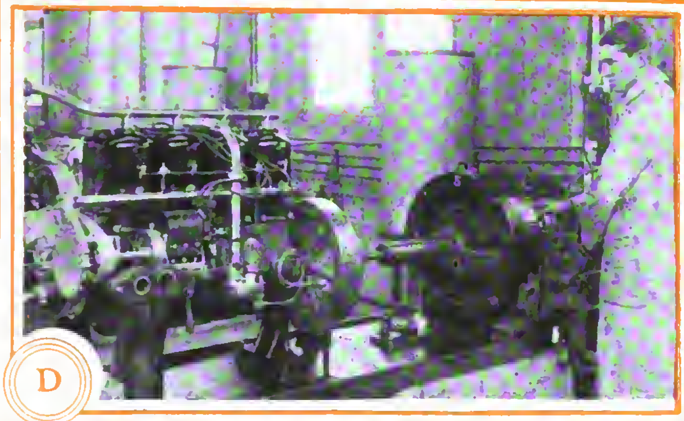


A



B

C



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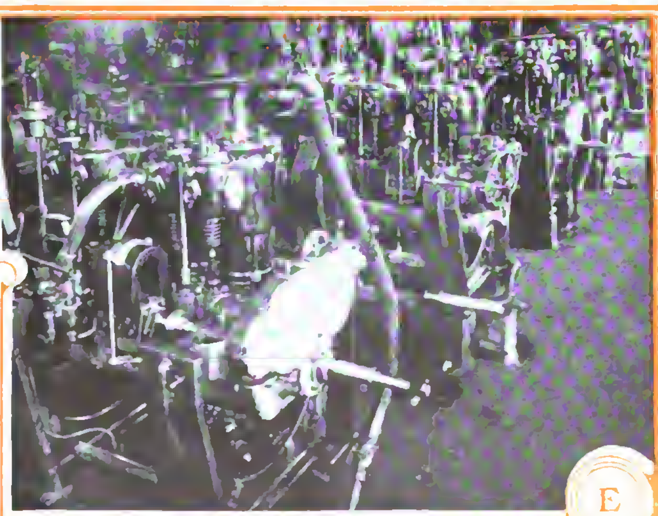


E

A—A row of motors undergoing test in the Rambler plant utilizing the new system by means of which half of the motors are driving dynamos which furnishes current to electric motors to drive the other half of the motors undergoing test on a "run-in" basis.

B—Another view of the Rambler testing equipment showing the electric motors, one for each testing block, and the tanks to the left which are placed to hold the cooling water. This view gives some idea of the vastness of the modern automobile manufacturing plant, and the problems which must be coped with. The testing room, of course, receives all of the motors at one time or another, and hence, equal provision must be made here for handling large numbers, else the motors will be poorly and insufficiently tested and run in.

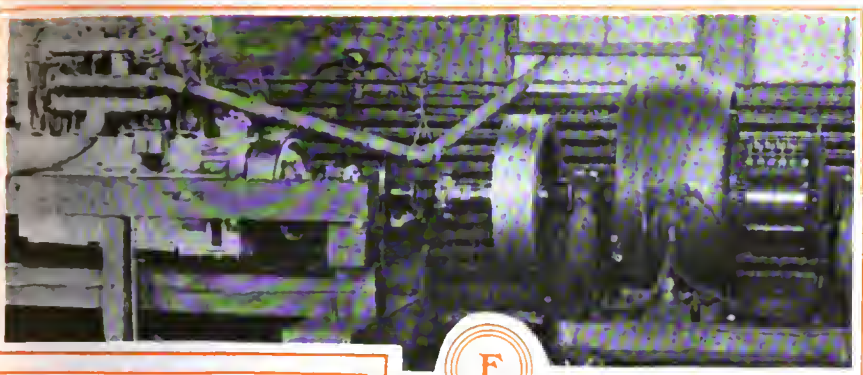
C—A static testing machine used in the Woods plant for testing the ability of flat steel as used in springs and like work.

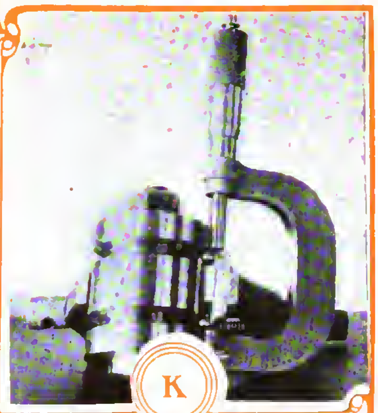
D—In the Rambler plant showing a test block with the motor to be tested removed, disclosing the tumbler shaft which connects the motor to be tested with the electric motor which is utilized in connection therewith.

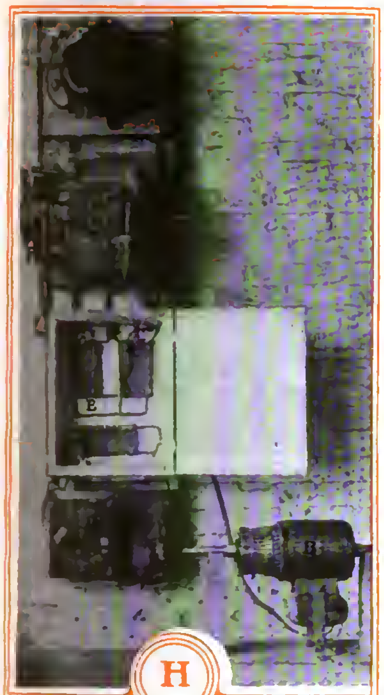
E—A view of the test room in the Premier plant showing a line of motors undergoing adjustment. Modern testing equipment provides not alone for the testing of the motor but the trying out of many other parts which enter into the complete chassis.

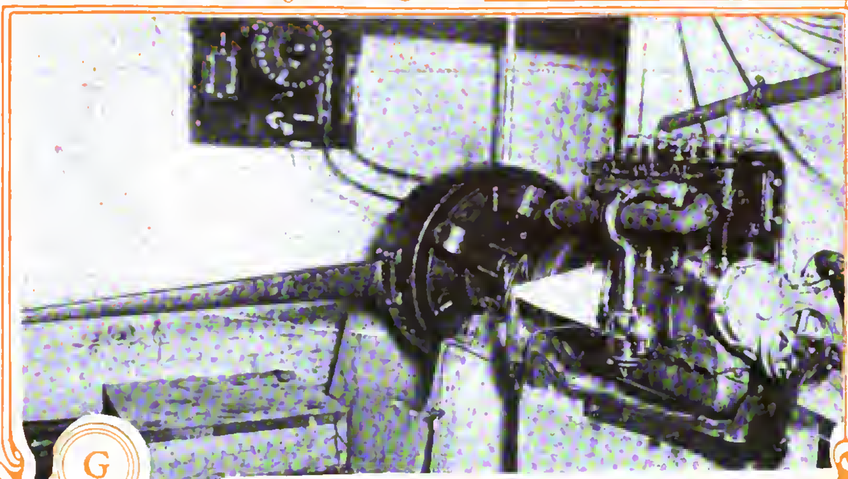
internal resistance, and a continued life without depreciation, are finding favor as the auxiliary means of supplying energy, and this is especially true when the battery box is provided with a system of terminals which will work without jarring loose, and in which the resistance of joints is at a minimum.

The question of standardization is now approaching a point where it can be seriously discussed with some expectation that the day will not be far off when an autoist will find it possible to take the wheel of any automobile and not have to learn how to manipulate the foot pedals, and sliding-gear mechanism. There must be some one right way of placing the sliding-gear mechanism so that it will serve every end, and it will be of the greatest advantage, broadly speaking, if drivers can learn once









F—An electric dynamometer as used in the Alden-Sampson plant for ascertaining the power, flexibility and endurance of truck motors of the company's design.

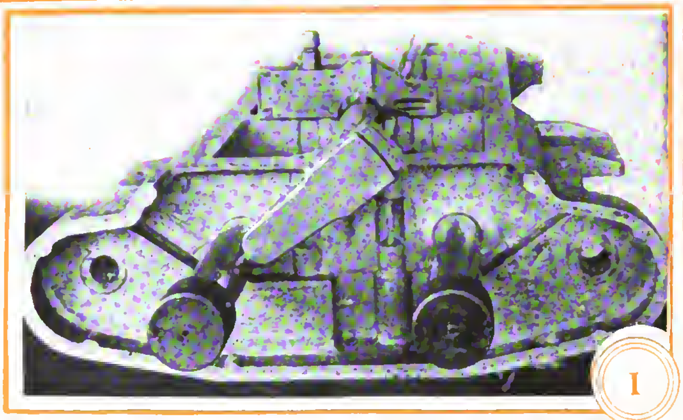
G—Electric dynamometer as used in the Inter-State plant, comprising an electrical machine with cradled fields and a lever arm which connects with platform scales. An Inter-State motor is shown on an adjacent platform ready to be tested.

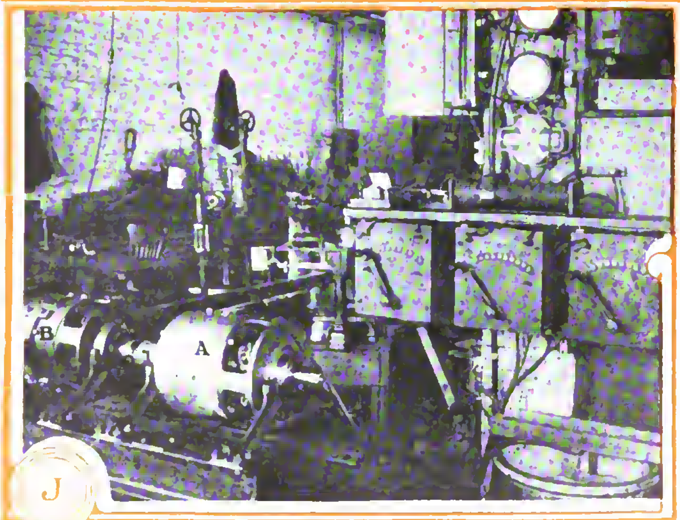
H—Electrical testing machine in the Woods plant, comprising a step-down transformer, suitable switches, volt and ampere meters, and a test block on which the armature B is placed, and by induction if any one coil in the armature is defective as to insulation, sufficient heat will be generated to cause the insulation thereof to smoke, thus disclosing to the tester the particular defective coil.

I—An instrument for ascertaining centers of the half time gear shaft in relation to the crank shaft of Thomas motors, the same consisting of a dummy shaft in place of the crank shaft, dummy shafts in place of the cam shafts and a rotating pointer which contacts with the secondary shafts equally if the work is true.

J—Testing equipment of an electrical character used in the Woods plant for determining as to the efficiency, temperature increase, commutation and endurance of motors used in Woods Electrics.

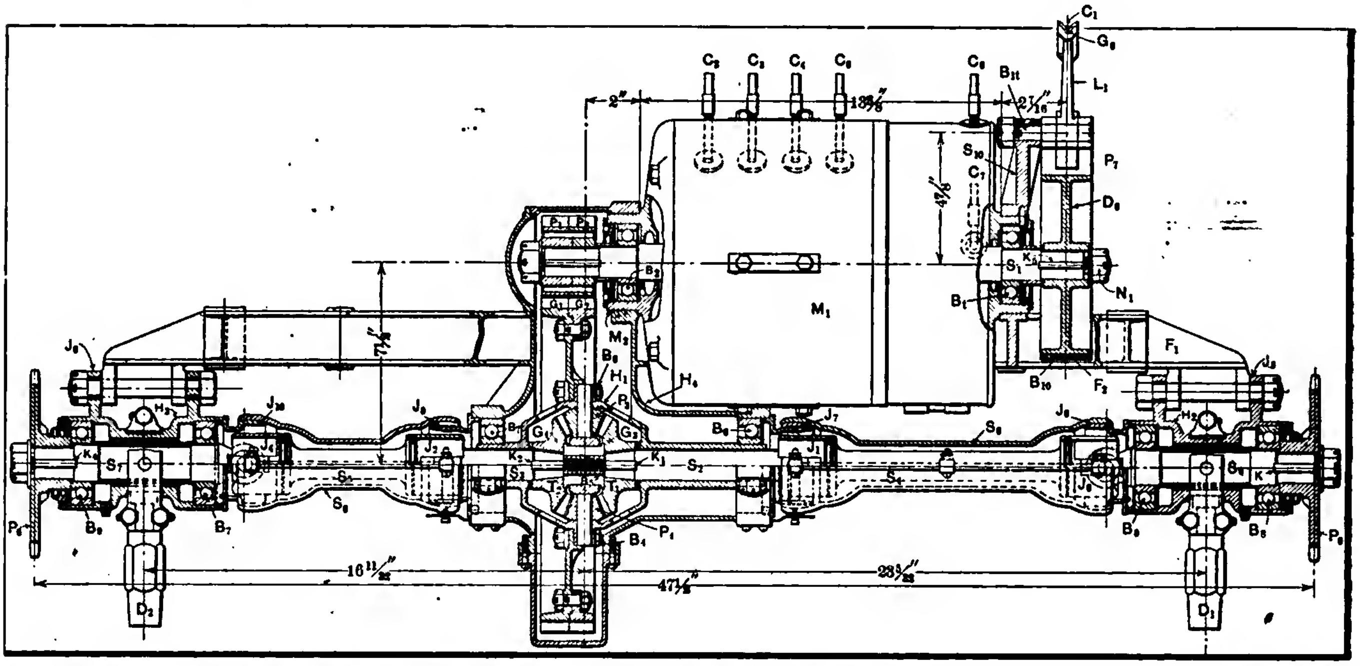
K—Measuring the center distances of the inner races of a dual ball bearing.





for all the nature of the requirement, and thereafter as a matter of habit, run a car without the dangers which are invariably present when there are no two cars alike. Skill, when it is analyzed, simmers down to the level of habit.

There are many other details in relation to automobiles which can well be reduced to a standard, and the quality, taking it as a whole, which will finally obtain, will be much higher under standard conditions, than it can be during all the period when minds disagree. It is possible to seriously consider that all the men who disagree as to the best method of performing a given test, will be more nearly right in their respective undertakings when each one of them diverges a little from the path which to him looks the most promising.



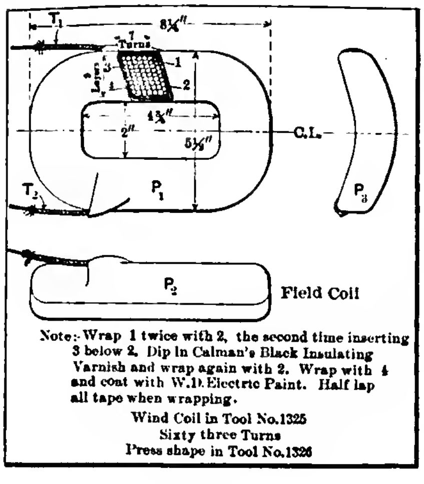
Working drawing in partial cross-section of the motor, reduction and countershaft unit of the Woods electric, showing a neat and unusual feature of design. The central case containing the differential gear is connected to the sprockets on each side by doubly-jointed shafts, preventing any possibility of binding through mis-alignment or distortion of the frame by strain from hard usage. The reduction gears are of the herringbone type, and annular ball bearings are used throughout.

ELECTRIC VEHICLES ON PARADE AT CHICAGO

INTEREST to an extent as never before centers in the electric vehicle situation, primarily, on account of the excellent service this type of vehicle has ever been capable of, and then, in view of the improvements wrought in batteries in recent times, and the many mechanical refinements which have crept into the cars. Electric motors were originally protected in connection with other modes of transportation as in trolley car service, and controllers of the drum type also emanated from the same source.

The electric motors demanded a certain amount of attention, and it took quite a little effort on the part of advanced engineers before they were as a unit on the question of the use of a single or two motors. Storage battery engineers are divided into two camps, one of which adheres to the lead type of storage battery, and the other is taken up with the Edison idea.

In the mechanical work the company offerings are diversified, as, for illustration, the Babcock Company is nailing its faith to a worm drive; Baker electrics are shaft-driven cars; Woods motor vehicle is an excellent example of side-chain drives; Detroit electric is a double reduction silent chain type; Rausch & Lang uses a side chain; Studebaker mounts the motor on davits, and a silent chain flexible drive is the result, and the Waverley is also a silent chain proposition. Each company will tell why its preference is for the particular method it employs, but the users of electrics, and spectators in general, will testify to the excellent operating qualities of electrics in general.

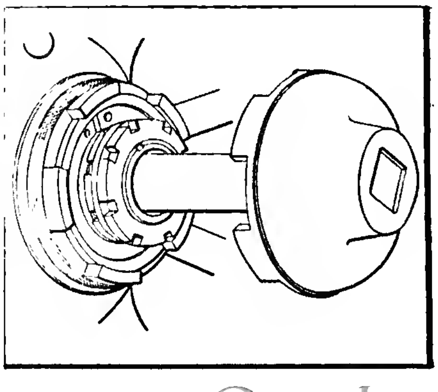


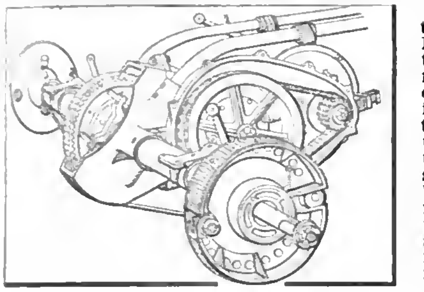
Field coil of the Woods electric, of which four are used. There are 63 turns of wire on each coil, these being wound on a form and then pressed into their final shape. Intermediate between the winding and the final pressing the coils receive four windings of insulating tape and two coats of insulating varnish and paint, to make them absolutely proof against dampness. The curving shape of the coils indicates the manner in which they are to be fitted into the frame of the motor. This is, of course, of the four-pole type, series wound, and draws its current from 40 9 MV Exide cells.

BABCOCK ELECTRIC HAS ADVANTAGE OF A WORM DRIVE

The Model No. 14, at $2,600, is a coupé for four passengers, using an individual motor, which is rated at 5 horsepower, and suspended on the chassis frame under the body, making a straight line for the propeller shaft to the housing in the live rear axle. The battery is composed of 36 cells, each with 13 plates, divided into two halves, and placed under the hood in front and under the deck at the rear. The initial reduction in the transmission system is 3.9:1, and for the rest the control system gives five forward speeds and reverse. The chassis frame

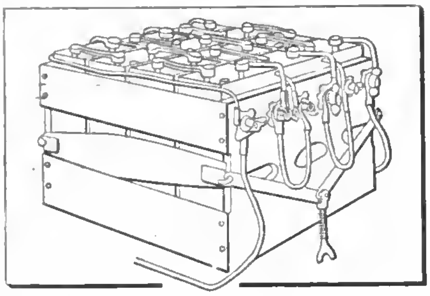
Studebaker electric uses the full floating type of rear axle, of which one of the hub ends is shown. In this drawing the floating shaft with the dog clutch on the end has been partially withdrawn from the axle, as if for removal. This reveals the five dogs on the clutch and the five sockets in the hub in which they enter to take up the drive. When the parts are in place the hub cap is screwed on over the threads. The withdrawal of the shaft reveals the bearings.





Power plant of Detroit electric models E, F, G, H and L. In this case the motor is mounted just in front of the rear axle, making a unit construction, while at the same time a large proportion of its weight is supported from the body by means of the radius rods. The motor is a multipolar, series wound, rated at 2½ horsepower under normal conditions.

Section of the Babcock battery, showing how the cells are assembled. The illustration shows twelve cells assembled in a unit for installation in the car. Connections are made from cell to cell in the same row by copper bars, permanently soldered in place to give a perfect electrical contact. The rows are connected outside the box between large and solid binding posts.



is of wood with a 3-16-inch armor of steel; annular ball bearings are used at every point, excepting for axles; Timken roller bearings are used for road wheels. The car weighs 2,600 pounds, and wheels are fitted with 32 by 4-inch pneumatics front and rear.

In addition to the worm-drive model, the company also offers its usual line, among which Models 5, 6 and 10 are notable examples. In these models a side-chain drive is utilized, the motor is swung under the chassis frame nearly in the mid-position, and the battery is divided into two parts, one of which divisions is placed over each of the axles, and the road performance as the result of this battery division is noticeably good. It has been the aim of the company in the designing of each of its models to so arrange the control that a green operator may stay green; a mistake cannot result in an accident.

DETROIT ELECTRICS WILL USE EDISON'S NEW BATTERY

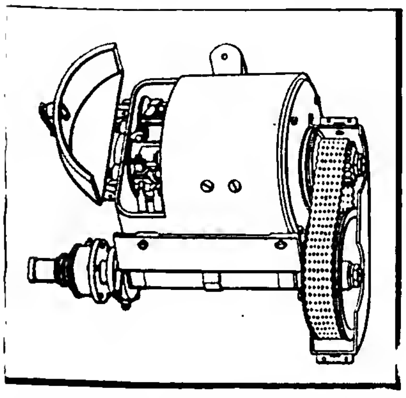
One of the reasons for the much increased popularity of the electric vehicle is the attention on the part of the manufacturers to the little details. In this respect, the makers of the Detroit Electric pleasure carriages have taken time by the forelock and announced the adoption of the newest Edison improved battery for the present season. It is claimed for this battery that it has a lessened weight for the same discharge ability, that it even has a greater discharge ability on lessened weight, which latter would mean that a vehicle with a lowered weight of batteries would run a farther distance on a single charge, that is, a lessened number of charges per season, making the whole car less bothersome as to charging. Five differing models of cars are listed as follows: H, a three-passenger roadster, of 87-in. wheelbase, 51-in. tread, driven by one 3-horsepower motor located on the rear axle, with a controller which affords five forward speeds and three reverse, with body supported upon an angle iron frame. Ball bearings are used on motor and transmission throughout the whole list of cars. On this model, the wheels and tires are 32 by 3 1-2 all around, the same as on all others. This sells at $1,650. Next in order of price comes Model A, selling at $1,900. This carries a two-passenger Victoria body, has an 80-in. wheelbase, and weighs 200 pounds more, otherwise it is the same. Above that comes Model E, a two-passenger coupé, at $2,100. This weighs 2,300 pounds. The wheelbase agrees with Model H, as do also the tires. Model C is also a coupé, but sells at $2,350. The wheelbase is shortened to 80 in., and the motor is placed in the middle of the chassis. On Model D, a four-passenger brougham at $2,500, the same description applies, except that the weight is 2,400 pounds.

BAKER ELECTRIC IS A SHAFT DRIVE

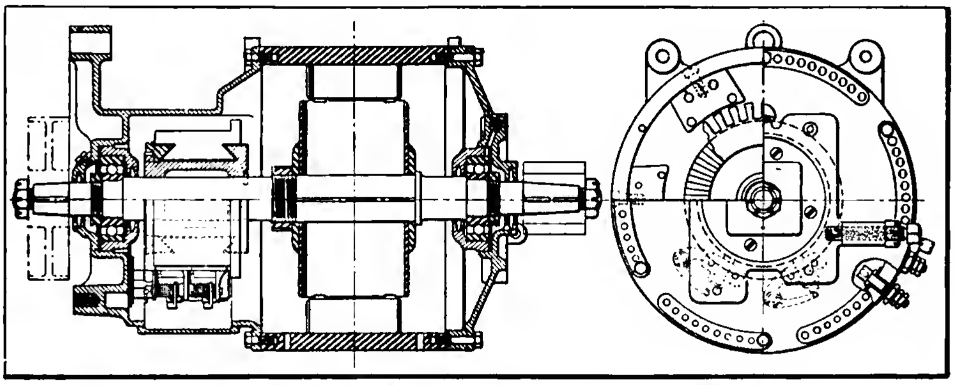
The Baker idea as it has been expounded for 1910 is with a view to conforming to the conventions as they are voiced by engineers in the automobile field in general—hence the shaft drive. Baker Electrics are made in four models, including a runabout which seats two, victoria with the same seating capacity, a coupé which seats two, and the largest size, which is also a coupé, has accommodation for four. Exide batteries are used in all Baker models, the smaller size being an 11 PV with 30 cells. This battery is divided and one-half of it is placed in the front of the vehicle and the other half to the rear. The $2,000 victoria is fitted with an Exide 9 MV battery with 28 cells in two divisions, and this type of battery is used in the remaining models as well. The transmssion in Baker models is through a silent chain to the shaft, and a live rear axle with a bevel drive serves for the rest. Ball bearings are relied upon to kill friction, and the weight of the respective models is very carefully trimmed, being 1,900 pounds for the runabout and 2,200 pounds for coupé.

FIVE RAUCH AND LANG CREATIONS WILL BE SHOWN

Chicago will see a full line of the R & L electric vehicles, which list will include no less than five stunning creations. These vary in price from the lowest to the highest, so that a car may be had suitable for every pocketbook. Beginning the list is Model 20, two-passenger Stanhope, at $1,900. This car has one 2 1-2-horsepower motor located in the middle of the chassis. Power to run the motor is furnished by 9 M V Exide cells, 24 in number, divided into several parts so as to distribute the



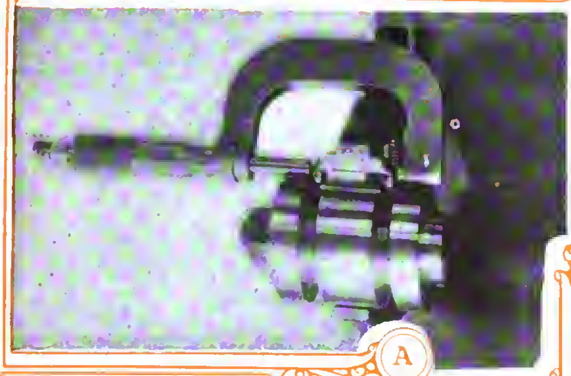
Motor, first reduction and countershaft of the Baker electric. The motor is a four-pole, series wound, and the reduction by silent chain; the propeller shaft connects on the left to the countershaft.

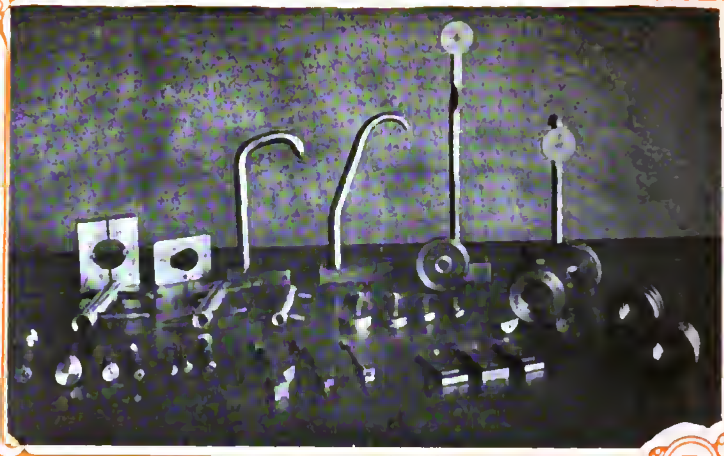


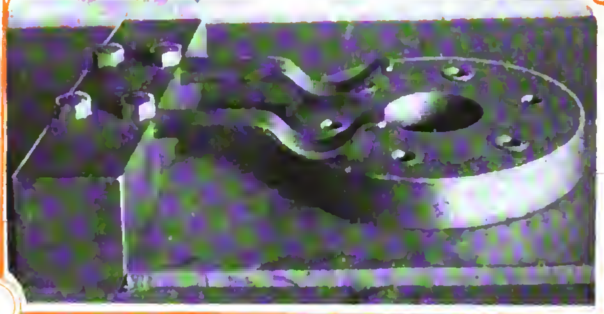
Longitudinal and lateral sections of a Waverley electric motor, for vehicle service. The field coils are indicated in their respective positions. They are altogether four in number. The armature is shown roughly, together with the means by which it is secured to the shaft, namely, a key, with a nut forcing it against a shoulder. The commutator seems wide and of proportions which will reduce sparking. The armature is mounted on ball bearings.

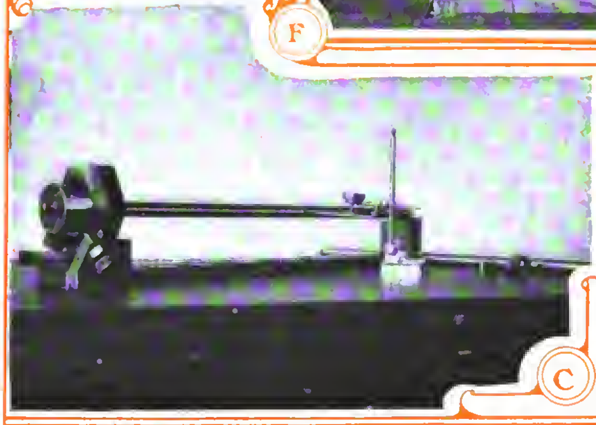
PLATE X.

Methods of Accurately Sizing









A—Micrometer measuring the center distances of inner races of a ball bearing.

B—Special measuring callipers or gauge used for sizing the walls of castings and tubes to within very close limits.

C—Extensometer fitted to a surface gauge resting on a surface plate, measuring the accuracy of the keyway in a jack-shaft.

D—Special form of tilting jig which may be set to any angle and locked in position, thus facilitating the drilling of holes which are out of the vertical or horizontal plane.

E—A collection of special measuring plug, ring, and other forms of gauges.

F—A special form of jig with accurately ground and hardened button head bushings, and a clamping means for use in reaming holes to great accuracy.

weight where it will do the most good, the same being unavoidable. The controller gives six forward speeds and three reverse, this number, like that of all electric vehicles, being far in excess of the number furnished on any other form of car than an electric. First reduction is by silent chain, while the final drive to the rear axle is by double side chains. The wheelbase is 77 in., while a tread of 53 in. is utilized. Despite a pressed steel frame, the weight ready to run is but 1,975 pounds. The tires used are 32 by 3 1-2 inches all around, and on all models except the most expensive and heaviest coupe. Ball bearings are used throughout, except in the case of the axles, which run on rollers. Model 22 is a three-passenger Stanhope, for which the makers ask $2,100. The description above applies except that the weight is increased to 2,125 pounds, and the cells used are 11 M V. On Model 133, however, the number of cells is increased to 30, this being a two-passenger runabout selling at $2,100. The wheelbase is increased to 85 inches, as is also the same quantity for all higher-priced models. The weight is slightly lessened, being 2,050 pounds. Model 23 is a very popular car. This is a four-passenger Victoria, made to sell at $2,200. Twenty-four cells are used, but the weight is increased to 2,100 pounds. Lastly, Model 24 is a four-passenger coupe and sells at $2,700. The weight is 2,550 pounds, in view of which the tires are enlarged, being 32 by 4 all around.

G—Surface gauge on the platen of a Brown & Sharpe No. 4B milling machine.

H—A depth gauge with a special terminal so made as to facilitate measuring.

I—Method of measuring the pitch of taps used in automobile manufacturing.

J—A pair of dwarfed jacks which are used in centering the work as shown.

K—A collection of instruments of precision which includes an extensometer on the right, dwarfed jacks under the socket, and a special jig to the left.

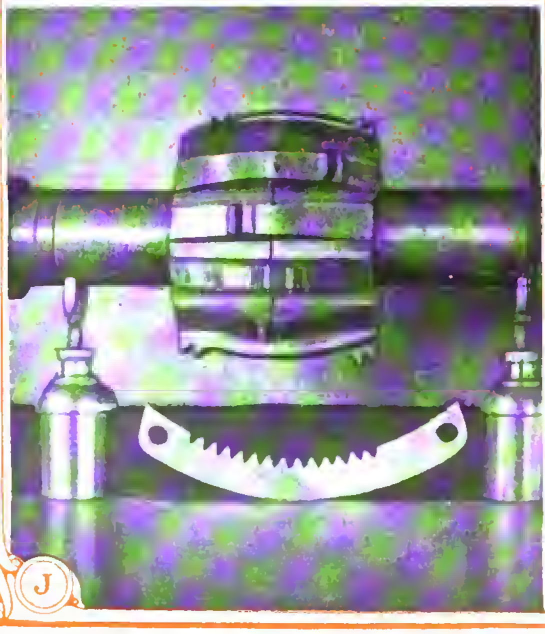
L—A set of micrometer calipers for in and outside measuring reading to thousandths.

Note—The illustrations as above given were furnished by the E. R. Thomas Motor Company, but are representative of the facilities which are used in first-class plants.

STUDEBAKER PLANS LAY STRESS ON STANDARDIZATION

With a reputation to uphold, as a branch of the company which makes the country's standard wagons and buggies, the Studebaker Automobile Company has designed a series of electric automobiles which will represent the latest development of electricity as an exact science. No type of power plant has been developed to the same degree as an electric. In gasoline and even in steam engineering practice, the designer never knows just what he will get until the first engine of a series is completed and set on the testing block. The electric motor, on the other hand, offers simply a problem in mathematics; its power can be figured with absolute accuracy while the drawings are still in the drafting room.

Thus it is not remarkable that the electric vehicles should have reached a condition of standardization far ahead of the gasoline ones. The Studebaker product, including five distinct models, varies only in the slightest details from that which bore the company's name last year. The motor, a standard design rated at 2 horsepower, though with an overload capacity of perhaps 300 per cent., is hung from the middle of the frame. It drives a short countershaft through noiseless herring-bone gears, and from the countershaft in turn a single chain drives the divided rear axle. The Studebaker Company makes five models, or differing body forms, on two distinct chassis.



A.A.A. CONTEST BOARD ANNOUNCEMENT

MEETINGS of the Contest Board of the American Automobile Association were held January 12 and 13, the following members being present: S. M. Butler, chairman; T. A. Wright, David Beecroft, Joseph H. Wood and P. D. Folwell.

The appeal of the Overland Automobile Sales Company, of Dallas, Tex., from the decision of the referee in awarding to the Mason car the first prize in the "North Texas Endurance and Good Roads Tour," held at Dallas, December 13 to 19, 1909, was submitted to the board. The appeal was overruled, and the decision of the referee affirmed, on the ground that the extreme road and weather conditions justified the referee's decision.

The appeal of Messrs. Bireley & Young, of Los Angeles, entrants of the Columbia car, from the decision of the referee in awarding the first prize to the Pennsylvania car in the fifty-mile track race held on the Arizona Fair Grounds track, Phoenix, November 11, 1909, was considered and action deferred pending the receipt of further information.

The following is a list of the proposed contests for 1910, with approximate dates, from which the Contest Board will make up its official contest schedule:

IN THE EAST

Reliability Contests

Philadelphia, Century Motor Club, ——.
Philadelphia, Quaker City M. C., April 15.
Denver to Mexico—Flag to Flag—G. A. Wahlgreen, May 1.
Hartford, Auto Club of Hartford, May 1.
Harrisburg, Motor Club of Harrisburg, May 2 to 7.
Norristown, Norristown Auto Club, May 18.
Fort Worth, Fort Worth Star-Telegram, May 22.
Detroit, Detroit Auto Dealers' Association, May 25.
National (Glidden) Tour, A. A. A., June 15-30.
Denver, Denver Motor Club, June.
New York to Seattle, M. R. Guggenheim, July 4.
Philadelphia to Wildwood, North Wildwood Auto Club, July 2.
Minneapolis-Tribune, Minneapolis Auto Club, August 1.
Munsey Tour, Frank A. Munsey Company, August 15.
Minneapolis, Minnesota State Auto Association, August 31.
Philadelphia to Wildwood, North Wildwood Auto Club, September 3.
Cleveland, Cleveland Auto Club, September.
Kansas City, Auto Club of Kansas City, September.
Louisville, Louisville Auto Club, October 8.
Chicago, Chicago Motor Club, October 15.
Denver, Denver Motor Club, October.
Worcester, Worcester Auto Club, October.

Road Races

Denver, Denver Motor Club, May 30.
Riverhead, Motor Contest Association, June 1.
Cobe, Chicago Auto Club, June 25.
Grand Rapids, Grand Rapids Auto Club, middle July.
Denver, Denver Motor Club, September 5.
Lowell, Lowell Auto Club, September 5.
Vanderbilt, Motor Cups Holding Company, October 1.
Fairmount Park, Quaker City Motor Club, October 8.
Savannah, Savannah Auto Club, ——.

Hill Climbs

Atlanta, Atlanta Journal, February 22.
Kansas City, Auto Club of Kansas City, April.
Bridgeport, Auto Club of Bridgeport, May 30.
Wilkes-Barre, Wilkes-Barre Auto Club, June 11.
Worcester, Worcester Auto Club, June 4.
Cleveland, Cleveland Auto Club, June.
Ossining, Upper Westchester Auto Club, June 18.
Plainfield, Plainfield Auto Club, July 11.
Richfield, Richfield Springs Auto Club, middle July.
Algonquin-Chicago, Chicago Motor Club, middle August.
Denver, Denver Motor Club, November.
Minneapolis, Minneapolis Auto Club, ——.
St. Paul, Auto Club of St. Paul, ——.

Track Races

New Orleans, New Orleans Auto Club, February 5 and 6.
Montgomery (Ala.) Auto Association, February 12 or April 20.
Birmingham, Birmingham Police Relief Association, April 27.
Atlanta, Atlanta Auto Association, May 5, 6 and 7.
Indianapolis Motor Speedway, May 29, 30 and 31.
Boston, Bay State Auto Association, May 30.
Brighton Beach, Motor Racing Association, May 30.
Philadelphia, Quaker City Motor Club, June 4.
Columbus, Columbus Auto Club, June 14.
Indianapolis Motor Speedway, July 1, 2 and 4.
Dallas, Dallas Auto Club, July 4.
Cheyenne (Wyo.) Motor Club, July 4.
St. Paul (Minn.), State Automobile Association, July 4.
Wildwood, Motor Club of Wildwood, July 4.
Wildwood, N. Wildwood Auto Club, July 4
Wildwood, N. Wildwood Auto Club, August 6.
Cheyenne (Wyo.) Motor Club, August 17.
Cheyenne (Wyo.) Motor Club, September 5.
Wildwood, Motor Club of Wildwood, Sept. 5.
Wildwood, North Wildwood Auto Club, September 5.
Galveston, Galveston Cotton Carnival, July.
Kansas City, Auto Club of Kansas City, July 23.
Philadelphia, Quaker City Motor Club, August 6.
Indianapolis Motor Speedway, August 12 and 13.
Indianapolis Motor Speedway, September 2, 3 and 5.
Minneapolis State Fair, Auto Clubs of Minneapolis and St. Paul, September 5 and 10.
Providence, Rhode Island Auto Club, September 9 and 10.
Indianapolis Motor Speedway, October 7 and 8.
Dallas, Dallas Auto Club, October 25.
Atlanta, Atlanta Auto Association, November 15.
New Orleans, New Orleans Auto Club, November 5 and 6.
San Antonio, San Antonio Auto Club, November 6, 9 and 13.

PACIFIC COAST

Road Races

Santa Rosa, May 9.
Portland Rose Carnival, Portland Auto Club, June 11.
Santa Monica, Licensed Motor Car Dealers' Association, Los Angeles, July 4.
Mount Baldy, September 10.
San Francisco-Portola, Auto Club of California, October 23.
Los Angeles-Phœnix, Maricopa Auto Club, November 24.

Hill Climbs

Altadena, Licensed Motor Car Dealers' Association, Los Angeles, February 22.
Mile High Hill Climb, Redlands Mile High Hill Climb Association, November 24.

Track Races

Los Angeles (Cal.) Motor Racing Association, Jan. 9, Feb. 12 and 13, Mar. 12 and 13.
Los Angeles (Cal.) Motordrome Company, April 8, 9, 10.
Los Angeles (Cal.) Motordrome Company, April 13.
Los Angeles (Cal.) Motordrome Company, April 15, 16, 17.
Los Angeles (Cal.) Motordrome Company, 24-hour, April 30, May 1.
Santa Rosa, Santa Rosa Auto Association, May 15, 16.
Los Angeles (Cal.) Motordrome Company, May 29, 30, 31.
Los Angeles (Cal.) Motordrome Company, July 2, 3, 4.
Los Angeles (Cal.) Motordrome Company, Labor Day.
Seattle, M. R. Guggenheim, September 10, 11 and 12.
Spokane, Spokane Interstate Fair, ——.

THE AUTOMOBILE CALENDAR

Feb. 5-12.........Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.
Feb. 14-19........Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dai H. Lewis, Manager, 760 Main street.
Feb. 14-19........St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington avenue.
Feb. 14-19........Rochester, N. Y., Convention Hall, Third Annual Show, Rochester Automobile Dealers' Association. Captain C. A. Simmons, Manager.
Feb. 19-26........Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.
Feb. 10-26........Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.
Feb. 19-26........Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South street.
Feb. 19-26... ....Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.
Feb. 21-26........Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.
Feb. 22-26........Baltimore, Second Annual Automobile Show, Auto Club of Maryland, Fifth Regiment Armory.
Feb. 21-26........Portland, Me., Auditorium, Fifth Annual Automobile Show. F. M. Prescott, Manager.
Feb. 22-27........Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.
Feb. 24-26........Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.
Feb. 24-Mar. 3....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Mgr.
Mar. 5-12.........Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.
Mar. 7-12.........Albany, N. Y., Armory, Automobile Show.
Mar. 12-19........Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.
Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsman's Show, Buffalo Launch Club. D. H. Lewis, Mgr., 760 Main St.
Mar. 26-Apr. 2....Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.
April 23-29.......Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

THE AUTOMOBILE

Vol. XXII Thursday, February 3, 1910 No. 5

THE CLASS JOURNAL COMPANY
H. M. SWETLAND, President
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231-241 West 39th Street, New York City

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SUBSCRIPTION RATES
United States and Mexico - - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Union, including Canada - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS
ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

NATIONAL AUTOMOBILE SHOW FEATURES

With the opening of the doors of the Coliseum and the Armory, which will serve as an overflow, the great metropolis of the middle West will have in its midst a display of automobiles such as were never before assembled for inspection under such favorable conditions. That the show will be national in character is proven by the names which will be found on the list of exhibitors; they come from the East, the West, and the South, with not a few from the contiguous territory, which, in a geographical sense, stretches north to the frontier. The cars, which will be shown to the number of 101 separate exhibits, will be flanked by 171 accessory displays, and the slightest investigation of the situation will disclose a condition of the greatest business harmony, the entire absence of any suspicion of exclusion of any particular interest, and, in order that the ends will be met, the buying public will be afforded the fullest opportunity to examine them one and all, down to the last detail.

Comparison will be possible, and advantageous; the buyer who knows just what he wants will find it there; the prospective who is on the fence, as it were, will be able to climb down, and the maker who labored long under the delusion that he was the inventor of all that is good will find how futile it is to lock oneself up in a room, behind a stout door, with a sign on it which says, "No admittance," to dream, uninterruptedly, and to evolve, possibly, a machine which will be a world-beater.

Best of the product of brains, when all is said, is that which is presented in a photograph of the composite of all such creative powers, including in a harmonious nest, but in orderly relation, the best of all the ideas which emanate from inner man.

Just as the motor, bereft of its balance wheel, will strike a discord, due to an inharmonious beat of its cyclic relations, so, may it be said, the designer who follows his own bent, uninfluenced by the good which surrounds him, will find, when he lines up in the grand review at the national exhibition, that his ideas will scarcely hobble down the highway of prosperity without a pair of good, strong crutches to lean upon.

Taking the universe as a pattern to go by, the mind which grasps the situation, looking at it broadly, is hardly likely to reach the conclusions that things just happen; that the sun, the planets, and the stars, were merely spilled into space, and left to trickle down from level to level, the plaything of circumstances, and as vagrants of a thoughtless child, ricochet as they travel, wearing to a threadbare suspicion of the mass of inception. So it is with the handiwork of thought when it is blended into a tangible thing by action; the thing will be representative of the thought, which, if it is the product of a finite mind, will scarcely compare with the more imposing array which will follow a concert of action, as when minds agree, and the product becomes the offspring of a pyramid of harmonious thoughts.

A national show—at which are gathered the products of a year of effort—is bound to result in the greatest good to the greatest number, since, when comparison is made under conditions of equality, the points of merit will come to the surface, and the things which are not worthy to survive will be roundly condemned by all.

In making comparison, the point of view must not be lost sight of; the automobile which will serve as a plaything for the idler who is struggling to lessen income is not likely to prove of great utility to the man who mortgages his homestead to acquire luxury on wheels, nor can it be said that a homely "draught horse" of an automobile will gracefully support the "family crest." To go to the show dressed in the right mind is to remember that every type of automobile has as a mate a user who will be well satisfied if envy is not allowed to cast a blur over the eyes, and in the moment of confusion substitute a white elephant for a pleasing companion.

Let the salesman rant of his wares; he is paid a stipend to do so, just as a lawyer is retained to defend a "case" —it may be one of little standing in law when the truth is bared. Go to the show, purchase with real money rather than with the exchange of a mortgage, and select the automobile which will do the very work for which it is intended, or, better yet, consider well the work to be done, and select the very automobile which is designed to above everything else thrive in that very class of service.

CONFLICTING STATEMENTS HAVE BEEN CIRCULATED

CHARLES Y. KNIGHT GIVES OUT THE ACTUAL FACTS

ABOUT THE KNIGHT MOTOR IN UNITED STATES AND ABROAD

NEW YORK CITY, Feb. 3—So many conflicting statements have been circulated in this country regarding the Knight motor in the United States, that I deem it advisable, in justice to the owners of the patents as well as to the public, to make a clear statement of the situation, and have also been requested to include some review of conditions abroad.

At present there are five licensees in Europe under the Knight patents, viz.: The Daimler Company, Ltd., of Coventry, England; Messrs. Panhard & Levassor, of Paris, France; the Daimler Motoren Gesselschaft (Mercedes Co.), Unterturkheim, Germany; Minerva Motor Company, Antwerp, Belgium, and the Deluca Daimler Company, Ltd., of Naples, Italy. We issue only one license for each European country, and there are three unimportant states where we have yet to license anybody.

The Daimler Motor Company, Ltd., of England, took this motor up in December, 1907, and began delivering cars equipped therewith in December, 1908, putting out about 800 large cars during the season ending September 30, 1909. Aside from these cars of the 1909 type, they replaced nearly 100 of their 1908 poppet valve motors with the Knight motor for customers, and sold a number to go abroad to other motor car companies. They have not built a single motor of the poppet valve type since taking up the Knight motor, and are employing it in their omnibus and railroad car work. Their output for 1909 comprised motors of the following dimensions and R. A. C. rated powers

H.P.	Dimensions	No. Cyl.
38	4⅞ x 5⅛	4
57	4⅞ x 5⅛	6
48	5½ x 6	4
22	3¾ x 5⅛	4

For the first two months of the 1910 season this firm's sales exceeded the output for the entire 1908-1909 season by quite a number of cars. This company won the Royal Automobile Club's Dewar Trophy for the best certified performance of the year with two motors (38 and 22 horsepower), which ran for six days and nights continuously under full power, the 38 horsepower averaging nearly 55 horsepower at 1,200 per minute, and the 22 averaging more than 38 horsepower at 1,400, and then these motors were placed in standard cars and run 2,000 miles on Brooklands, at the rate of 42 miles per hour, without a single mechanical hitch.

Daimler cars also won numerous hill climbs in England during the year, and were the first English built cars to sell in any number in France.

The next to get ahead with these motors was the Minerva Company, of Belgium, who took the work up about six months later than Daimler and only managed to get in with a few 38-horsepower four-cylinder cars in 1909. These were built with 20 per cent. offset of the crankshaft, were very fast, and one in the hands of their Glasgow agents won the Scottish Cup for lowest fuel consumption in the Scottish trials last summer, against 68 competitors from all over the world, covering 1,000 miles at an average of 24.96 miles per imperial gallon of petrol, and making fastest combined time on the hills and mountains of the course, both as to actual time and under formula, and winning medal therefor. In two miles the consumption worked out 45 to the gallon and was 10 per cent. better than any other car has done in these drastic trials.

For the season of 1910 the Minerva Company is making no poppet valve motors whatever, producing the Knight motor in three sizes—16, 26 and 38 horsepower, four cylinders. Their entire 1910 product was sold previous to October 1, 1909, among the various countries of Europe. Their 38 horsepower during 1909 won many hill climbs and races on the continent and in England. in addition to the Scottish Trials victory.

Panhard & Levassor will be delivering cars equipped with Knight motors in May or June of this year. Their first demonstrating car was sent to their London agents in December and was equipped with a four-cylinder motor, dimensions 4 by 5 1-2, which under test developed 43 horsepower at 1,140 revolutions. This company will not produce a great many cars of this type during 1910, owing to the lack of preparation and proper tools, having subjected the motor to 15 months of the most severe tests which could be devised before finally adopting it. One agent alone has guaranteed to contract for the entire 1910 output of cars equipped with this motor at a premium of $300 per car over the same chassis with the poppet valve motor.

The Mercedes Company will not get into the market until late in the Fall, this company being the last in Europe to take up the motor. Machine work will begin upon parts in May and cars will probably be ready for Fall delivery. Their motors have given splendid results under test, the 38-horsepower four-cylinder (4 7-8 x 5 7-8) showing 61 horsepower at 1,300 and the 22-horsepower (3 3-4 x 5 1-8) 50 horsepower at 2,000 revolutions.

No. of Revolutions per minute	Knight Motor 4 cylinders 3 3-4 x 5 In.	B.H.P. of 6-cylinder Engine, 4 x 4 3-4-In. Poppet Valves
400	12	12.1
500	16	16.6
600	21	20.8
700	25	24.8
800	29	23.4
900	33	32
1,000	37	34.6
1,100	40.5	37.4
1,200	45	39.3
1,300	48	41.8
1,400	51	43.6
1,500	54	45.2
1,600	56.5	46.5
1,700	58.5	47.5
1,800	61.25	48.2

The Deluca Daimler at Naples will not be in the field until late in 1910.

In America we have made no great effort to start going. The industry has been booming to such an extent that the manufacturers have been reluctant to make a start upon a new program, and we have been too busy abroad superintending the introduc- of our motor over there to permit us to devote a great deal of attention to this large field. In Canada the Canada Cycle & Motor Company have acquired the rights for use in the Russell car, E. L. Russell, the manager, having come across to England during the summer of 1909 to make the arrangements. They are now putting out cars of their own construction equipped with 22 and 38-horsepower Daimler (English) and Minerva (Belgian) motors and have been very successful. Some idea of the interest aroused by the appearance of these motors in Canada may be gathered from the fact that more than 1,300 people last week attended a meeting held under the auspices of the Engineering Society of the Faculty of Applied Science of the Toronto University upon the occasion of an address by the inventor relating to features of the motor.

The tendency so far as our own business is concerned is toward a stroke of about 5 inches regardless of bore, and there is no doubt an inclination in Europe toward a stroke at least 25 per cent longer than the bore, up to 6 inches. The entire English and European industry look askance at the colossal concerns upon this side, fearing a flood of cheap cars to the other side when the pendulum finally swings to the other extreme, or when what they regard to be the inevitable reaction comes.

(Signed) CHARLES Y. KNIGHT.

MAXWELL-BRISCOE, COLUMBIA, BRUSH RUNABOUT MERGER

UNITED STATES MOTOR COMPANY RAPIDLY CRYSTALLIZING

SIXTEEN-MILLION-DOLLAR AGGREGATION OF MOTOR INTERESTS

BENJAMIN BRISCOE, having just returned from Detroit, where a conference was held with Frank Briscoe, President of the Brush Runabout Company, and the Briscoe Mfg. Company, carried in his wake a series of persistent rumors which have for their purport much more definite matter involving the future of the United States Motor Company, than that which passed current in recent days. The best information available at this time is to the effect that the Maxwell-Briscoe, Columbia, Brush Runabout, Briscoe Mfg. Company, Ajax-Grieb Rubber Company, Westchester Appliance Company, and other concerns of a representative character, are the moving spirits in this monster re-arrangement of automobile interests. To what extent this nucleus will gather force is a matter which will have to be confined to speculation. The character of the men and the companies represented in this new line-np is such as to whet the imagination, and it is anticipated by the knowing ones in the inner circle, that the United States Motor Company is destined to rival the Napoleonic movements of the most ambitious efforts in recent times; it being the idea, according to reports, to coalesce a series of companies, each one of which is to be a leader in its particular line of endeavor, financially self-sustaining, and so situated with respect to the market that the united concerns will add their respective quota without overlapping. In this way, it will be possible to reap advantages in all directions, because each unit in the big combination will be habitually expert in its own particular line, and the sum of these units will be of concentrated advantage, due to the combined ability under conditions of economy of management, which should result in the greatest good to the purchasing public, taking the form of superior product at the minimum cost.

It has long been understood by those who keep informed as to the strength of the undercurrent in automobile circles, that the General Motors Company had its eye on the Maxwell-Briscoe series of plants, which it hoped to augment by taking over the big new plant in which Brush runabouts are made. Frank Briscoe seems to have been adamant in the face of all these tempting offers, and perhaps the present proposed creation represents the gist of the real answer; at all events the market has evidently suspected something from the quarter which is dominated by the Maxwell-Briscoe interests, and the activities of the General Motors Company in the direction of acquiring these interests led to speculation of the groundless sort.

The market was merely blinded by the known fact that the General Motors Company wanted to make a combination, and while rumor mongers basked in the light of this one idea, the real scene was being shifted into presentable shape behind an asbestos curtain.

The United States Motor Car Company was quietly incorporated under the laws of the State of New Jersey, and the capitalization was stated to be $2,000, which inconspicuous sum lent an air of mystery to the project when it was learned that the Maxwell-Briscoe string of capital had its finger in the pie. C. W. Kelsey, of the Maxwell-Briscoe Company (head of the sales organization), is arranging to take up his new duties in Hartford, and the old Columbia Motor Car Company is bound to feel the energizing presence of Kelsey, as soon as he is able to find a suitable residence for himself and family, which, however should not be an extremely difficult task in Hartford.

That it is considered a move of the greatest importance for the United States Motor Car Company to acquire the Columbia Company is readily seen when the point is made that the Columbia Company, under the skillful management of the late George H. Day, secured control of the Selden patent, and this company has always represented the dominant situation in the management of the Selden patent. When the Maxwell-Briscoe Company, Premier, and five or six others, came down the A. M. C. M. A. tree, it was little thought that by a skillful move on the part of the Maxwell-Briscoe interests, they would climb to a more favorable position on the other tree which the Court put its mark of favor on. Around Hartford, the situation seems to be fairly well understood, and the automobile fraternity there is aroused to a high pitch of anticipating excitement.

There are quite a number of side lights to be attached to the latest move, as, for illustration, the string of capital which controls the destinies of some well-known Philadelphia electrical companies (one in particular) is said to be allied with the Maxwell-Briscoe line-up. This should not be surprising since the connection which has ever existed between Philadelphia capital and the Columbia Company would still have to be taken into account.

A.M.C.M.A. TO BE DISBANDED AT CHICAGO

While it is true that the controlling factors in the A. M. C. M. A. will not disclose beforehand the action which will be taken at the meeting which will be held in Chicago during the National Show time, it is fairly good inside information that the A. M. C. M. A. is to be abandoned. It was originally organized under a contract for five years, and the time will expire within the next week or two. That this contract will not be renewed is largely due to the absence of companies outside of the A. L. A. M. When the atmosphere clears up, the only company left will be the Ford Motor Company, and while it seems quite certain that the Ford will continue as heretofore, the fact remains that the A. M. C. M. A. was organized almost independently of the position which was previously assumed by Henry Ford. He is still sticking to his position as then taken, and the disbanding of the A. M. C. M. A. is simply a logical move in the absence of members to support it. An association without members is in a rather anomalous position.

ALL BUT FORD TO BREAK INTO A.L.A.M.

It is now fairly understood that all the companies which were joined together under a contract for five years, and were known as the A. M. C. M. A. will be admitted into the fold under terms which The Automobile published some time since, but it was not then assured that the entire list of A. M. C. M. A. would come over. While the association is acting upon these names, seemingly one at a time, the fact remains that there is a place, apparently, for each one of the A. M. C. M. A. companies, with the understanding, of course, it desires a seat at the board.

RUSHMORE AND DIETZ LAMP FIRMS MERGE

It is announced that the Rushmore Dynamo Works, of Plainfield, N. J., and the R. E. Dietz Co., of New York City, have effected a combination to promote the sale of Rushmore lights and generators and Dietz oil lamps. Numerous improvements will be made, and the factory facilities greatly increased.

List of Accessory Exhibits

HORNS AND SPEEDOMETERS

Auto Improvement Co., New York.
Gabriel Horn Mfg. Co., Cleveland, O.
Hoffecker Company, Boston, Mass.
Jones Speedometer Company, New York.
Lovell-McConnell Mfg. Co., Newark, N. J.
Stewart & Clark Mfg. Co., Chicago, Ill.
Veeder Mfg. Co., Hartford, Conn.
Warner Instrument Co., Beloit, Wis.

LUBRICANTS AND LUBRICATORS

Cook, Adam, Sons, New York.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Hancock Mfg. Co., Charlotte, Mich.
Harris, A. W., Oil Co., Providence, R. I.
Havoline Oil Co., New York.
McCord Mfg. Co., Detroit, Mich.
N. Y. & N. J. Lubricants Co., New York.
Randall-Faichnay Co., Boston, Mass.

SHIELDS, TOPS AND MOUNTINGS

Chicago Wind Shield Co., Chicago, Ill.
Cowles, C., & Co., New Haven, Conn.
Fellwock Auto & Mfg. Co., Evansville, Ind.
Garage Equipment Co., Milwaukee, Wis.
Hayes Mfg. Co., Detroit, Mich.
Kimball, C. P., & Co., Chicago, Ill.
Mezger, C. A., New York.
Pantasote Co., New York.
Rande Mfg. Co., Detroit, Mich.
Sprague Umbrella Co., Norwalk, O.
Standard Varnish Works, Chicago, Ill.
Troy Carriage Sunshade Co., Troy, O.
20th Century Motor Car Supply Co., South Bend, Ind.
Valentine & Co., New York.
Vanguard Mfg. Co., Joliet, Ill.
Vehicle Top & Supply Co., St. Louis, Mo.

CARBURETERS AND GAS TANKS

Bowser, S. F., & Co. Fort Wayne, Ind.
Breeze Carbureter Co., Newark, N. J.
Byrne-Kingston & Co., Kokomo, Ind.
Gasoline Motor Efficiency Co., Jersey City, N. J.
Gilbert Mfg. Co., New Haven, Conn.
Holley Bros. Company, Detroit, Mich.
Mosler, A. R., & Co., New York.
Stromberg Motor Devices Mfg. Co., Chicago, Ill.
Wheeler & Schebler, Indianapolis, Ind.

SUPPLIES

Detroit Motor Car Supply Co., Detroit, Mich.
Excelsior Supply Co., Chicago, Ill.
Gilbert Mfg. Co., New Haven, Conn.
Standard Auto Supply Co., Chicago, Ill.
United Manufacturers, New York.

OTHER STRUCTURAL PARTS

Auto Parts Mfg. Co., Muncie, Ind.
Baldwin Chain & Mfg. Co., Worcester, Mass.
Bretz, J. S., Co., New York.
Brown Lipe Gear Co., Syracuse, N. Y.
Continental Motor Mfg. Co., Muskegon, Mich.
Cook's Standard Tool Co., Kalamazoo, Mich.
Cramp & Sons Ship & Engine Co., Philadelphia.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Driggs-Seabury Ordnance Corp., Sharon, Pa.
Duff Mfg. Co., Pittsburg, Pa.
Elite Mfg. Co., Ashland, O.
Excelsior Motor & Mfg. Co., Chicago, Ill.
Fientje, Ernst, Cambridge, Mass.
Franklin, H. H., Mfg. Co., Syracuse, N. Y.
Gemmer Mfg. Co., Detroit, Mich.
Globe Machine & Stamping Co., Cleveland, O.
Hartford Suspension Co., Jersey City, N. J.
Imperial Brass Mfg. Co., Chicago, Ill.
Link-Belt Mfg. Co., Philadelphia, Pa.
Long Mfg. Co., Chicago, Ill.
McCord Mfg. Co., Detroit, Mich.
Mesinger, H. & F., Mfg. Co., New York.
Motor Parts Co., Plainfield, N. J.
Muncie Gear Works, Muncie, Ind.
Oliver Mfg. Co., Chicago, Ill.
Perfection Spring Co., Cleveland, O.
Ross Gear & Tool Co., Lafayette, Ind.
Sager, J. H., Rochester, N. Y.
Smith, A. O., Co., Milwaukee, Wis.
Spicer Universal Joint Co., Plainfield, N. J.
Standard Roller Bearing Co., Philadelphia, Pa.
Standard Welding Co., Cleveland, O.
Timken-Detroit Axle Co., Detroit, Mich.
Timken Roller Bearing Co., Canton, O.
Triple Action Spring Co., Chicago, Ill.
United Manufacturers, New York.
Warner Gear Co., Muncie, Ind.
Warner Mfg. Co., Toledo, O.
Whiteley Steel Co., Muncie, Ind.
Whitney Mfg. Co., Hartford, Conn.

Accessory Display

GRANTING that the automobiles will all be lined up at the Ninth Annual Exhibition at the Coliseum and the Armory, all is not said. Separating out the accessories, in order that they may be the more conveniently examined, is all that it amounts to—the very cars which present such a fine spectacle, are only so because they are graced by the very accessories of which they are largely composed. Considering the accessories then, taking them away from the automobiles on which they rightfully belong, is but a convenience.

These units of automobiles, when they are properly considered, may well be separated out into classes, and in the process, to accept one of two or three schemes is a necessity. Trade considerations are at the bottom of some of the methods of classifying; tires, for illustration, are scarcely accessories—automobiles, to be of any use at all, must be equipped with them. In the long run, if the question is to receive intelligent treatment, the autoist who desires to advance on a firm footing, must remember:

(A) So-called accessories, provided they must be a part of an automobile if it is to run at all, belong to a class here designated as "units."

(B) Accessories, which are not essential to the running of a car, but, on the other hand, are present on a car if law and safety are given due weight, become accessories of necessity.

(C) The remaining consideration involves accessories of convenience—accessories which can be done without considering the running of the automobile, or the law, and safety.

Parts makers, as a rule, manufacture, from submitted designs, parts of units, and, from a logical point of view, belong to another class, or better yet, are as an annex of the automobile makers who employ them. Unit makers, since they evolve designs, have in mind the furtherance of their own interest, insofar as the establishing of a reputation for turning out good units becomes as a stock in trade which is ordinarily designated as "good will."

Accessories of necessity, under the classification here suggested, will be a little difficult to separate out; speedometers, according to some are not necessary; judging speed, on the other hand, is exceedingly difficult, and the autoist who regards the law, must admit that it is necessary to know the speed which is being made at any time in order to keep within the law. Take the ignition system, as an illustration of the difficulty involved in making a logical classification, and it is at once apparent that the magneto is a necessity, but it cannot be so readily shown that the auxiliary coil and battery is entitled to this rank—the coil is used when the magneto fails; true, under such conditions the coil will become a necessity, but this truth ranks with the conclusion which must be reached if the whole motor becomes deranged—another motor will have to be supplied.

Lamps are accessories of necessity when automobiles are run in the night time—they are merely onaments in broad daylight; the necessities rule, however, in making the classification. When the whole situation is adequately explored, it is difficult to separate out the accessories of convenience; perhaps a foot-warmer is in this class; mayhap a grademeter responds to the name, and it is convenient to have a time-piece on the dash, or a guidebook in the locker, a place for extra wraps, room for a trunk, and a windshield to break the force of the on-coming blast—let it be dust, wind, or the pesky messenger of the elements which takes on the form of hail, not forgetting a swarm of gnats.

WIDE AND VARIED

It is convenient, of course, to have a pair of goggles—are they necessary? Some times! Tops, for touring cars; they are as the "umbrella." Chains, for wheels; they prevent skidding. Extra tires—not so necessary these days when tires of good selections, and large enough for the work, are in common use—they are as a safeguard. If extra tires are taken along, why abuse them by allowing strong light, the product of inclement weather, and silt of the road to perch upon them—tire life is measured by two kinds of instruments, one of which is called "long" and the other "short." The particular one of these measuring instruments—instruments of precision, let us say, to take along, will depend upon the quality of the casing which hides the tires.

Lubricating oil is the "diplomat" of the automobile; it is as the go-between when friction and the "chip" which is on the shoulder of a journal begin to rub elbows. A can of lubricating oil is mighty handy; a convenience, let us admit, which has necessity as a first cousin. Grease! it is the diplomat's secretary. This same grease, in its capacity of secretary, does the dirty work; stands as a buffer between the silt of the road and the delicate surfaces of the plurality of bearings which are not provided with a drawing room in which to ceremoniously receive the prince of lubricants—oil.

The know-it-all who is so fond of saying that grease is out of a job until a journal warms up, ignores the fact that oil is not necessary in a bearing which will not warm up—let us have the can of solid lubricant; some of it belongs in the transmission gear system, more in the steering gear, a little in the eyes of the springs, a smear over the knuckle-pin, and a little here and there; with a portion in reserve.

Shock absorbers, while they are regarded as accessory features of automobiles, are so necessary that the automobile which speeds without them is far on the road to the guillotine; they soften the blow which comes when an obstruction rises up out of the roadway, and afford a second advantage—riding has more of pleasure, a better assurance of a safe ending, and less of the thought that the score will draw heavily upon the bank account. The need of shock absorbers, while it is absolute if the spring suspension is but poorly designed, is also present in proportion to the weight of the automobile and as the square of the velocity.

In the maintenance of tires, considering the composition of them, which is frictioned fabric in alternate layers with rubber, to measure life on the long scale, there are two or three details which must not be disregarded—the tires must be stoutly inflated and maintained in this state at all times. Besides inflating, in view of the ills which follow if dampness contacts with the bared fabric, it is essential to success that the fabric be kept coated with rubber. To assure this condition, it is necessary to repair each little score just when it happens; the fabric being cotton, serves as a wick, and the water which will be drawn in, is sure to carry along a myriad of mildew microbes.

It is useless to smear cut rubber over a wound—the rubber must be vulcanized; a vulcanizer is the accessory which will do the work quickly and well. As for inflation, it has been stated by experts of undoubted competence, that the autoist is not living who will be able to inflate a 36 by 5-inch tire to excess by using any manual tire pump made. The danger lies in not inflating sufficiently, and, without a gauge to tell of the growing pressure, it is very easy to allow the tired muscles of the man to act as the gauge—a tired man is a mighty poor gauge when it comes to the matter of coaxing long life out of a tire.

LIST of ACCESSORY EXHIBITS

PUBLICATIONS

The Automobile, New York.
Chilton Printing Co., Philadelphia, Pa.
Class Journal Co., New York.
Motor Age, Chicago, Ill.
Motor, New York.
Official Automobile Blue Book, Chicago, Ill.

MAGNETOS AND TIMERS

Atwater-Kent Mfg. Co., Philadelphia, Pa.
Bretz, J. S., Co., New York.
Connecticut Telephone & Elec. Co., Meriden, Conn.
Heinze Electric Company, Lowell, Mass.
Herz & Co., New York.
Lavalette & Co., New York.
Motsinger Device Mfg. Co., Pendleton, Ind.
Remy Electric Co., Anderson, Ind.
Simms Magneto Co., New York.
Splitdorf, C. F., New York.
Witherbee Igniter Co., New York.

MOTORCYCLES

American Motor Co., Brockton, Mass.
Aurora Automatic Machinery Co., Aurora, Ill.
Consolidated Mfg. Co., Toledo, O.
Excelsior Supply Co., Chicago, Ill.
Greyhound Motor Works, Buffalo, N. Y.
Harley-Davidson Motor Co., Milwaukee, Wis.
Hendee Mfg. Co., Springfield, Mass.
Hornecker Motor Mfg. Co., Geneseo, Ill.
Merkel-Light Motor Co., Pottstown, Pa.
New Era Gas Engine Co., Dayton, O.
Pierce Cycle Co., Buffalo, N. Y.
Reading Standard Co., Reading, Pa.
Reliance Motor Cycle Co., Owego, N. Y.

IGNITION OTHER THAN MAGNETOS

American Elec. Nov. & Mfg. Co., New York.
Apple Electric Co., Dayton, O.
Benford, E. M., Mt. Vernon, N. Y.
Briggs & Stratton, Milwaukee, Wis.
Electric Storage Battery Co., Philadelphia, Pa.
Hardy, R. E., Co., New York.
High Frequency Ignition Co., Los Angeles, Cal.
Kokomo Electric Co., Kokomo, Ind.
Mezger, C. A., New York.
Mosler, A. R., & Co., New York.
National Carbon Co., Cleveland, O.
National Coil Co., Lansing, Mich.
Never-Miss Spark Plug Co., Lansing, Mich.
U. S. Light & Heating Co., New York.
Vesta Accumulator Co., Chicago, Ill.

LAMPS, OIL AND ELECTRIC

Badger Brass Mfg. Co., Kenosha, Wis.
Dietz, R. E., Co., New York.
Edmunds & Jones Mfg. Co., Detroit, Mich.
Gray & Davis, Amesbury, Mass.
Ham, C. T., Mfg. Co., Rochester, N. Y.

MISCELLANEOUS

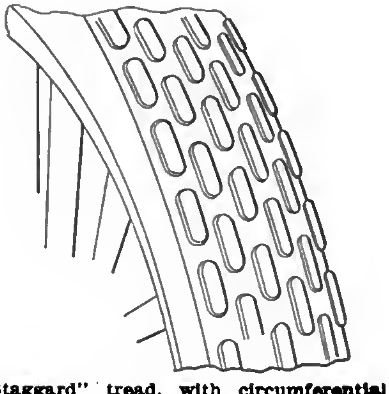
Breakstone, S., Chicago, Ill.
Fulton-Zinke Co., Chicago, Ill.
Gates-Osborn Mfg. Co., Marshalltown, Ia.
Morrison-Ricker Mfg. Co., Grinnell, Ia.
Motor Specialty Co., Detroit, Mich.
Norton Co., Worcester, Mass.
Overland Sales Co., Chicago, Ill.

TIRES, RIMS AND SUPPLIES

Ajax-Grieb Rubber Co., New York.
Batavia Rubber Co., Batavia, N. Y.
Continental Caoutchouc Co., New York.
Consolidated Rubber Tire Co., New York.
Dayton Rubber Mfg. Co., Dayton, O.
Diamond Rubber Co., Akron, O.
Empire Tire Co., Trenton, N. J.
Federal Rubber Co., Trenton, N. J.
Firestone Tire & Rubber Co., Akron, O.
Fisk Rubber Co., Chicopee Falls, Mass.
Fox Metallic Tire Belt Co., New York.
G & J Tire Co., Indianapolis, Ind.
Goodrich, B. F., Co., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hartford Rubber Works, Hartford, Conn.
Leather Tire Goods Co., Niagara Falls, N. Y.
Michelin Tire Co., Milltown, N. J.
Morgan & Wright, Detroit, Mich.
Motz Clincher Tire & Rubber Co., Akron, O.
Pennsylvania Rubber Co., Jeanette, Pa.
Republic Rubber Co., Youngstown, O.
Royal Equipment Co., Bridgeport, Conn.
Shaler, C. A., Co., Waupun, Wis.
Swinehart Clincher Tire & Rubber Co., Akron, O.
Thermoid Rubber Co., Trenton, N. J.
Universal Tire Protector Co., Angola, Ind.
Weed Chain Tire Grip Co., New York.

No label is needed on the Firestone non-skid, which has its name printed on it some thirty times, and leaves its mark as it goes.

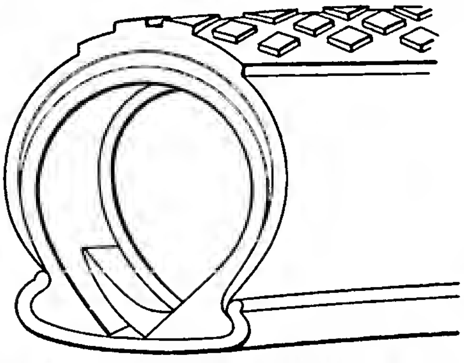
TIRES RIMS AND CHAINS



"Staggard" tread, with circumferential rows of oblong projections, characteristic of the Republic, non-skidding tire.

SOLUTIONS of the tire problem are many and various, and although grumblers may say that it is not really solved yet, still the situation has been reduced to a point where tires are fairly reliable and can be expected to give a known amount of service. Non-skid treads are especially in evidence, and the forms of demountable and quick-detachable rims show evidence of great inventive skill having been expended on them.

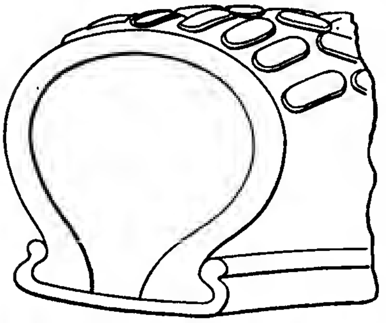
The latest production of the Ajax-Grieb Company, of New York City, following out the lines indicated above, is a diamond tread non-skid tire. The tread is simply made about 1-8-inch thicker than usual, and then criss-crossed with diagonal grooves. The raised diamonds thus resulting are so designed as not to flatten into a smooth surface when bearing the weight of the car, as they might be supposed to do. Of course, all Ajax tires will continue to be guaranteed for 5,000 miles, according to the well-known plan.



Diamond-shaped projections, arising from an already thickened tread, distinguish the Empire, new anti-skid tire.

The Continental demountable rim, marketed by the Continental Caoutchouc Company, of New York City, is one of the automobilist's old stand-bys. It shows few changes over the 1909 form. The clincher rim on the inner side bears against a permanent flange, and on the outer is retained by a series of wedge-shaped lugs on bolts which pass through the felloe. Lugs on the under side of the clincher rim rest in notches in the felloe rim, so preventing rotation. Continental non-skids are also shown.

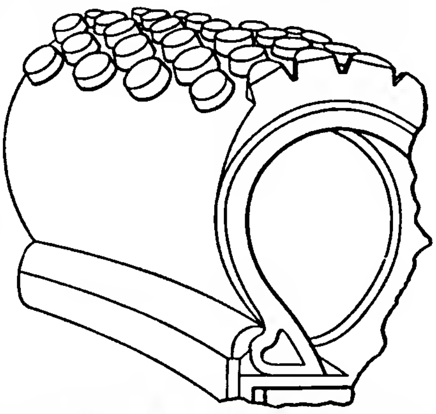
Dayton airless tires are again shown without change, except in that different styles of treads are offered to the purchaser. One of these, which the company calls a double-grip non-skid, has a flat corrugated tread with diagonal depressions about an inch apart. The interior construction of the Dayton is already familiar, the inner tube being simply abolished and the outer shoe strengthened with crosswise ribs molded integral. The maker is the Dayton Rubber Mfg. Co., of Dayton, O.



Morgan & Wright has oblong projections arranged in two spiral series, alternating with each other.

The Diamond Rubber Company, of Akron, O., shows that it fully appreciates the possibilities of the solid tire on motor buggies and commercial vehicles by showing a complete line of these, in addition to its well-known pneumatics. A new demountable rim also appears under the Diamond banner; it is of the bolt-retained type and looks solid and substantial. Several varieties of anti-skid treads also are shown at this stand. This company also manufactures hard rubber steering wheels and battery boxes.

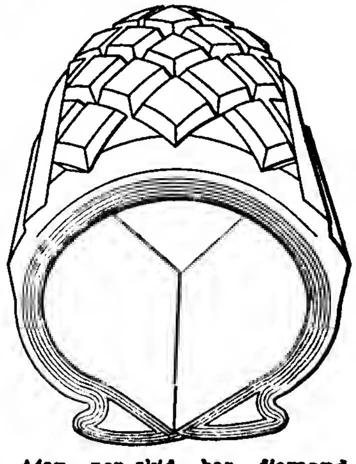
The checkered tread tire which appears at the stand of the Empire Tire Company, Trenton, N. J., is another variation of the groove idea; in it, however, the diamonds stand out separately on a raised portion of the tread. The Empire demountable rim is of the bolt-retained type; it is not necessary to remove the nuts on these, but merely to loosen them. The lugs may then be turned aside and the rim slipped off over them. This does away with the annoyance of losing these small parts in the road dust or mud.



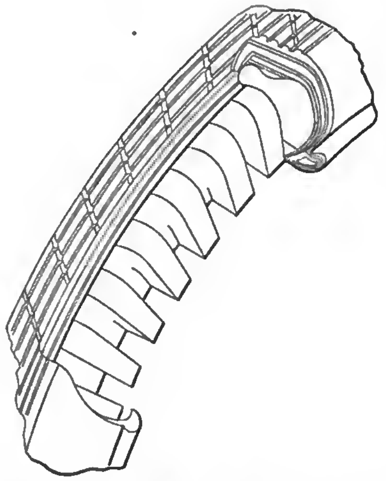
The time-tried Bailey tread is retained on the Diamond, and gives satisfactory service, both summer and winter.

The Federal non-skid, brought out by the Federal Rubber Company, of Milwaukee, Wis., has an idea apparently unique among the supporters of the all-rubber tread. These tires, known as the "cross-country type," have around their circumferences three rows of maltese crosses molded in the rubber. The rows are staggered with relation to each other, and the great number of sharp points seems well adapted to give a thoroughly firm grip on the road, even under the worst conditions.

No one could mistake the Firestone non-skid, no matter how unlearned he might be in technical matters; for it has its name written across it in bold letters some twenty or more times. The Firestone Tire & Rubber Company, which is another of the Akron group, believes in the all-rubber tread. The Firestone demountable rim, of the through-bolt type, differs from the ordinary run in that it is adapted to carry clincher rims of the



Ajax non-skid has diamond-shaped projections, formed by cutting grooves in the tread.

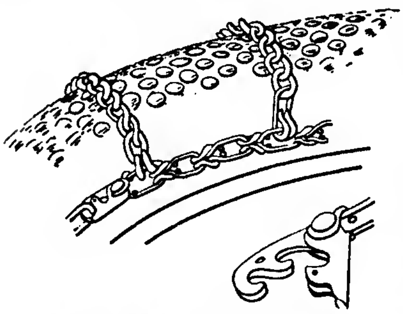


Dayton "airless" tires have a non-skid tread, formed by a novel method of grooving the surface rubber.

quick-detachable variety.

The Fisk demountable, designed especially to comply with the Fisk Rubber Company's ideas concerning the mechanical fastening of tires, has already been on the market several seasons and is quite familiar. It is another through-bolt type, in which the usual lugs are replaced by a continuous ring which encircles the rim and clamps it on by the pressure of the bolts. The valves of the tires used on this rim do not pass through the felloe, but come out diagonally at one side.

The anti-skid chains made by the Fox Metallic Tire Belt Company, of New York City, have their links stamped out of sheet metal. They are bent and interlocked, giving the effect of a flat steel band, with small square projections which make contact with the road surface. These cross chains are attached by side chains of the usual type, drawn together by a patent clamp with a lever to secure a good tension and prevent noise.

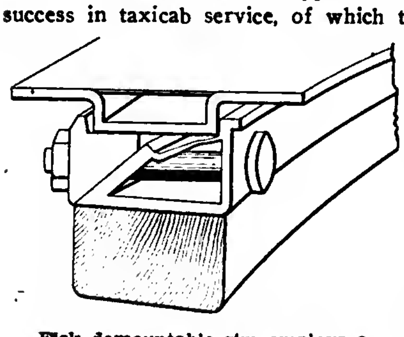


Weed chain grips in improved form, with the snap connection shown in detail beneath.

The Indianapolis company which makes the G. & J. tires has nothing of startling novelty to offer, depending on its standard line of clincher, Dunlop and quick-detachable types, all of which are made with either smooth or Bailey tread. One of the veterans of the tire business, the G. & J. Company, keeps on making the best tires it knows how, with its long experience, and automobilists certainly are not backward in investing their hard-earned cash in its product.

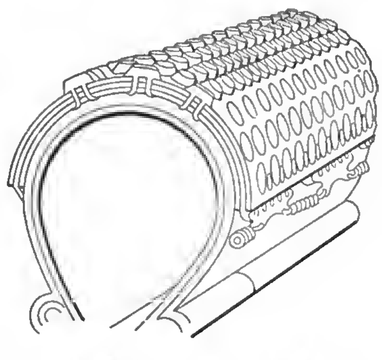
The Palmer web tires which have been used with such success on electric cars during the past season, come from the Akron, O., factory of the B. F. Goodrich Company, another veteran of the industry. It is claimed that the use of these tires has exceptionally good influence upon the single-charge mileage capability of the average electric. Of course, the standard clincher pneumatics are not being neglected; a specialty is being made of interchangeable odd sizes for cars sent out with undersized rims.

In addition to its Bailey tread non-skid the Goodyear Tire & Rubber Company, of Akron, O., has brought out a heavier non-skid of the raised diamond type. This is expected to find much success in taxicab service, of which the Goodyear Company is making a specialty. The Doolittle demountable-detachable rim, operated by turnbuckles, which this company recently adopted, is set forth in a comprehensive exhibit. It is one of the cleverest devices of the sort that has yet happened and deserves its remarkable success.



Fisk demountable rim employs a continuous ring as retainer, held in place by bolts.

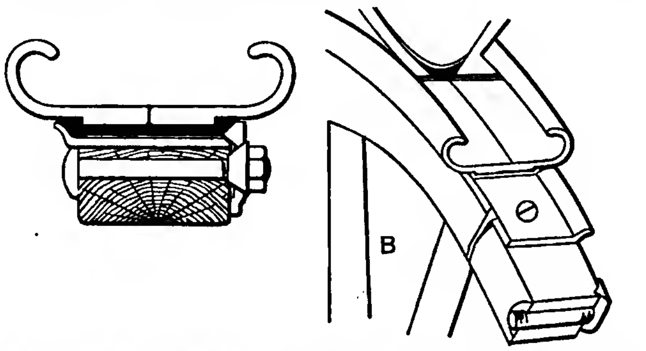
The Hartford Rubber Company, of Hartford, Conn., was one of the first to push the Dunlop style of tire, and still finds a large demand for it, in spite of the competition of the quick-detachables of the clincher style. The Hartford non-skid with the coils of steel spring wire encircling the tread has proved a great success, and now occupies a leading position in the company's output. Its multiplicity of claw-like points prove just the thing for greasy asphalt pavements.



Detachable non-skid treads are featured by the Woodworth, with side springs for tension.

Woodworth tire treads in several styles form the exhibit of the Leather Tire Goods Company, of Niagara Falls, N. Y. These are of leather, steel-studded and are detachable at will. In position they are held snugly against the tire by a series of coil springs along each edge. The Woodworth tire chain is of the usual type, but takes the precaution to interpose between each chain and the tread of the tire a strip of heavy leather, to protect the latter from abrasion.

The anti-skid type featured by the Michelin Tire Company, of Milltown, N. J., is steel-studded, the studs being imbedded

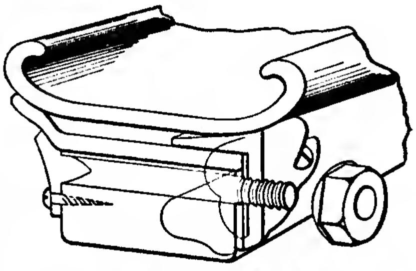


Perspective and cross-section of the Nadall demountable-detachable rim, from Chicago. Note the split slincher rim, which falls apart on the removal of the locking ring.

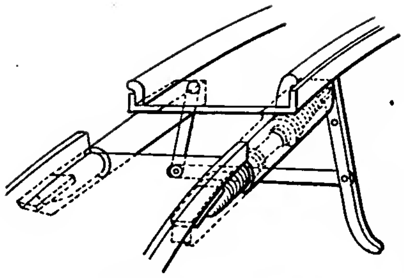
in a leather tread which is vulcanized to the rubber. These rivets, of soft steel, after being turned to shape, are chilled to give a glass-hard surface. The Michelin demountable rim, of the through-bolt type, has been on the market for a comparatively long time. The lugs have a rather thin wedge end which enters well under the clincher rim and gives a strong grip.

Morgan & Wright, of Detroit, have a new non-skid called the "Nobby," which is not slang, but describes the appearance of the tread. Raised oblong knobs encircle it in transverse rows, the rows running spirally with the alternates in opposite directions. The general idea is that often employed on the driving wheels of traction engines; thus the old saying is again proved, that there is nothing new under the sun. Still, the "Nobby Tread" will be found on many wheels next summer.

The Motz Clincher Tire & Rubber Company, of Akron, O., is a firm believer in the solid tire as against the pneumatic. The Motz idea is to secure resiliency by providing a deep cross-section for the tire, in which the rubber is cut away just under the tread. Thus, although there is ample wearing surface in contact with the road, the thinner portion provides a sufficient degree of resilience for all uses.



Demountable rim shown by Diamond, retained by a series of bolted wedge-shaped lugs.

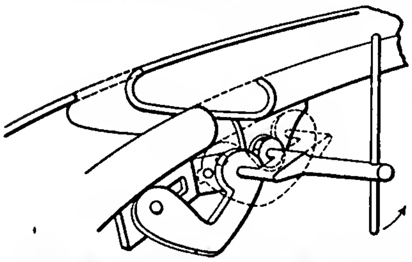


Doolittle demountable rim, adopted by Goodyear, uses twin turnbuckles actuated by one lever.

The exhibit of the Pennsylvania Rubber Company, of Jeannette, Pa., includes non-skids of both the molded rubber and the steel-stud types. The former is provided with a tread of a special hard white rubber held to the body of the tire by a strip of fabric impregnated with a special compound. Another form is a suction-cup tread, which is provided with a series of rubber knobs hollowed out in their centers. They are claimed to be very efficacious on greasy pavements.

The staggard tread, which was one of the earliest forms of the molded rubber non-skid, is again shown by the Republic Rubber Company, of Youngstown, O. The tire has a series of oval projections in rows running circumferentially of the tread. The rows, some five in number, overlap each other so as to form a surface of continuous roughness. The Republic exhibit shows a number of manufacturing samples illustrating the manner of forcing the rubber into the fabric of the tire in order to secure the permanent union.

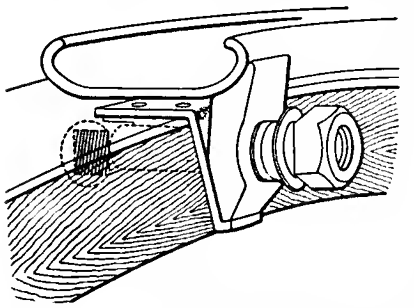
The vulcanizers made by the C. A. Shaler Company, of Waupun, Wis., are one of the experienced automobilist's constant companions, and have saved many a dollar in tire bills. They are now made in small sizes suitable for motorcycles, and have also been adapted to the use of electric current for the heating. These latter have an automatic heat control. They are made in sizes adapted both to the garage man and to the private owner.



Showing special tool required for the Universal demountable, which has a split rim.

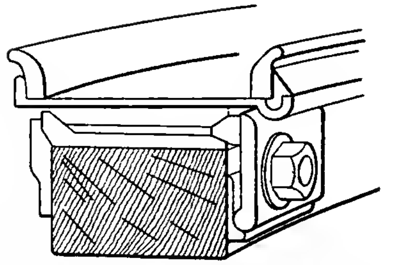
Native of Chicago is the Nadall demountable rim, made by the Nadall-Van Sicklen Company. It incorporates a quick-detachable scheme which has proved very successful. It is a through-bolt design, with a continuous circumferential ring instead of lugs. The quick-detachable idea is simply the splitting of the clincher rim circumferentially. The two halves are normally held together by a ring of spring steel, but may be easily separated. Then they fall apart and leave the tire absolutely free.

Standard solid cushion tires for clincher rims are shown at the stand of the Swinehart Clincher Tire & Rubber Company, of Akron, O. These are made for all kinds of pleasure and commercial vehicles, and are especially adapted for taxicab service. In addition the Swinehart Company is now marketing a clincher quick-detachable pneumatic tire. The quick detachable rim has a bolted flange which can be operated without any tool except the ordinary wrench.



On the Empire demountable rim the retaining lugs do not have to be removed completely.

The "Universal" tire protector, made by the company of the same name at Angola, Ind., is a heavy chrome leather band studden with hardened steel rivets. The protectors are easily detachable, though they are recommended for constant use in all weathers, fair or foul. The constant tension devices fitted on these bands are especially neat, and are claimed to prevent creeping of the tread under any condition.

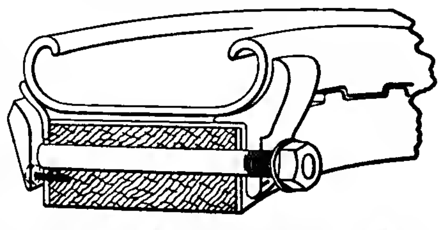


Firestone has a quick-detachable rim mounted demountably, of the bolt-retained type.

Weed tire chains, made by the well-known New York Company, have a firm grip on the affections of the autoist, as well as on the roads his car travels. For the 1910 product no change was found necessary. The only alteration has been the employment of a special grade of steel which would take the hard surface required by the work without becoming brittle. The Weed line now comprises no less than 76 different sizes.

The Universal Rim Company, of Chicago, is making a demountable rim of the type in which the clincher rim is sawn across, and the ends forced apart in order to remove the rim from the felloe. This is accomplished by an ingenious linkage, operated by a special key and lever; a single half turn of the lever is sufficient either to remove or replace the rim.

Hard though it may be to pick out any part of the automobile in which satisfactory service enhances the pleasure to be derived from the car, to the exclusion of other parts, yet most will agree that the tires are the most essential in this respect. It cannot be denied that in the past tires have been the automobilist's bugbear, even more so than ignition and carbureter troubles. The worst thing about a puncture or blowout has always been that it required considerable expenditure of the coin of the realm to set it right, whereas vibrators and auxiliary air valves could be adjusted without expense by the owner.

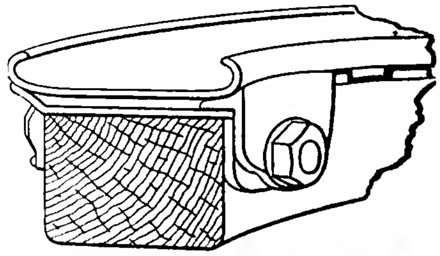


Precautions are taken by Michelin against creeping of the rim on its base, the felloe, which would shear off the valve-stem.

Innumerable attempts have been made to secure a satisfactory substitute for tbe pneumatic, and, as the descriptions above will show, some of these are meeting with considerable success. Yet the pneumatic remains the standard, and seems likely so to remain. The degree of perfection now reached is evidenced by the guarantees of 5,000 miles service which are made by several manufacturers.

Tires for commercial service are further from the point of finality than those for pleasure vehicles. For the heaviest trucks even solid rubber is often unsatisfactory. Wood blocks, and even aluminum and steel bands are used, though so far without exceptional success. Hardly a month passes without the announcement of some form of spring wheel, but these, too, have failed to secure wide recognition.

For medium-weight commercial vehicles pneumatic tires are invading fields hitherto the exclusive realm of the solid tire. The invention of the double and triple pneumatic, with two or three tires side by side on the same wheel, after the familiar arrangement of solid tires, has been the cause of this.



Retaining lugs of the Continental are neatly shaped and project no more than necessary.

Distance Revolution and Time Counters

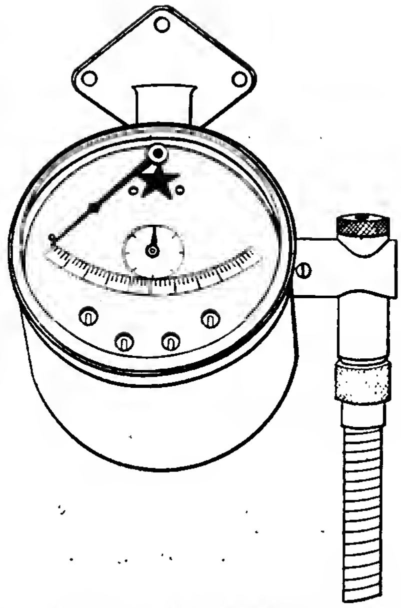
SPEED, time and distance are sources of the automobilist's greatest pride, and form the standard whereby he measures the superiority of his vehicle over all forms of transportation involving the horse. So it is that few cars are found without some instrument for measuring these quantities. But the odometer and speedometer are not limited in their usefulness to fostering pride, no matter how justifiable; they serve the business man in the verification of his accounts and the checking of expense accounts to prevent waste.

One of the most complete and varied lines offered for the show-goer's inspection is that of the Auto Improvement Company, New York City, which markets its products under the trade name of "Ever-Ready." Odometers, speedometers and clocks are shown in no less than fourteen styles and combinations. The speedometers belong to the centrifugal type, which claims the advantages of being immune to changes from climatic conditions. Neither are they over-sensitive to minor variations; on the contrary, the hand is very steady, at any speed from one mile an hour up. Part of the factory test to which each speedometer must submit before being delivered to the purchaser is a trip of 2,000 miles on the bench.

Three different sizes are made, with dials 2 5-8, 3 and 4 inches in diameter, registering to 50, 60, 70 or 80 miles. The driving shafts are constructed with great care, a steel monocoil being used, protected by a brass, steel-lined casing. The Auto Improvement Company has a special line of clocks built for automobile use, for which it claims many good points. These are sold either separately or in combination with other registering instruments.

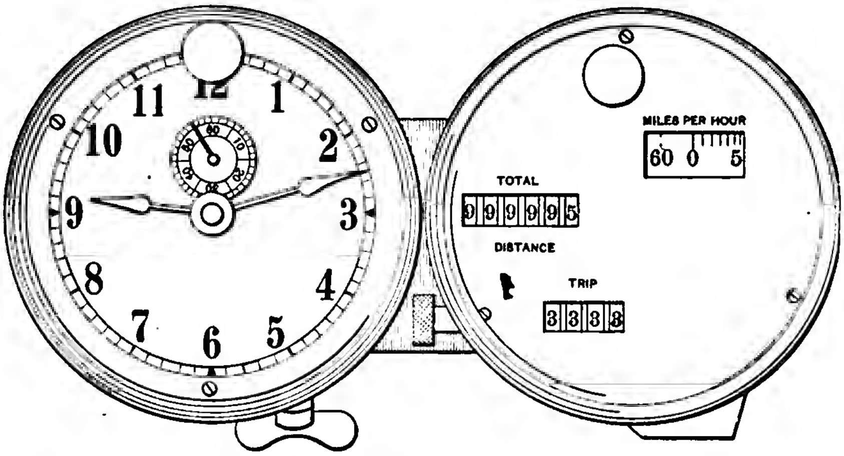
The Hoffecker Company, of Boston, Mass., has on hand its jolting machine to give spectators an ocular demonstration of the steadiness of "the steady hand." A frame is provided, loosely mounted, and with a cam mechanism which gives it frequent and violent shocks; on this is carried a speedometer driven at a constant speed. The frame jerks about in all directions, yet without affecting the indicating hand of the speedometer.

The Hoffecker is offered in three sizes, with 3, 3 1-2 and 4-inch dials, reading to maxima of 50, 60 and 90 miles respectively. With the smallest of these, which sells at a moderate price, a separate season and trip odometer of a well-known type is provided, attached to the outside of the case. The other two styles have a special Hoffecker odometer built in with the speedometer mechanism. This odometer differs from the usual form in that the trip mileage is indicated by a hand moving on a scale concentric with that of the speedometer proper, either inside or outside of it. The figures of the season odometer show through a window in the usual fashion. The Hoffecker operates on the centrifugal principle.

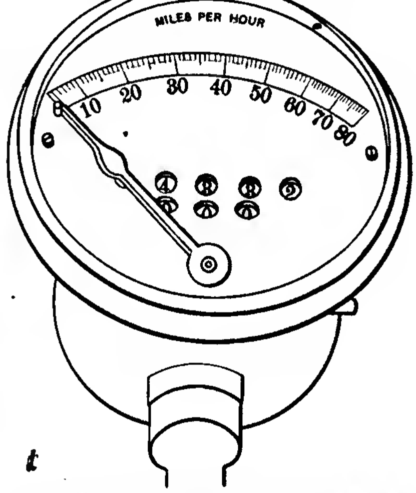


Star speedometer reverses usual arrangement of scale, with pivot at the top end and dial at the bottom.

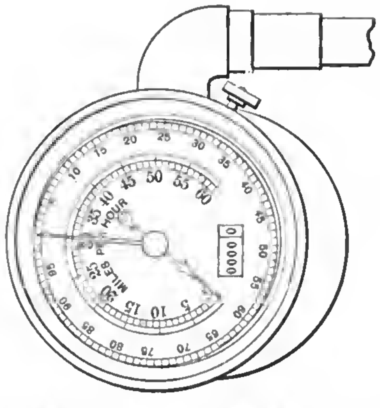
That busy little instrument, the Jones "Live-Map," is exhibited on the stand of the Jones Speedometer Company, of New York City, and attracts as much attention as it did at the two New York shows. The idea is to print the directions for a trip of a hundred miles on the rim of a cardboard disc, and to mount the disc in a frame with gearing to the front wheels in such a manner that it will be rotated at a speed proportional to that of the car. With the proper adjustment, a stationary hand on the frame will then always point to that part of the card which bears the directions for the road which the car is at that moment traversing. This presupposes, of course, that the car follows the route exactly, without side excursions. An adjustment is provided, however, which permits the card to be adjusted at any time to the position the car occupies. The cards are about ten inches in diameter, each bearing directions for a hundred miles of road, and about 600 different ones have been prepared by the Touring Club of America for use in the instrument. The usual line of Jones speedometers is shown, differing in few respects from those of 1909, combined in various ways with odometers.



Neat combination of clock and speedometer-odometer brought out by Warner as a member of the "Autometer" line. The odometer figures read to 100,000 and 1,000 miles for season and trip, and provision is made for electric lighting.



Compact instrument from the Jones factory, with scale reading from zero up to 80 miles an hour.



The trip odometer reading from a scale by an indicating hand distinguished the Hoffecker.

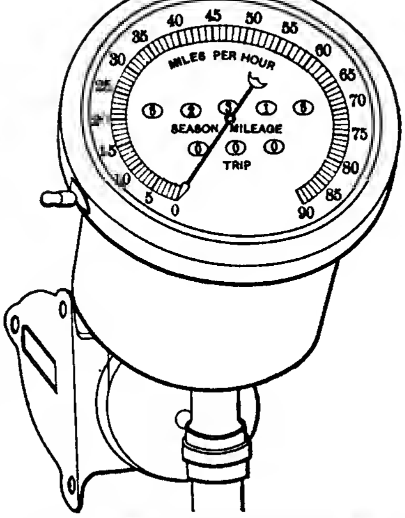
"Multipolar" speedometers are shown in various forms on the stand of the Stewart & Clark Mfg. Co., of Chicago. An especial feature, one which is usually associated with the Stewart product, is the method of mounting on a standard bolted to the frame of the car, instead of on the dashboard. The Stewart speedometers, however, are also made for attachment in the customary way, and both styles can be had in twin form with clocks.

In principle and operation the Stewart instruments do not differ from forms already found satisfactory. The principle, of course, is magnetism, the influence of a rotating magnet on a floating disc held by a spring, which attempts to follow the magnets. These latter, four in number, are imbedded in a ring-shaped rotor driven from the front wheel. They are made of imported tungsten steel, accurately machined. The central stud which carries the rotar receives in turn a spindle, mounted on a jewel bearing, which carries the following disc. Being made of a special alloy metal, this has a low resistance. It is also very light, even in connection with the indicating hand mounted on it, so that the hand moves freely.

Chief among the instruments which sell at a price gauged for the pocketbook of the man of average means is the "Star," the product of the Star Speedometer Company, of Danville, Pa. In appearance it is unostentatious, being in shape cylindrical and set to be mounted at an angle, with the dial on the upper face of the cylinder. The indicating hand is pivoted not at the center, but at the extreme upper and forward edge; it swings over an arc of perhaps 90 degrees on a scale graduated from zero to 50 miles by regular intervals. The odometer mechanism reads to four figures, the figures appearing in windows outside the speedometer scale; there is also a fractional hand, like the second hand of a watch, inside of the scale, reading by eighths..

The low price of the "Star" is claimed to be due to simplified design and modern methods of manufacture. Its gear cutting is done accurately, and the bearings are as nearly free from friction as it is possible to make them. Neither has the external finish been slighted. The flexible shaft drives through bevel gears into the side of the instrument.

Tachometers, as shown by the Veeder Mfg. Co., of Hartford, Conn., are, in reality, nothing more than what the public is accustomed to call speedometers. Their design depends on the principle of centrifugal force, but in an entirely different application from that commonly seen. The working part is a little centrifugal pump, like that used for circulating water in cooling systems. The liquid which fills the pump and the tube above it does not circulate, however, but is driven more and more completely out of the pump casing the faster the paddle wheel goes round. This action causes the liquid, which is red in color, to rise or fall in the glass tube above the pump, and a scale shows the speed to which the level corresponds.

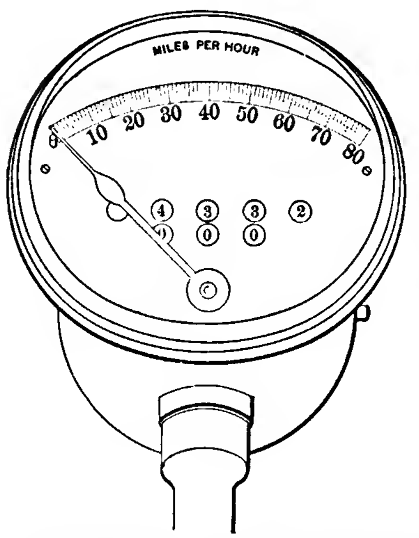


Exceptionally long scale is secured on the Stewart instrument reading up to as high as 90 miles.

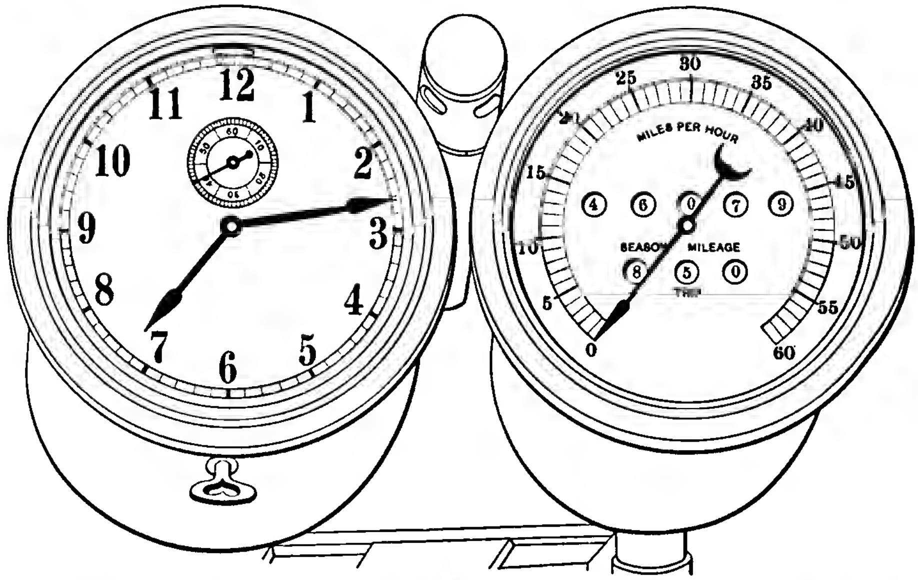
As long as the liquid stands at the zero mark when the car is at rest, the readings must be correct. If any of the liquid should leak out or evaporate, this fact would be indicated by the falling of the level below zero under this condition; it can then be adjusted by means of a small nut.

"Autometers" appear on the stand of the Warner Instrument Company, of Beloit, Wis., both in the form in which they first won the attention of the automobilist, and in the newer form in which they were first seen last year. The mechanism of the two are, of course, identical. Their distinctive feature is the use of a band with figures which appear in turn in front of a window, instead of an indicating hand. It is claimed for this system that it is possible to have a separate figure for each mile an hour of speed, amounting in effect to an indicating scale of many times the usual length.

These instruments work on the familiar magnetic principle, the magnet rotating and exerting a dragging influence on the spring-retained band. The odometers shown in combination with the newer forms read to 100,000 and 1,000 miles on their season and trip faces, instead of the customary 10,000 and 100 miles.



Another form of the Jones speedometer, differing slightly from that which was previously shown.



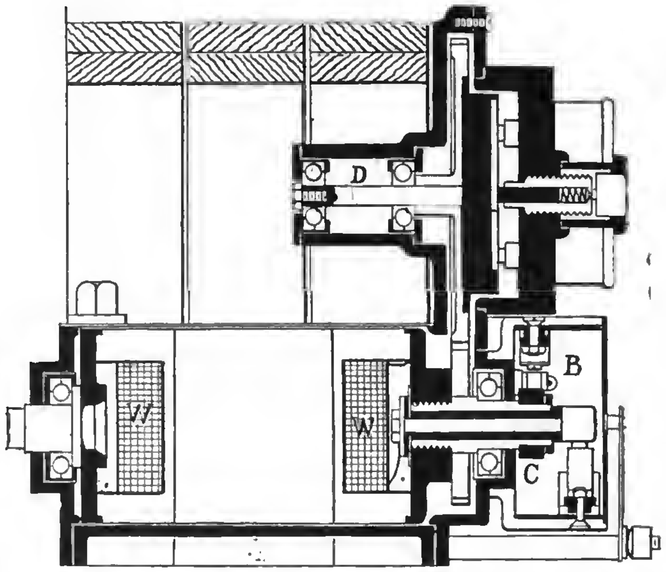
Twin instrument, with clock, of the Stewart Company, working on the magnetic principle; at night the combination may be illuminated by an electric bulb in the central turret, which is provided for that purpose.

Magnetos and Auxiliary Ignition Systems

PRINCIPLES of electricity, as applied to automobile ignition, are becoming more widely understood, and there is a corresponding increase in the number of systems offered to the public. Some of these, it is apparent, are the result of much painstaking experimentation, being applications of laws formerly understood only in research laboratories. Others are but new forms of old principles, depending for their merit on mechanical ingenuity and skill in design.

Among the oldest manufacturers of electrical ignition appliances in the country is the Apple Electric Company, of Dayton, Ohio. The regular Apple system employs a dynamo in connection with the storage battery and coil. In fact, the system differs from that which a few years ago was universal, namely, the battery, four-coil and timer system, only in the provision of the dynamo, which in service is constantly recharging the battery.

The Electric Storage Battery Company, of Philadelphia, will exhibit as usual Exide batteries suitable for electric pleasure and commercial vehicles, Exide sparking batteries and Exide lighting batteries. The latter are used, among others, by the Packard Motor Car Company to provide current for the dome lights in all Packard limousines. Exide ignition batteries are offered in two forms; one in the conventional way, with the usual number of cells, wired in series, in a wooden case, and the other with an emergency battery in the same case. The emergency battery is, of course, of the same voltage as the main battery, but has a smaller amperage capacity, being good for but a few hours' continuous usage. This, however, is usually sufficient for the automobilist to reach a charging station. The idea is like the reserve gasoline tank, which is almost universal.

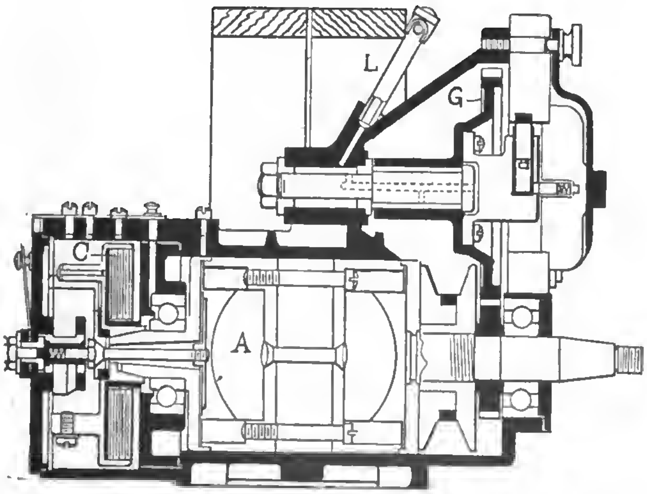


Splitdorf magneto shows thorough use of annular ball bearings, the distance between the bearings on the armature shaft being comparatively short to minimize bending strains on this part.

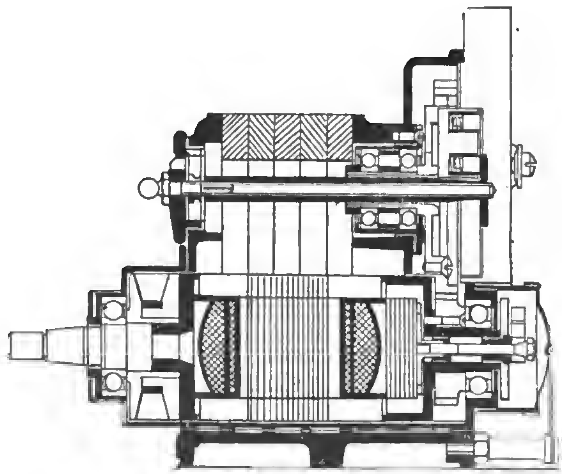
At Chicago, as at both the New York shows, the R. E. Hardy Company, of Detroit, will exhibit, in addition to its line of "Sta-Rite" plugs, a new plug called the "Apropos." The porcelain of this plug, at its business end, is hollowed out in a conical form, through the center of which the electrode projects.

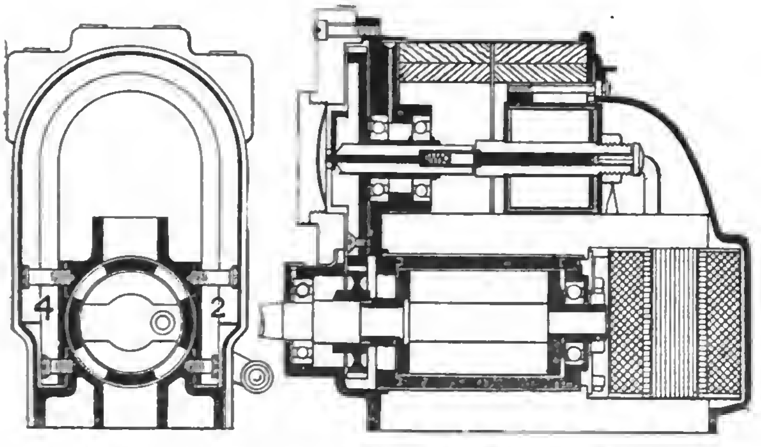
The Seeley ignition system and the Seeley duplex magneto are shown by the High Frequency Coil Company, of Los Angeles, Cal. The 1910 system is identical with that of last year. The electric current, which may come from either a magneto, a storage battery or a dry battery, is led through a non-vibrator coil with a condenser wired in parallel. From this the current goes through a single wire to a roller type of timer on the motor. The timer sends the current to the four cylinders in turn, by way of the resonators mounted on each cylinder. These in external appearance are small cylinders, seated on a bracket close to the spark plugs, to which they are connected by brass strips. Within each resonator are two windings, a primary of three turns, and a fine and dense secondary. The induced high-tension current in the latter in turn bridges the gap of the sparking points.

A complete line of electrical apparatus, and some other kinds, constitutes the exhibit of A. R. Mosler & Co., of New York City. Among these may be noted "Spit-Fire," "Triumph" and "Beat-em-All" spark plugs, "Umph" timers and distributers, Mosler roller timers and distributers, self-snap controlling levers and cut-out levers and "Isti" rear signals.

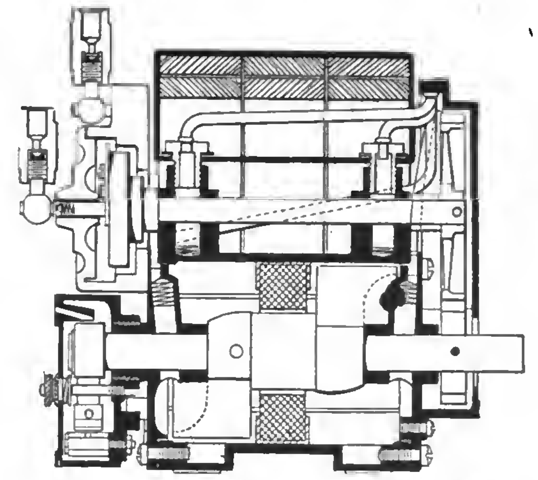


On the Kingston magneto the condenser is mounted concentrically with the armature, just inside of the contact-breaker, thus making the shortest possible connections.


Complete enclosure is a feature of the Herz magneto, the magnets being set close together and the ends closed in with plates; ball bearings are used throughout on both shafts.



On the Pittsfield magneto the coils in which the high-tension current is induced are mounted just behind the armature, and are always stationary; this arrangement allows them to be better insulated.

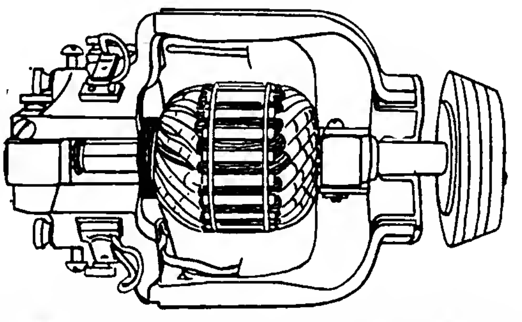


Compactness distinguished the Remy magneto, together with its original form of ball snap terminals for the high-tension leads.

Dry batteries still find considerable favor in ignition, being especially highly regarded as an auxiliary for magnetos. In this line the "Columbia," made by the National Carbon Company, of Cleveland, Ohio, has always occupied a position of pre-eminence. Advantages claimed for these batteries are that they may be replaced at a nominal cost when exhausted, instead of having to be recharged, like a storage battery, which means either the loss of the use of the battery for a considerable period of time, or else the greater investment of two batteries; further, they contain no acid, so will not slop and spill, or corrode terminals, and are water and weather-proof. The particular feature of the "Columbia" line is that these batteries give notice of their approaching exhaustion from 100 to 200 miles in advance of the point where they become useless.

"Monarch" spark plugs and timers are shown in various styles by E. M. Benford, of Mount Vernon, N. Y. The "Monarch" porcelain plug is simple in design, with electrodes projecting well into the combustion chamber. In mica-insulated forms the whole central core projects to meet the grounded electrode. The magneto plug, also mica-insulated, has a core of twice the usual thickness, so that the heat, oil and extreme high-tension current of magneto service can have no ill effect upon it. The insulated electrode has an inner head of crown shape, providing a multiplicity of sparking points wherever the points of the crown approach the cylindrical continuation of the outer shell.

The B. & S. igniter, which is made by the Briggs & Stratton Company, Milwaukee, Wis., is a device designed to replace a magneto, by accomplishing the ignition of an ordinary engine very economically from a set of storage or dry batteries. It is claimed that a four-cylinder engine will show 2,500 miles on one charging of a 6-60 storage battery. The device consists of a complete ignition system designed to be mounted rigidly on the engine base and driven by the shaft ordinarily provided for the timer. This case, 5 inches in height and 3¼ inches in diameter, contains a non-vibrating spark coil, a condenser, a positive make-and-break mechanism and a high-tension distributer to the plugs.



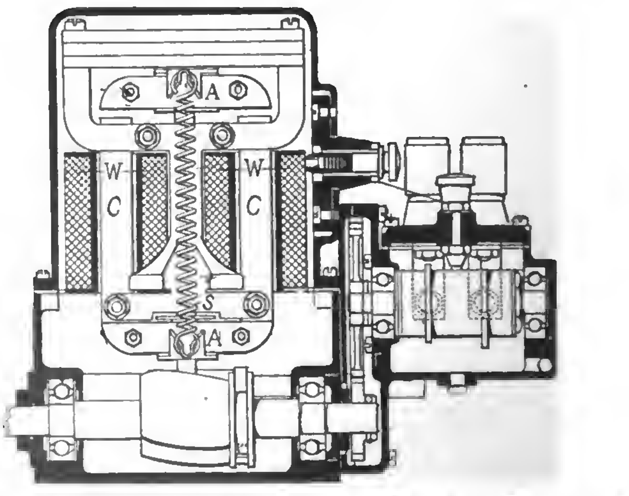
Dynamo generation of the ignition current is favored by the Apple Electric Company; the Apple machines are designed to be driven by a friction pulley on the flywheel.

In addition to Kingston coils, switches, timers and spark plugs, the Kokomo Electric Company, of Kokomo, Ind., has brought out for the coming season a magneto, of the standard type, but offering some refinements. Annular ball bearings are used throughout. The armature has a high-tension winding, making the magneto one of the true high-tension type.

"Soot-proof" spark plugs are shown by C. A. Mezger, Inc., of New York City. As this plug has been on the market for some time and is a favorite among automobilists, it is scarcely necessary to state that it still retains its characteristic feature, a long, straight electrode seated in a deep annular chamber, the walls of which form ample insulating surface. Even though the latter should be completely covered with soot or carbon, the resistance of the path thus formed would be so high that the spark would jump between the points in preference.

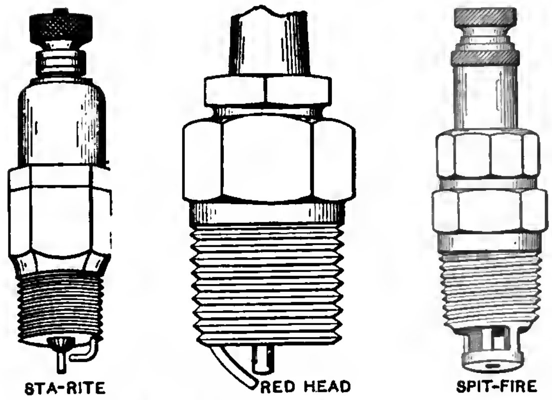
The chief exhibit at the stand of the Heinze Electric Company, of Lowell, Mass., is the new Heinze magneto. This attracts the eye through the shape of the horseshoe magnets, which are round in cross-section, instead of rectangular—that is, before bending they are rods rather than flat strips. The ends of the magnets are tapered and forced by pressure into correspondingly tapered holes in the pole-pieces, giving a very intimate contact. The armature core is of cast iron, and of the shuttle type, but the slots are not as deep as usual. The winding has fewer turns, also, the claim being that this is compensated for by cutting a greater number of lines of magnetic force on each revolution.

The Atwater-Kent spark generator is shown in a form closely resembling that of 1909, together with the Unisparker, which was new last season. As is well known, the great advantage of this system is its economy of current consumption, but one spark



The Witherbee represents an entirely new idea in ignition devices; it is claimed that it will generate sufficient current for starting by turning the starting crank.

being made for each explosion, instead of six or seven, as is the case with vibrator coils. In the spark generator the whole mechanism is placed on the dash and driven by a positive connection with the camshaft of the car; in the Unisparker the contact maker and distributer are placed on the engine, and the condenser and spark coil are placed on the dash, thus doing away with a separate drive shaft.



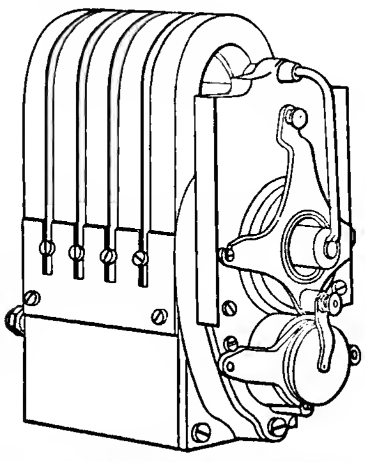
Illustrating three standard types of American-made spark plugs, two being porcelain-insulated and one using mica for this purpose.

The complete line of magnetos made by the German firm of Unterberg & Helmle is shown at the stand of the J. S. Bretz Company, of New York City. These are listed in nine sizes, two of which, designed for large motors, are fitted with the special U. & H. spring device, which produces a spark no matter how slowly the motor is cranked. A new form is that adapted for use in dual ignition systems; a special dash coil and switch has been provided for use with it, as the magneto is of the true high-tension type. The condenser is mounted on the end of the armature and revolves with it, so that a number of brushes and other connections are eliminated.

The Connecticut Telephone & Electric Company, of Meriden, Conn., recently announced the addition to its line of a magneto. Attention has been paid to the adapting of the magneto to the understanding of a man of limited mechanical education, such as are more and more to be found in the possession of automobiles. One feature in particular is the provision of a separate spark gap for each cylinder; in case that cylinder is not firing the spark will jump the safety gap and will be visible through a window. Another point aimed at was efficient sparking at low speed, so that it will not be necessary to spin the starting crank in order to start the motor.

Two types of Eisemann magneto are marketed by Lavalette & Co., of New York City. The original Eisemann, which was a low-tension with separate coil, is continued, but there has been added a true high-tension type, with secondary winding on the armature. Both employ pole-pieces of a helicoidal shape, whereby the magnetic lines of force are progressively broken and reestablished. A spark advance of 35 degrees has been made possible, the method being the shifting of the steel shoes on which the fiber block of the make-and-break device works. The same company has a dual ignition system, with non-vibrator dash coil and switch, for starting from the seat.

An entirely new magneto for primary ignition is shown by the Motsinger Device Manufacturing Company, of Pendleton, Ind. It is driven by a friction governor pulley and operates equally well in either direction. It generates a direct current, and is intended for use with the regular equipment of spark coils and timer. The familiar "Auto-Sparker" has by no means been superseded, however, being still on the job, and this year capable of a slightly greater amperage output than formerly. It is suited for charging 6-volt storage cells and can carry a load of six tungsten lamps each 6 volts and ½ impere.


K-W magneto, in which all working parts are of chrome steel, ground and lapped.

Coils insulated in glass form the exhibit of the National Coil Company, of Lansing, Mich. The efficiency of glass as an insulator is proven by its use in many other situations in electrical engineering where an insulator of great reliability is required. The National coils are claimed to be proof against all leakage of current and cross-induction between coils, thus eliminating one of the most prolific sources of missing, mis-firing, slow action, large fuel consumption and run-down batteries. In appearance these coils differ in no way from standard, the usual hard rubber insulation being simply replaced by glass. This material is naturally of an exceptional quality, to stand the hard service.

The "Never-Miss" spark plugs, guaranteed for one year, are shown by the Never-Miss Spark Plug Company, of Lansing, Mich. These plugs are made in two types, one for magneto use with four grounded points surrounding the central electrode, and the regular design with both points of the projecting wire form. The exhibit includes an auto clock, to be fastened to the steering wheel rim; ammeters, also guaranteed for one year; battery connections, and chain-repair devices to bring together and hold in place the ends of a broken chain.

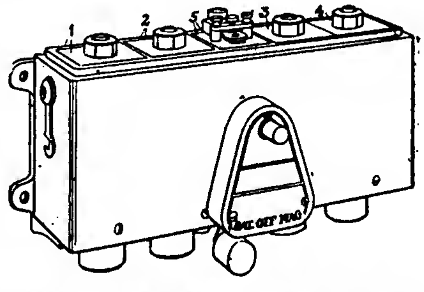
Simms magnetos, made in England by Frederick Simms, of the original Simms-Bosch Company, are imported and sold in this country by the Simms Magneto Company, of New York City. They are of the standard high-tension type, with secondary windings on the armature. In design they show the results of the long experience of their maker in this line of work. The claim is made for them that with six drops of oil every 10,000 miles they will give continuous and reliable service for hundreds of thousands of miles.

A complete line of storage batteries for electric vehicles is shown by the United States Light & Heating Company, of New York City, whose products go under the trade name of the "National" batteries. This concern has introduced new types of batteries, in one of which the plates are of a medium thickness, while in the other they are very thin. It also shows its new line of high-bridge jars.

Remy low-tension magnetos are shown in two models for 1910 at the stand of the Remy Electric Company, of Anderson, Ind. Both types are of the same design, which is well described pictorially in the illustration offered herewith.

The Vesta Accumulator Company shows storage batteries for lighting and ignition purposes. The former are being made a specialty, in view of the great popularity of electricity as a means of illumination. The Vesta magneto, of the low-tension type, which made its début at New York this year, is also on hand. It embodies all the features which have come to be regarded as standard in that type of magnetos which relies on a separate coil for the transformation of the current to a high voltage.

The Witherbee igniter is the latest product of the Witherbee Igniter Company, which started as a manufacturer of storage batteries. Its design differs in many respects from standard, embodying as it does a very successful effort in the direction of providing a good spark at a very low speed, for easy starting of the motor. The lines of magnetic force are cut by a cam-operated device corresponding to the armature, which however works at a fixed rate of speed.



Master-vibrator spark coil brought out by the Connecticut Telephone Company, which has many good features.

Electric Acetylene and Kerosene Lamps

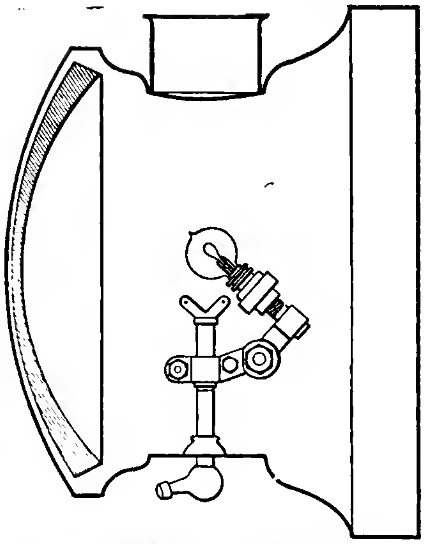
ORNAMENTAL, as well as useful, are the lamps which are now being produced by the leaders in this line. After reaching the nearest possible point to ultimate perfection as light-giving devices, the continued development has been in the line of beautifying the lines and finish.

In simplicity and pleasing though unostentatious effect, one of the leaders is the "torpedo" style of the Solar, made by the veteran lamp-maker, the Badger Brass Mfg. Co., of Kenosha, Wis. The body and flare of this lamp are a single piece of heavy brass, and the door is recessed in such a manner that the front reflector is outside the glass. Two forms of eclipsing devices for city driving are shown. The "Solarclipse" drops a shutter behind the acetylene jet and the back reflector, and the "Raydeflector" shifts the jet out of focus with the reflector.

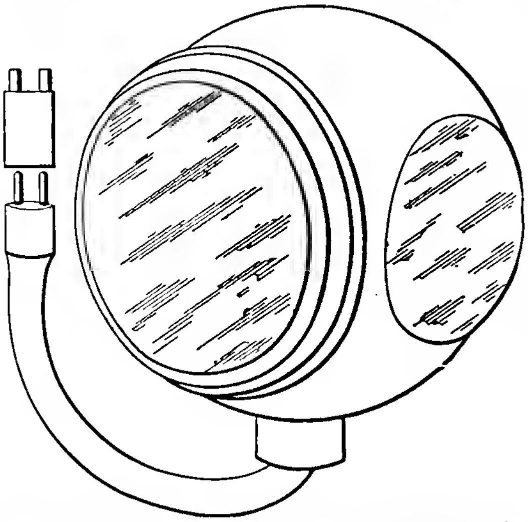
R. E. Dietz & Company, of New York City, has five sizes of "Majestic" headlights, with several varieties of side and tail lamps. The line of the company has been much reduced by eliminating patterns which were found not up to the required standard; consequently the whole product is now concentrated on a few of the very best styles. New devices are the result of recent demands, among them the "Presto," for changing from oil to electricity, and "Comet," for changing from oil to acetylene.

Edmunds & Jones, of Detroit, display oil and electric side lamps and combination electric and acetylene headlights. The latter are distinguished in appearance by their rather unusual length. The flare fronts are integral with the cylinder part, giving a smooth surface. The latest E. & J. development is a condensation cup, to catch the water which is often present in acetylene gas and which always causes trouble unless quickly eliminated. The idea is to arrange the piping so that water will drain into the cup, where it will not interfere with the system.

The leader in the Gray & Davis line is the close-coupled lamp, which has a very short body. The shortness of the body is said to prevent flickering, as there is no body of useless air in which currents may arise. On the other hand, there is more air above and below the jet, where it is the most use. Another Gray & Davis feature is the patent leather finish, a dull black surface which does not require polishing, yet has a rich appearance. A combination electric and acetylene device, very neat in design, forms a part of the exhibit, and seems destined to popularity.

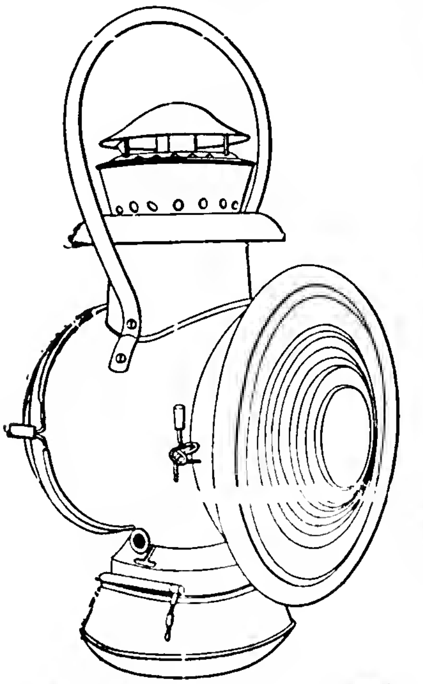

Gray & Davis combination acetylene and electric headlight, as an electric.

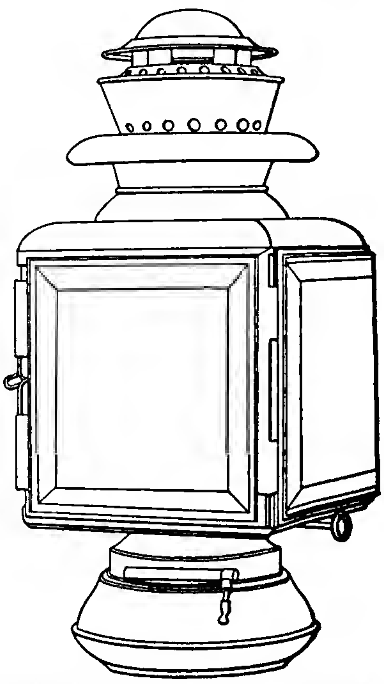
Ham's "Cold Blast" oil lamps, made by the C. T. Ham Company, of Rochester, N. Y., embody features of design which have always secured them a place when the question was one of reliability in light-giving. They are neat in appearance, showing a considerable degree of perfection in design, both from the mechanical and artistic points of view. The doors of the cylindrical body styles are made with bull's-eye lenses of a special design, which is said to greatly enhance their light-projecting qualities.


Dietz electric tail-light, in which advantage is taken of electric simplicity to make the shape.

Two distinct tendencies are to be observed in lamp construction, one of them is the movement toward the universal use of electricity, and the other the tendency to provide means of dimming the projected beams of powerful headlights. The latter has been made the subject of not a few city ordinances, and automobilists who live in the affected districts are tired of compliance by such primitive means as whitewashing the front glass, or pasting in a sheet of brown paper—both are common.

As for electric lighting, the great obstacle is the almost universal use of the magneto for the ignition system. The doom of the battery, even as an auxiliary, was already in sight when electric lighting first became popular. The majority of magnetos are not used for lighting.


Cylindrical-bodied Ham oil side light, with bull's-eye front lens.


Ham square-bodied, oil-burning side light, known as the "Coupé" style.

Carburetors and Fuel Accessories

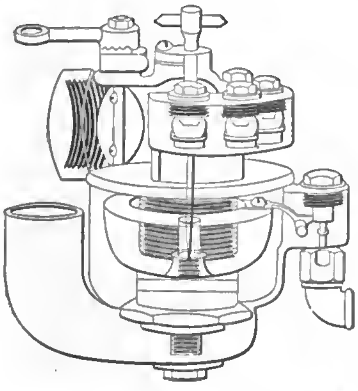
FUEL systems are covered in complete by the exhibits, ranging from the gasoline storage tank, through pumps and other distributing mechanisms to the gasoline tank of the automobile, thence through intermediate devices to the carbureters; one new device provides for the further mixing of the gas after leaving the carbureter for the motor cylinders.

The S. F. Bowser Company, of South Bend, Ind., shows its well-known and reliable line of storage tanks and pumps, which have become a standard. These are built to fulfill any requirement for either a public or private garage, providing a safe and convenient storage. The tanks are located outside of the building, and are filled from the outside; the pump, on the contrary, is on the inside, and delivers the required amount of gasoline into the tank of the car without exposure to the air.

The Breeze carbureter, shown by the Breeze Carbureter Company, of Newark, N. J., is distinguished by such modern features as the venturi-tube suction chamber surrounding the gasoline jet, and the concentric float. The gasoline and air adjustments are both placed on top of the carbureter, the former having figures and graduations stamped on a dial head to indicate its position. The auxiliary air valve is claimed to be noiseless in action, and the longer it is in use the better it seats. The shape of the needle valve, which comes down into the opening of the nozzle, causes the gasoline spray to be broken up into the finest particles. This company also makes a gasoline strainer and various forms of engine connections.

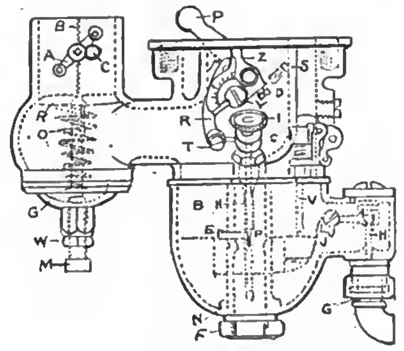
An interesting type of auxiliary air valve may be observed on the Kingston carbureter, exhibited by Byrne, Kingston & Company, of Kokomo, Ind. It consists of a series of ball valves, which the suction of the motor causes to lift in turn, progressively, from their seats. The openings in the seats on which the balls rest are cups or inverted cones of different tapers. The top of the gasoline nozzle forms a cup, the upper edge of which is somewhat above the narrowest part of the chamber.

The clever little device brought out by the Gasoline Motor Efficiency Company, of Jersey City, N. J., under the trade name of "Homo," is favorably staged. This device, it will be remembered, is intended to be inserted in the inlet pipe between the carbureter and the motor. It consists of a screen of coarse wire mesh, behind which is a ball-bearing fan. The passage of the stream of mixture causes the fan to rotate and break up the particles of liquid gasoline, thus assuring a uniform gas charge.



Kingston carbureter, showing row of ball valves for auxiliary air.

The Bowers carbureter, an unusually simple and compact device, is exhibited at the stand of the Gilbert Mfg. Co., of New Haven, Conn., successor to the F. E. Bowers Company. Like many other carbureters of recent date, the Bowers embodies the venturi-tube suction chamber and the concentric float. The compact appearance is due largely to the fact that the supplementary air inlet is concentric with the main air inlet. The venturi-tube has a conical-shaped piece inserted in its lower end, surrounding the jet, through which the main air supply enters. The auxiliary air comes in around this central piece and joins the central stream in a mixing chamber above the jet. The shape is such that a whirlpool effect is created in the chamber.



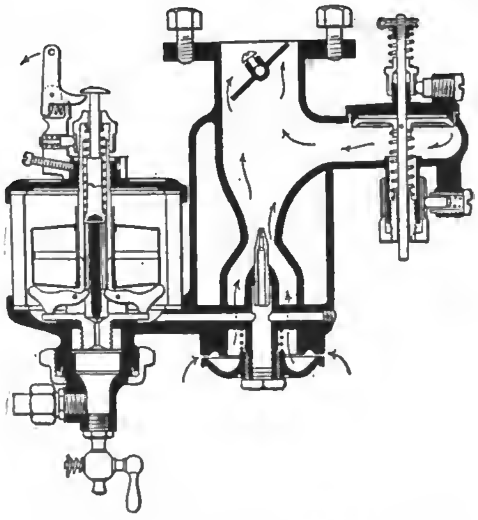
Latest model of Schebler carbureter, retaining original features.

The Holley Brothers Company exhibit the carbureter bearing their name in several forms, all of which are more or less familiar to the public. This company will be remembered as the first to utilize the venturi principle as the exclusive means of proportioning the air supply to the gasoline, and also as the originator of that type known as the "puddle" carbureter, in which at low motor speeds the mixture is by evaporation from the surface of a puddle of gasoline, rather than by a spray. One of the forms offered to the public is the original of this type, in which the float chamber is concentric with the jet, and the automatic air valve is eliminated.

A. R. Mosler & Company, of New York City, show a carbureter known as the M & B, a small and light device with a concentric float. The air passages appear to be in the shape of a letter T, the vertical stem being the main air passage, surrounded by the float chamber and having in its center the gasoline nozzle. One of the arms of the T has the auxiliary air valve in its end, and the other forms the outlet for the completely mixed gas. A butterfly throttle valve is regularly provided at this outlet. The auxiliary air valve is adjustable by means of an easily operated wing nut. The needle valve screws down on the jet from above, and is provided with a graduated nut and spring stop.

The Stromberg Motor Devices Company appears in its home show with a complete line of carbureters of two types, in one of which the float is concentric and in the other located by the side of the mixing chamber. The latter form provides an ample water jacket surrounding the mixing chamber, to compensate for the loss of heat incidental upon vaporization. The transparent glass float chamber, which gives these carbureters such a distinctive appearance, is naturally continued.

Four styles of the Schebler carbureter are shown on the stand of Wheeler & Schebler, of Indianapolis. All of these have concentric float chambers. In three of the styles the air passage traverses the float chamber in the shape of a letter L, with the jet at the angle. In the fourth type the main air passage is straight and vertical, slightly strangled at the jet to secure a venturi-tube effect. The jet comes into this passage at an angle, with an overhead valve.



Stromberg carbureter, with glass float chamber and venturi tube.

Motors Transmissions Steering Gear and Parts

SUFFICIENT for the manufacture of a complete automobile are the parts shown by the assemblage of manufacturers in the galleries of the show buildings. From the motor, gears and axles, down to the smallest and least important accessories, everything needful is there. Crankshafts, cylinder castings and axle forgings appear in the rough, and as finished and assembled into their respective units.

Chains as a method of transmitting power have many advantages which have by no means been lost sight of by automobile manufacturers. They are more efficient than any other known method of transmitting power between parallel shafts, and far superior to any of the methods of transmitting between shafts at an angle. Apropos of which is the exhibit of the Baldwin Chain & Mfg. Co., of Worcester, Mass., which is exclusively devoted to chains and sprockets. A new form of quick-detachable link is featured.

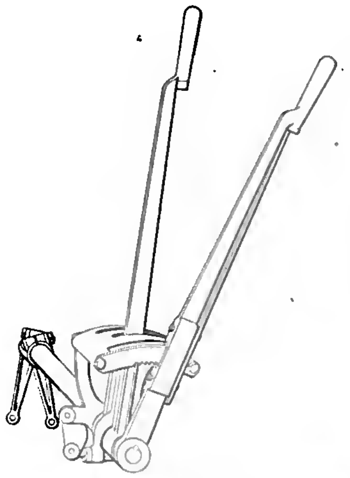
The shipbuilding firm of William Cramp & Sons finds many customers among the automobile builders. It specializes in several alloys of the brass and bronze genera. Parsons white brass is almost a standard for crankshaft and other heavy-duty bearings. Manganese bronze, either in ingots or castings, is also furnished by this company; the castings include many intricate shapes, such as crankcases, gear cases, and front and rear axles.

The Diamond Chain & Mfg. Co., of Indianapolis, is another upholder of the chain as a transmitter of power. The company is very proud of the fact that its chains were selected for use on the Wright aeroplanes, in which they are used to connect the motor with the two propellers.

The Driggs-Seabury Ordnance Corporation, of Sharon, Pa., is preparing to furnish forgings and stampings for crankshafts, connecting rods, axles and frames of various qualities of steel, and in any stage of finish.

Die-cast babbitt bushings are exhibited by the H. H. Franklin Mfg. Co., of Syracuse, N. Y., the maker of the Franklin automobile. These bushings are used throughout the Franklin, and have given such satisfactory service that the company established a special department to make and sell them to other builders.

In the line of steering gears the product of the Gemmer Mfg. Co., of Detroit, comes near to the standard. These gears are simple and not over-expensive, and at the same time are strong enough to insure safety in this vital part of the car.

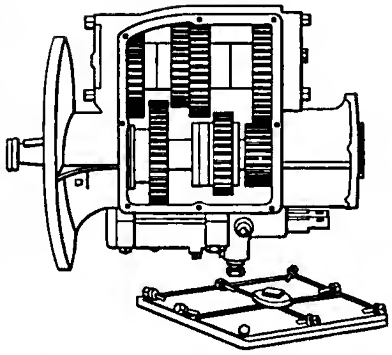


Selective gear and brake levers made by the Warner Mfg. Co.

"Imperial" compression couplings are shown at the exhibit of the Imperial Brass Mfg. Co., of Chicago, in a multiplicity of sizes and styles. They are of the cone type, and offer many advantages for automobile use.

Steel tool and battery boxes are the product of the Globe Machine & Stamping Company, of Cleveland. They are specialized for the various demands of an automobile, one being just the size to hold a gas tank; others are fitted with treads for steps.

The exhibit of the Elite Mfg. Co., of Ashland, O., is made up of various styles of "Ohio" jacks, the latest being a new-style ratchet, which is claimed to have only one-half the usual number of parts. The lifting bar can be dropped instantly.



Three-speed selective type of change-gear for rear axle unit construction.

Three distinct styles of "Long Distance" radiators are on the stand of the Long Mfg. Co., a Chicago firm which has attained prominence in this line. One of these is a vertical tube design, and the others are of the cellular persuasion.

McCord tubular radiators are seen in good company. The vertical tubes are closely united with the horizontal sheets which form the body of the radiating service, so that both form a rigid mass. The exhibit of the McCord Mfg. Co., a Detroiter, includes oilers, radiator fans and gaskets, all of which find a wide use among automobile manufacturers.

Auto Cle wrench sets appear on the stand of the Motor Parts Company, of Plainfield, N. J. These sets, which are well known to automobilists, consist of sockets of various sizes, all fitting a single universally-jointed handle, which can be operated through the most tangled maze of pipes.

The pioneer jack company, the Oliver Mfg. Co., of Chicago, shows its improved "Peerless" jacks, which are now made so that the handle can be used as a tire tool or a hammer. The jacks work with equal ease in either direction.

Sager equalizing coil springs, which are a form of shock absorber, form an interesting exhibit at the stand of J. H. Sager & Company, Rochester, N. Y., together with bumpers to protect the lamps and radiator.

Dust-proof and oil-tight, the Spicer universal joints shown by the Spicer Universal Joint Mfg. Co., of Plainfield, N. J., have found a wide employment on modern automobiles.

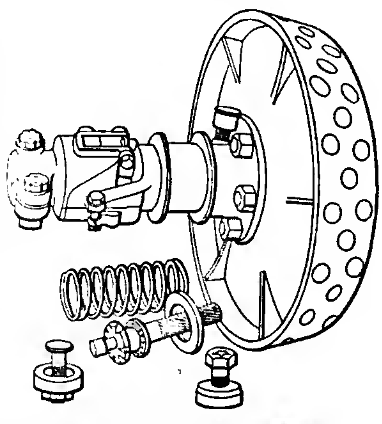
Rims of the suitable cross-section are one of the requisites in securing satisfactory tire service, so it is not likely that the up-to-date manufacturers neglected the stand of the Standard Welding Company, of Cleveland.

Whitney chains, made by the Whitney Mfg. Co., of Hartford, Conn., are especially adapted to commercial vehicle work, and the maker is vigorously pushing them in that line.

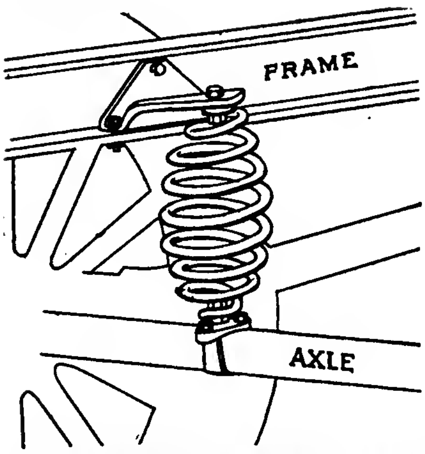
J. S. Bretz & Company, of New York, in addition to U. & H. magnetos, shows a full line of F. & S. ball-bearings, a German make which is widely used on both sides of the Atlantic. The bearings are made with single or double rows of balls, and also in a special type for magnetos for all purposes.

Standard roller bearings are shown both separately and combined in rear axles of various types, by the maker, the Standard Roller Bearing Company, of Philadelphia.

The Timken-Detroit Axle Company and the Timken Roller Bearing Company, of Canton, O., both show Timken roller bearings, separate and in axle forms. A specialty is the short type of bearing, which can be used in place



Cone clutch with cork inserts, product of the Auto Parts Mfg. Co.



Coil springs attached between the axle and frame, as used by Sager.

of the annual ball-bearings, and is made in the same sizes. This is finding much favor for change-gears, where the space is limited.

The Brown-Lipe Gear Company, of Syracuse, N. Y., shows a line of change-gears, steering gears and differentials which is familiar to all automobilists. Its spur and internal gear differentials have long been a standard.

"Continental" motors are shown three sizes, rated at 30, 50 and 60 horsepower, by the Continental Motor Mfg. Co., of Muskegon, Mich. All are four-cylinder models, with cylinders cast in pairs, and have a very neat pump system of lubrication.

Neat in appearance, the product of the Excelsior Motor & Mfg. Co., of Chicago, attracted favorable comment. It is a four-cylinder motor 4 1-8 by 5 1-4 inches, with a multiple-jet carbureter and a pump system of lubrication.

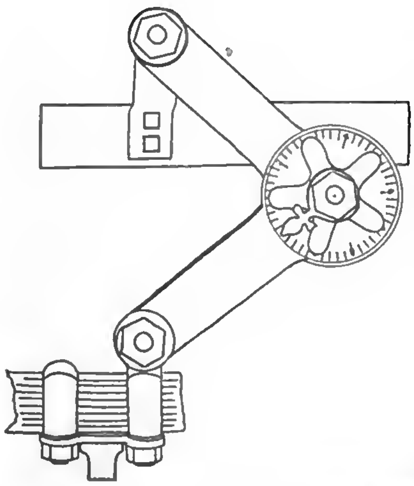
The Muncie Gear Works, of Muncie, Ind., shows a two-speed and reverse planetary gear in combination with bevels, differential, and a jackshaft suitable for use on motor buggies.

The Warner Mfg. Co., of Toledo, O., has a line of change-gears of all kinds, making a specialty of the rear axle type for unit construction. Differentials and steering gears are also shown. The Warner Gear Company, Muncie, Ind., is offering a full line of transmission gears, steering equipment, and parts. The plant of this company is one of the sights of Muncie, and many of the assemblers of automobiles of fine characteristics look to this concern for the very equipment which is at the bottom of the quality which is favorably commented upon.

Hartford shock absorbers of the friction-plate type are exemplified by two model automobiles each about two feet long, which seem to be traveling over a very rough road. One of them bumps and one does not; the conclusion is obvious.

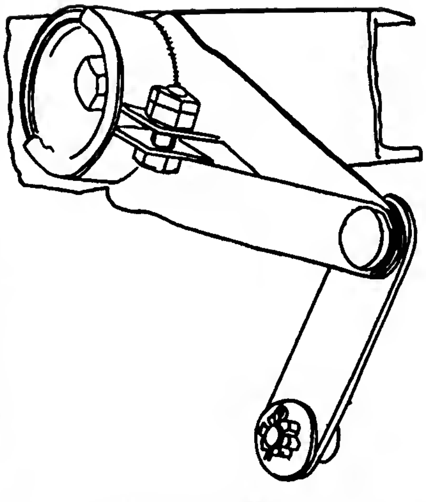
The H. & F. Mesinger Mfg. Co., of New York, has a combination strap and coil-spring shock absorber which has the merit of being simple and inexpensive. The company's inside blow-out patch is also shown.

Flat-leaf springs in both the customary types and in a patented form are exhibited by the Perfection Spring Company, of Cleveland, O. The patented form is a double semi-elliptic spring, with the ends connected by a special form of linkage.



Hartford friction-plate shock absorber, a pioneer in this line.

This company, in addition to its special product which is known as the Perfection Spring, is a large producer of every type of springs as used in the suspension of chassis frames. The plant is fitted out with all forms of heat-treating equipment, by means of which vanadium steel and the special forms of Krupp steel are made into springs such as are employed on some of the most exacting designs of cars which are now to be had. In a review of the spring and shock absorber situation as it obtains this year, it would be most incomplete without calling attention to the high character of the materials which are used in comparison with some of the products of even a year or two ago. When shock absorbers were first introduced, the idea was carried out in conjunction with most frail castings, insecure fittings, and methods sidering the situation as a whole.

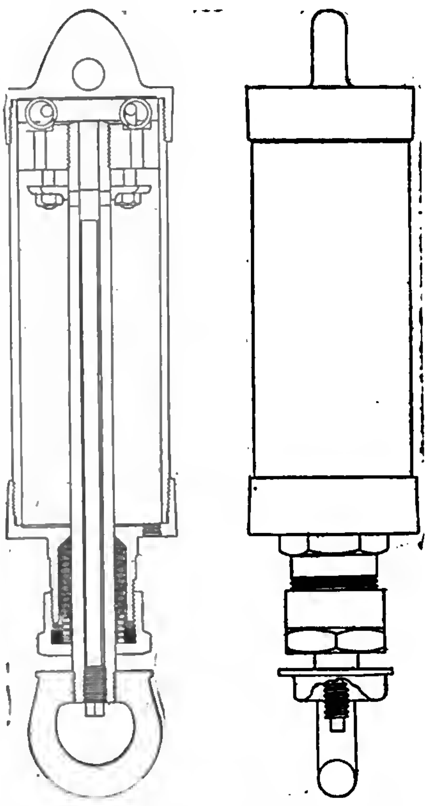


Friction-band shock absorber known under the trade name of Foster.

Ernest Flentje's glycerine-filled shock absorbers, hailing from Cambridge, Mass., are as usual much in evidence. They take the eye of the technical sharps, to whom the liquid compression principle is especially pleasing.

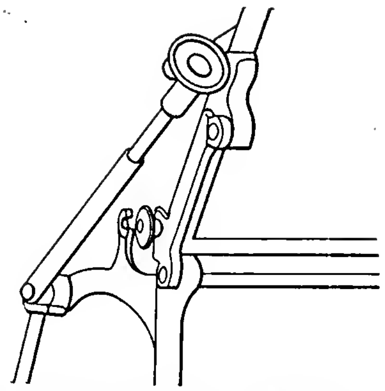
At this time, in a review of the situation as a whole, it is enough to say that the shock absorbers are well designed, materials used are capable and the methods of fastening to the side bars and to the axles are in keeping with the better understanding which accompanied experience. The principles which are employed in the designing of shock absorbers may be subdivided: (a) friction types, which set up a drag and dampen the oscillations of the moving mass (b) dash-pot types, which increase the dampening effect with the speed of acceleration of the moving mass, and (c) spring check types, in which the retarding influence is increased in proportion to the distance of travel.

Experience is the best teacher, hence discussions in relation to the relative merit of the respective types are likely to result in far-fetched conclusions, particularly when account is taken of the details in the application of the shock absorbers. It is very likely that failure is courted when any type of shock absorber is promiscuously applied, and it is undoubtedly true that the problem demands specific treatment in order that the particular applications will be in full accord with the especial requirements in every case. Many makers of automobiles realize that shock absorbers are capable of prolonging life of the members which make up a car.



Glycerine-filled cylinder with piston, the Flentje shock absorber.

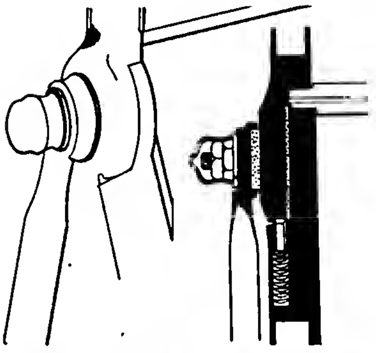
WIND SHIELDS



Locking device of Sprague windshield, with nut for upright position.

PROTECTION from wind and dust though scorned by the most hardened automobilists, is nevertheless essential to the comfort of many less accustomed to facing the wintry blasts. Modern windshields are designed to fit the appearance of the cars they are to be used on, and so are not the unsightly excrescences of former days, bristling with rods and knobs. Simplicity is now the keynote, and no great mechanical skill is required to change the shields from one position into another.

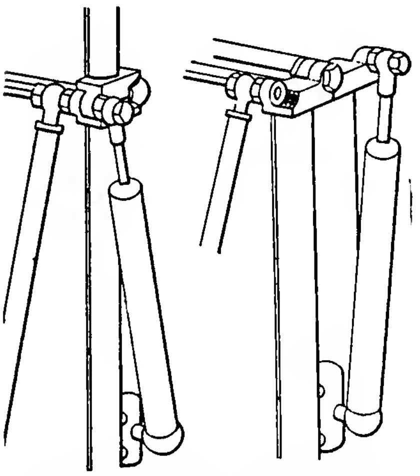
Eight or ten different styles of shields are marketed by the Chicago Wind Shield Company of Chicago, and these differ in many respects. One of these embodies very neatly the compound folding movement, which allows the upper half to move up and down very nearly parallel with the lower half, so as not to interfere with the steering wheel. When folded, it locks firmly both at the top and at the bottom.



Friction automatic windshield, with cross-section, showing leather discs.

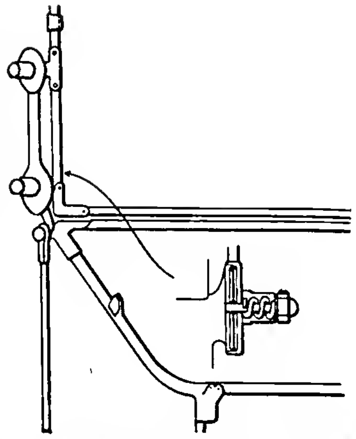
In the moderate-priced division the offering of the Fellwock Auto & Mfg. Co., of Evansville, Ind., is particularly notable. It is a divided shield, folding, and simple and neat in appearance. The frame is of wood, which will please those who like a substantial air. The design shows a desire to build a strong and reliable shield, without undue frills.

An automatic windshield, the upper half of which can be set at any desired angle, is marketed by the Garage Equipment Company, of Milwaukee, Wis. This feature is secured by a friction-plate hinge. T change the angle it is only necessary to loosen two wing nuts, one at each end of the hinge. The lower half can also be folded to the front, so that the whole shield can be swung down over the hood, out of the way.



Hydraulic windshield, made by Emil Grossman, New York.

Three automatic types are exhibited by C. A. Mezger, of New York. On the newer types retention is by a spring enclosed in a telescoping tube, 5 inches long and 3-4 inches in diameter. The spring works only when the upper half is within about two inches of either its upper or lower position; during the remainder of the swing the shield is prevented from moving rapidly by the friction between two smaller tubes enclosed in the large one. A third type is the friction automatic, which has no spring.

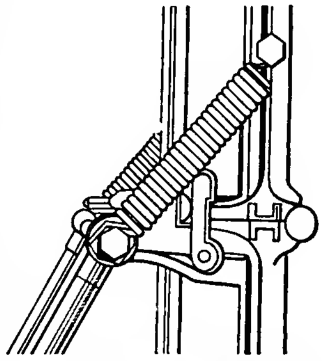


Troy windshield, showing the hinge giving parallel motion.

Sprague's tops and windshields, made by the Sprague Umbrella Company, of Norwalk, O., are shown in a number of interesting styles. In all of these it is evident that the object has been to secure a substantial construction which would stand the hard knocks a shield is sure to get. The locking devices are firm and free from complication.

The Sextette automatic windshield is shown by the Troy Carriage Sun Shade Company, of Troy, O. This shield is distinguished by the large number of graceful and convenient positions which it can be made to assume. The hinge contains two discs, one of them with a single corrugation, the other with two grooves, into which the corrugation fits. A spring forces the two discs together, thus locking the shield by the friction.

Noiselessness is claimed as the strong point of the Vanguard shield, made by the manufacturing company of the same name at Joliet, Ill. The shield is divided, with very narrow, almost invisible, brass molding along the edges. The hinge is a double-radius one, so that the upper half can swing without interfering with the steering wheel. The frame is of wood, of selected material, and the brass fittings are very substantial.

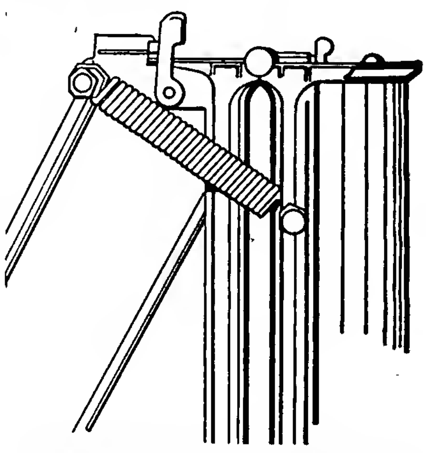


Standard automatic windshield (Mezger) in upright position.

"Vesco" windshields, as exhibited by the maker, the Vehicle Top & Supply Company, of St. Louis, show several models, all at reasonable prices which will bring them within the reach of the man of moderate means. Especial care has been taken to adapt these shields to the appearance of the cars on which they are to be used, with happy results.

The simultaneous activity of a number of inventors seems to have brought the windshield situation close to finality, for it is hard to see how a majority of the designs shown could be improved on. Complication has been reduced to the minimum, and appearance and construction are all that could be desired.

Noise, which emanated from wind shields, due to their poor construction, is now absent.



Standard automatic windshield folded, with the spring exposed.

Automobile Lubricants and Devices

THIS subject has proven to be the stumbling block of more ambitious writers than any other matter in connection with the running of an automobile unless it is that formula for approximating horse power of internal combustion motors has the lead by a neck. Nonsense creeps into lubricating discussions about as plentiful as sand floats into bearings, as it is borne on the breeze of passing automobiles, and, as a general rule, talk about the ills of the color or changing viscosity of lubricants, takes up so much space that there is none left to discuss the really important matters.

It is a little strange that an autoist of accentuated intelligence, due to a university education or the hammer blows of actual experience, will smear a little sand on the seat of a valve, grind for five minutes, and, by the simple process involved, take off 1-32-inch of the metal, bring the faces to an even bearing, make the valve tight under great pressure, and then claim that the lubricating oil used in the journal boxes of the motor and other parts is inferior, just because the same results are obtained, in about the same time, the only difference being that the bearings are ground in instead of the seats of the valves.

The ground glass, which is used in the valve-grinding process, differs but slightly from the silicon which creeps into the bearings, and even into the combustion chambers of the motor's cylinders, and, unfortunately, the grinding process, considering the bearings, goes on continuously; valve grinding, on the other hand, is an occasional process.

Even the blue above, referring to the sky, is due to dust—it is so fine we fail to see it excepting when a beam of light crosses the line of vision in such a way as to effect the end. A globule of water is so relatively large, when compared with a particle of dust, that the water would compare as the Sun of our Universe, alongside of the Moon which circles around Earth for the purpose of tolling off the thirteen months in an Indian's year. A bearing may be absolutely water tight and be wide open to dust-wear; due to the presence of this dust, is the same wear that makes it possible to grind in a valve.

The usual rule is, if a bearing squaks, give it a drink. The road to long life of a bearing is, do not let it squeak. Noise, while it denotes a condition of eminent danger, is also evidence of previous neglect. How much damage a bearing may have suffered before the noise became noticeable, is difficult of surmise, but it is safe to say that it is in the nature of permanent damage which no amount of "flooding" with oil, will eliminate.

When a golden eagle is coined at the mint of the Nation, and it takes wings of flight, if it rests for a time in the cavern of a man's pocket, jingling against a bunch of keys, it will not have to be given theroid tablets for the purpose of reducing its avoirdupois; it will be diminshed in intrinsic value by the contact, and, being money, the loss will be noticed and subtracted from its valve. When bearings are subjected to the same jingling process, as they will be if lubricant is not fed to them, they, too, will depreciate, and the loss will have to be counted in dollars.

WHAT IS THE PURPOSE IN OILING BEARINGS?

An academic statement of fact would read like this: "Oil forms a film over the bearings surfaces, floats the spindle, prevents the same from making contact with the bearing brasses, and, instead of the brasses wearing, the oil wears out instead—oil is cheaper than bearings."

If disappointment is to be avoided, if bearings are to last for long, and if depreciation is to be abandoned for the most part, it is necessary to assign to lubricants a sterner part. The first duty of a lubricant is to float the spindle and take the brunt of the work; to this must be added the duty of "sealing" up the journal sufficiently to exclude dust.

If there is a sufficiency of the lubricant present, that is to say, if there is a sufficient pressure behind it, and it feeds through the bearings, and out, it will, on its outward migration, float all the incoming dust, and this mischievous foreign matter, suspended in the stream of outgoing lubricant, will be prevented from making a mud pie under the spindle, where, if it is allowed to remain, it will grind the life out of the bearings.

Apparently, according to this reasoning, only liquid oil under pressure, is available for the purpose. The conclusion is ill-advised; grease is a most perfect seal for a bearing; it smears over the bearing surfaces adequately in view of the prime requirement, and the pressure which it sustains, acts as a pump, so that the excess exudes from the bearings, but, being thick and viscose, it remains around the rim, so to speak, most effectually blocking the way of any foreign substance which is knocking at the door for admittance.

There are one or two other points about solid lubricants which get mixed in the process of reasoning; some say it must be heated before it will enter bearings; they do not seem to understand that every bearing is capable of acting as a centrifugal pump. When any mass is rotated, it acts as a centrifugal pump, obeys all the laws of the same, and due to this the grease is pumped in, that is, pressure is accumulated, and the grease, in response to this pressure, follows the bent which we so aptly call pumping. Grease has one property which is to its advantage; if it is sluggish in its action during the process of pumping in, it is equally sluggish in its action after it gets in—it is likely to stay in.

Bearings, when they are cold, are less efficient than when they are warm; this is due to several phenomena:

(A) The amount of energy in the form of heat, which will be lost, will be in direct proportion to the difference in temperature between adjacent walls.

(B) The resistance to shear of the section of the lubricant will be greater as the viscosity of the lubricant is increased; viscosity increases as the temperature lowers.

The condition (A) is difficult of explanation; so long as there is no difference in temperature, it matters not at all as to the prevailing temperature, and yet, as has been definitely established, a cold bearing is less efficient than one which is working at a somewhat higher temperature.

There is one more point which will stand the light of calm discussion; all grades of lubricating oil come from the same well (barring differences in quality of crude oil from the different sections), and it is quite possible for a man of skill in the process, if he is provided with suitable facilities, to make all the grades of oil which can be evolved, and he must face a waste (as a by-product) unless he does utilize, in some way, the entire product of the well. Under the circumstances, and, in view of the basic considerations, it is almost futile for a rank outsider to discuss the respective brands of lubricating oil, for the purpose of fixing upon the quality; it is the skill of the man who does the work that lies at the bottom of the difference. Honesty of the distributor is a great factor, and a concern with a reputation at stake, has much to lose by substituting inferior goods—let us adore the oil-god who will be consistent rather than the fly-by-night who is insistent.

EXHIBITORS OF LUBRICANTS

Cook, Adam, Sons, New York.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Hancock Mfg. Co., Charlotte, Mich.
Harris, A. W., Oil Co., Providence, R. I.
Havoline Oil Co., New York.
McCord Mfg. Co., Detroit, Mich.
N. Y. & N. J. Lubricants Co., New York.
Randall-Faichney Co., Boston, Mass.

As the Guests and Hosts Appeared at the Eleventh Annual Banquet of the Automobile Club of America, January 31

CONSIDERABLE POLITICAL TALK AT A. C. A. BANQUET

THE Eleventh Annual Banquet of The Automobile Club of America of New York was held at the Waldorf-Astoria Monday evening, January 31st. It was unusually well attended, about 480 members and guests being present, divided into forty regular tables, besides the President's table and two press tables.

Miniature models of flying machines were suspended with pleasing effect above the tables.

The head table was honored by the presence of Hon. Elbert H. Gary, President of the Club; Rev. Wilton Merle Smith, D.D., Chaplain of the Club; Major-General Leonard Wood, U. S. A.; Hon. Lawrence Y. Sherman, Lieut.-Governor State of Illinois; Rear-Admiral Joseph B. Murdock, U. S. N.; Hon. Charles A. Towne, Ex-U. S. Senator from Minnesota; Col. John Jacob Astor; Hon. Archibald R. Watson, Corporation Counsel, New York City; Hon. J. B. R. Smith, Commissioner of Motor Vehicles, State of New Jersey; Hon. Frederick A. Bugher, First Deputy Police Commissioner, New York City; Hon. William F. Baker, Police Commissioner New York City; Hon. Warren W. Foster, Judge General Sessions, New York County; Hon. Martin J. Keogh, Justice Supreme Court, State of New York; Cortlandt Field Bishop; Hon. Martin W. Littleton; Hon. Charles F. Moore; Colgate Hoyt; Frederick D. Underwood; George F. Chamberlin; Glenn H. Curtiss; William C. Brown; William H. Page; E. Rand Hollander; Schuyler Skaats Wheeler, Albert R. Shattuck and Cornelius Vanderbilt.

After the usual Waldorf banquet menu had been served, President E. H. Gary introduced the following after-dinner program:

1. "Motive Power"—Hon. Lawrence Y. Sherman, Lieutenant-Governor of Illinois.
2. "The Effect of the Automobile on the Conscience, Pockets and Morals of the People"—Hon. Charles A. Towne, Ex-United States Senator from Minnesota.
3. "The Ideal Relation Between the Man Who Rides in an Automobile and the One Who Walks"—Hon. Martin W. Littleton.
4. "A Historian's Views as to the Future of the Automobile" —Hon. Charles F. Moore.

The Hon. Lawrence Y. Sherman, in the pose of a second Abraham Lincoln, announced his lack of knowledge of motor power, but was particularly well posted on general politics. He was followed by the Hon. Charles F. Moore, who was able to compare the political machine with an automobile in that both are given to inflation, free rides, and are started by a crank. His machine of the future will travel with equal facility on water, in the air or on land without roads. It was certainly a brilliant prophecy. The Hon. Martin W. Littleton disgressed on the increased cost of living, characterized the automobile as a sporadic device of the devil, and stated that the two he owns would not make one. The tables were badly deserted when the Hon. Charles A. Towne addressed the gathering, and at the close the impression was of an entertaining political meeting rather than an inspiration, following a great automobile event.

COBE AGAIN HEADS THE CHICAGO A. C.

Ira M. Cobe has been renominated for the sixth successive year for the presidency of the Chicago Automobile Club, of which he was one of the founders. It is expected that this nomination is equivalent to an election.

The administration ticket follows: For president, Ira M. Cobe; for first vice-president, T. N. Koehler; for second vice-president, T. J. Hyman; for secretary, C. A. McDonald; for treasurer, G. S. Whyte; for directors, F. W. Blocki, Claude Seymour, B. B. Johnson, Allan S. Ray, J. F. Gunther and Harry Vissering.

BUSY RACING SEASON FOR INDIANAPOLIS

E. A. Moross, director of contests at the Indianpolis Motor Speedway, announces the following racing dates as arranged for the Indianapolis track, these to be held under the sanction of the American Automobile Association: The track will be opened with a three-day meet on May 27, 28 and 30. May 30 is Decoration Day, and the races on this day will be under the direct auspices of the A. A. A. in the form of a national meet. The second event at the speedway is scheduled for July 1, 2 and 4. Oo August 3 and 4 the twenty-four-hour race will be held.

FORECAST OF ST. LOUIS SHOW

St. Louis, Mo., makers and dealers look forward to a very comprehensive show of motor cars which will be held in that city, February 14-19. Eighty-four makes of cars will be shown by 63 dealers or manufacturers, and several car loads of automobiles will be shipped direct from the Chicago Show.

The accessory dealers will swell the number of exhibitors to 76. The following cars will be exhibited: Moon, Dorris, Standard Six, Victor, Darby, Embree-McClean and Cunningham, all made in St. Louis; KisselKar, Cadillac, Peerless, Detroit Electric, Buick, Welch, E-M-F, Studebaker, Hupmobile, Regal, National, Lexington, Packard, Stevens-Duryea, Reo, Fal, Interstate, Maxwell, American, Simplex, Marmon, Oldsmobile, Oakland, Thomas, Chalmers, Hudson, Baker Electric, Atlas, Babcock, Stanley, Matheson, Corbin, Gaeth, Great Western, Rider-Lewis, Stoddard-Dayton, Studebaker Electric, Rauch and Lang Electric, Pierce-Arrow, Speedwell, Waverley Electric, Knox, Stearns, Brush, White Steam and Gas, Rambler, Parry, Paige-Detroit, Overland, Velie, Chadwick, Glide, Johnson, Columbus Electric, Firestone-Columbus, K-R-I-T, Winton Six, Jackson, Sterling, Apperson, Cartercar, De Tamble, Mitchell, Locomobile, Broc Electric, Westcott, Empire, Midland, Everitt, Springfield, Middleby, Smith Electric, Haynes, Pope-Hartford, Franklin.

NEWARK'S THIRD ANNUAL SHOW DETAILS

Newark, N. J., will hold its Third Annual Automobile Show during the week of February 19-26. It is said by those who know, that this show will compare favorably with greater shows held in New York and elsewhere. Newark, on account of its situation, is at once a part of the Metropolitan territory and is at the same time isolated from it. It is the center of the very prolific automobile section, and as such, much interest will be taken in the exhibition. One of the exceptionally interesting features at the show will be the exhibit of aeroplanes, which is promised will be the most complete one ever shown in America. This annual event which assumed large and important proportions last year, is looked forward to by Jersey enthusiasts with a great deal of pleasure, and this year it is expected that the local automobile agents will do a most thriving business, which is a matter involving some difficulties to explain due to the near presence of a host of New York agencies—citizens of New Jersey are patriotic.

INDIANA'S FIGURES SURPRISINGLY LARGE

The records of the Indiana Secretary of the State show that 72 new companies were organized in 1909, with an aggregate authorized capitalization of $6,533,000. All of this represents automobile and kindred industries. In addition, 16 sales agencies and garages incorporated, calling for an investment of $219,500. Seven new tire concerns came into existence during this year. The following companies increased their capital stock as follows: Overland Automobile Co., Indianapolis, $1,400,000; Planhard Manufacturing Co., Kokomo, $35,000; Simplex Motor Car Company, Mishawaka, $200,000; Western Motor Co., Logansport, $1,500,000; Auburn Automobile Company, Auburn, $725,000, and American Motor Car Sales Company, Indianapolis, $20,000.

GREAT PACIFIC COAST INVASION

California is coming into her own, so far as future racing events are concerned, and a number of important contests will be held this spring in the new Motordrome. Robertson announces that the Simplex people will build for him a light car somewhat along the Fiat "Cyclone" lines which he will also drive on the Coast. DePalma will be there with the original "Cyclone," while a third of this type, a Marmon 6-cylinder, is being built for Ray Harroun, of Chicago. Taking these in addition to other events, it will be seen that some of the usual speed battles of the spring will be fought on the Pacific Coast instead of over the old course as laid out on the sands of Florida.

TWO SHOWS FOR HARTFORD

Hartford will have two automobile shows, according to reports, instead of the one originally outlined. Neither one will run in opposition to the other. The local situation is a bit complex for the reason that no hall is available of sufficient size to accommodate would-be exhibitors. In consequence the second show, which is to run on the same date as the original exhibition, will be that of the Hartford Automobile Dealers' Association.

The Third Annual Show of the Hartford Automobile Dealers' Association from present indications bids well to outstrip all previous efforts of the organization. Fifty cars, representing 24 leading makes, are on the list, including some newcomers. The list of vehicles that will be on exhibition includes the Ford, Reo, Knox, Stevens-Duryea, Cadillac, Lozier, Waverly electric, Baker electric, Thomas, E. M. F., Flanders, Maxwell, Mitchell, Pierce-Arrow, Buick, Jackson, Rambler, Elmore, Cartercar, Interstate, Franklin, Empire, Hupmobile and McCue.

HARMONY SECURED IN CITY OF HOPS

Milwaukee, Wis., Jan. 29—The Milwaukee Automobile Club on Jan. 18 held a drawing for spaces at the second annual Milwaukee show, to be held in the new Auditorium from Feb. 22 to 27 inclusive. Dissension which marked the early campaign of the club for support among the dealers has almost disappeared, although there are still a few concerns determined to remain out of the show because they believe it more profitable to have private shows in their salesrooms, taking advantage of the interest aroused and crowds attracted by the big show.

ADDITIONAL EXHIBITORS AT BALTIMORE

Baltimore, Jan. 29—Fifteen belated dealers made such urgent demands for space at the coming Baltimore Show at the Fifth Regiment Armory, February 22 to 26, inclusive, after the first allotment of space had been made, that the show committee of the Automobile Club of Maryland had to rearrange plans to accommodate them. With the addition of this latest batch of exhibitors the number has been increased from 29 to 44.

A. A. A. TOUR FOR GLIDDEN TROPHY

At the meeting of the Contest Board of the American Automobile Association, held in New York, January 26, it was decided that the National Tour for 1910 should be a competition for the Glidden Trophy and that certificates to be known as "Glidden Certificates" should be issued to those contestants which finished the tour with scores that are within a small percentage of being perfect, the exact limits of such percentage to be determined and announced later.

The approximate date of the tour was set for June 15 to 30.

The tentative route outlined, embracing about 2,300 miles, is as follows:

Starting at Cincinnati, Ohio; thence to Louisville, Ky.; Nashville and Memphis, Tenn.; Little Rock and Texarkana, Ark.; Dallas, Texas, Okla City, Wichita and Topeka, Kan.; St. Joseph, Mo.; Des Moines, Cedar Rapids and Davenport, Iowa; Rock Island and Moline, Ill., and thence to Chicago.

SAVANNAH DISCUSSING GRAND PRIX

At a recent meeting of the Executive Committee of the Savannah Automobile Club plans were discussed for an international race to be held in Savannah on Thanksgiving day. At the meeting it was decided by those that attended to start work at once so that everything could be arranged in due time. Besides having an international race a stock car race will be had the preceding day, making the programme very similar to that of the Grand Prize race, held November, a year ago. Savannah is rapidly becoming an automobile center of the first importance in the South, and trade in cars is expanding considerably.

President Taft Rides in a Four-Cylinder Franklin

When the President rides out in an automobile, as he does frequently in contradistinction to his predecessor, the owner of the machine feels that he is signally honored, and hastens to chronicle the fact. Above our smiling executive is shown in the tonneau of a four-cylinder Franklin. The house is the Texas ranch house of Chas. P. Taft.

Spokane Taxicab Company has been reorganized with increased capital, and will begin operations with twenty high grade cars the latter part of February or early in March. Plans have been made for construction of a three-story garage, to cost $30,000, in the business district, and it will be rushed to completion. The new company, which has acquired the interests of C. E. McBroom, Robert H. Cosgrove and J. D. Williams, incorporated as the Spokane Taxicab Company, is composed of the following: W. G. Graves, Fred B. Grinnell, F. J. Holman, E. H. Knight, Clyde M. Graves, W. S. Norman, J. F. Carey, F. T. McCullough, Dr. R. McClure, Walter J. Nicholls, J. L. Prickett, D. B. Fotheringham, J. H. Spear, Dr. H. B. Luhn, Dr. S. B. Hopkins, George W. Merrill.

Louisville motorists have a fad which is growing rapidly. Unique emblems of every description, including Billikens, north poles, birds and beasts are being substituted for plain caps in front of their cars. Among the more popular emblems may be mentioned the north pole, while Prince Wells may be identified by a miniature facsimile of the road race cup which he won recently. Billy goats, monkies and eagles occupy prominent and somewhat exposed positions on the fronts of the radiators.

On January 13 the Michigan Lodge, National Association of Stationary Engineers, entertained one hundred engineers and mechanical experts from Detroit, Michigan and other cities, in the club rooms of the Michigan Steam Motor Company. Before the banquet those present inspected the new steam truck built by this concern. It is said that the engine in this type of truck is especially designed for general motive work where economy of space is desirable.

It is said that a number of motor trucks and business wagons in Louisville is about 20 per cent. more at this time than last year. The motor car has made steady inroads on the stronghold of the work horse and development along this line indicates the ultimate revolution of the old methods of handling goods, so far as the big cities are concerned.

The Automobile Club of Rochester is holding its second annual winter endurance run, having Syracuse as its objective point for the first night and return by another route to Rochester the second day. The Palmer-Singer 6-60 will be the pace-maker on the trip. This car has just completed its pathfinding trip made by Bert Van Tuyle, secretary of the Automobile Club.

It is said that Toledo, O., will get the Sterling vehicle plant, which proposes to manufacture a 1½ and a 3-ton truck. According to reports, the company, which is backed by Chicago men, and which has had several trucks manufactured, has practically closed negotiations for a site in Toledo. A. B. McCord will be the technical man at the head of the company.

Appreciating the valuable service rendered to the newspaper editors in Lancaster county, in their recent campaign for better country roads, the Lancaster Automobile Club has elected to honorary membership in the club each of the 30 editors within the domains of the county. It is said that this campaign has resulted in many road improvements in that locality.

In the American exposition which will be held in Berlin, Germany, during the months of June, July and August, a section has been set aside for the display of motor boats, engines and accessories. It is proposed to appoint an American committee to represent the motor boat industry of the United States.

The Asbury Park Automobile Company, of Asbury Park, N. J., has incorporated with a capital stock of $50,000. They will manufacture automobiles and conduct garages. The incorporators are: Daniel Havens, Fletcher T. Weedens, William C. Weeden and Louis P. Croce, all of Asbury Park.

The Motor Car Conveyance Company, New York City, has incorporated with a capital stock of $100,000. This concern will buy, sell and lease motor vehicles and taxicabs. The incorporators are: C. E. Lockwood, East Orange, N. J.; A. Lee, Brooklyn; J. W. Chapman, New York City.

Plans have been prepared for the Patent Holding & Mfg. Company to erect a four-story building for the manufacture of a commercial automobile to be designed by George E. Salzman, who will be superintendent of the plant. This company will also go into the garage business.

Bangor, Me., is to have an automobile show, to be held at the Auditorium from April 23 to 29, inclusive. This is the second annual exhibition in Bangor, and it is believed that there will be exhibited an even fuller line of cars and accessories this year than there was last.

The Owosso Motor Company, organized by a number of Owosso (Mich.) business men, will have a factory either in the latter town or in Detroit. They will manufacture a commercial car to sell for $1,850, rated at 20-horsepower. E. M. Clark is the general manager.

The Hartford, Conn., fire department wants a flying squadron to take the place of the horse-drawn chemical wagon. The board of fire commissioners, it is said, have in mind a Pope-Hartford machine. Five thousand dollars have been appropriated for the proposed purchase.

The Belnord Automobile Storage and Supply Company, New York, has incorporated with a capital stock of $10,000. They will deal in rubber tires and operate storage houses and garages. The incorporators are: I. Irving Cohn, Henry M. Flateau and Joseph Marx.

The J. J. Harper Company, Lynchburg, Va., has incorporated. The directors are: R. D. Apperson, president; L. G. Apperson, vice-president; G. O. Lee, secretary and treasurer. Capital stock, $25,000.

The date of the proposed All Connecticut Endurance Run has not yet been settled, and will not be until the A. A. A. takes action. It is said that this affair will take the form of an "automobile week" to include many other events.

Joerns Bros., of Stevens Point, Wis., with large interests at Sheboygan, Wis., and St. Paul, Minn., have organized a corporation with headquarters in St. Paul, to manufacture motor cars and trucks. C. A. Joerns, of Sheboygan, will be general manager.

The Post Lock Register Company has incorporated in New York City with a capital stock of $150,000. They will manufacture taxicabs and lock registers for the same. The incorporators are: T. W. Post, G. W. Moore, and C. Colgate, New York City.

It is reported that a corporation for the manufacture of motor cars will shortly be formed in Walton ,N. Y. E. B. Guild and George H. May have been appointed a committee to investigate the merits of different parts.

A midwinter endurance run from Hartford, Conn., to Pittsfield, Mass., thence to Springfield and back to Hartford has been proposed. On this same route traveled last year a Mitchell, driven by D. F. Smith, the local Mitchell agent, won out.

The Showalter Manufacturing Company, of Connorsville, Ind., has been incorporated with the following officers: President, T. H. Showalter; vice-president and general manager, H. G. Showalter; and treasurer, E. W. Showalter.

It is reported that the plans for the new Central Police Station and Criminal Courts Building at Milwaukee, Wis., to cost $250,000, will include a garage division for the care and maintenance of the cars owned by the city of Milwaukee.

The board of directors of the Motor and Accessories Manufacturers, Inc., will hold a meeting in Chicago February 10. W. M. Sweet, manager, with headquarters in New York, will spend several weeks in Chicago at that time.

Articles of incorporation have been filed by the Ellis-Tonnele Company, of Jersey City, N. J., with a capital stock of $50,000. They will deal in automobiles, supplies, parts, etc. Incorporators: A. L. Ellis, L. J. Tonnele and L. E. Herrman.

At the annual meeting of the Farmers' Mutual Insurance Company held at Lansing, Mich., the chief subject of discussion was automobile insurance, the association finally taking a stand against carrying automobiles as risks.

To the generosity of San Francisco motorists, enough cars were loaned to the children's agency of the Associated Charities to enable that organization to give 300 children an outing in Golden Gate Park.

The Co-Auto Motor Company, Indianapolis, has been incorporated with a capital stock of $25,000 and will manufacture and deal in automobiles. Incorporators: M. G. Beckner, J. Harrison and F. W. Wiese.

Application is shortly to be made for a charter for a new company in Philadelphia, to be known as the Lyman Tire & Rubber Company, which is to manufacture and deal in auto tires and appliances of all kinds.

The American Engine & Motor Company, of Wilmington, Del., has been incorporated with a capital stock of $1,000,000. They will manufacture rotary engines, automobiles, motor vehicle and power boats.

The Windsor Motor Company, Buffalo, N. Y., has been incorporated with $10,000 capital. The directors are: Henry M. Colgrove, Joseph Schmid, Jr., and Joseph J. Buettner.

The Milwaukee Chauffeurs' Club, recently organized at Milwaukee, Wis., has elected these officers: President, Marcus Wernicks; vice-president, Emil Krueger; secretary, J. A. Mayberry; treasurer, Michael Flynn.

The Omaha Automobile Show will be held from February 21 to 26, inclusive. It is expected that the leading manufacturers will be strongly represented therein.

It is said that over 100 carloads of automobiles were taken into Detroit for exhibition at the automobile show. Nearly 300 models of automobiles are exhibited.

The Maurer Garage Company, of Sheboygan, Wis., has been incorporated, with a capital stock of $15,000, by G. A. Franche, A. G. Maurer and F. G. Voigt.

OLDFIELD PURCHASES BENZ RACER

It is said that Barney Oldfield has purchased outright the new German Benz racing car in which Hemery made the world's record speed in England. This statement is said to come from Jesse Froehlich, managing director of the Benz Auto Import Company. He states that the car sold for $14,000 and that in the future Barney would have entire charge of it. This being true, the somewhat complicating rumors afloat concerning the probable pilot of this car may now be set at rest, as it is expected that Oldfield will drive the giant racer in all important contests.

George Ade, the Humorist, in His Mitchell Roadster

Even funny men ride in automobiles nowadays, as is evidenced by the picture above, which shows America's foremost witty man seated at the wheel of his small Mitchell roadster. In this little car Mr. Ade rides many miles in the course of a year, always finding the car "on the job."

In the early spring of 1896 Frank B. Stearns, then a young inventor of Cleveland, Ohio, produced one of the first "motor carriages" ever seen in Ohio. It was of the single-cylinder type, and although it was heir to all the troubles of the early type of automobiles, it is still in running order to-day. Single-cylinder cars were produced until the latter part of 1901, when the first 2-cylinder motor was produced. In it Mr. Stearns won a first-class certificate in the famous Mud-Lark run in 1904 from New York to Pittsburg. The growth of the Stearns factory has been noteworthy. The production has been steadily increasing, the output for the current season amounting to very close to 1,000 cars. With the extensive additions and improvements planned for the coming season, the output will be over the 1,500 mark. The number is equally divided between 15-30 and 30-60 models.

At the annual meeting of the B. F. Goodrich Company last week the directors decided to proceed with extensive factory additions early next Spring. The company has been adding two six-story buildings each year for the past two years. An appropriation of $1,000,000 was made for the additional improvements. The principal change in the official list came from the retirement of W. A. Folger as treasurer after spending 26 years in the rubber business. He is succeeded by W. A. Means, assistant treasurer; C. B. Raymond, secretary, was elected to the office of assistant treasurer. B. G. Work was re-elected president; F. H. Mason, vice-president; H. E. Raymond, second vice-president, and E. C. Shaw, general manager of works. The stockholders re-elected the old board of directors.

At a recent meeting held in New York, various officials of the Lozier Motor Car Company discussed the matter of length of service of many of the employees. It was noted that during their bicycle days this company gathered together a very strong working force and carried it practically into the motor business. Among those holding records for long service may be mentioned J. D. Perrin, the engineer of the company, with eighteen years to his credit; Samuel Roger, treasurer, started twenty years ago as an office boy; C. A. Emise, sales manager, has been with the Lozier company for seventeen years, and E. C. Cleary has had a service of thirteen years.

B. G. Vreeland, president of the Vreeland Bros. Automobile Company, Denver distributors of Moon cars, left St. Louis for home Tuesday, after a week at the Moon factory. Coming direct to St. Louis from the New York shows, Mr. Vreeland stopped at St. Louis to familiarize himself with the Moon construction. To do this he took off his coat, donned machinist's overalls, and with one of the factory engineers went over the various processes of manufacture and assembly. He said, when leaving the city, that he thought more of Moon cars than ever after his mechanical tuition.

The Allis-Chalmers Company, of Milwaukee, is shipping out each day large orders for electrical apparatus to motor car manufacturers, including E. M. F. Co., Detroit, Mich.; Oak Park Power Co., Flint, Mich., auxiliary of the General Motors Co. of Flint, Mich.; Kelsey-Herbert Wheel Co., Detroit; Rapid Motor Vehicle Co., Pontiac, Mich.; American Motor Castings Co., Brush Runabout Co., Detroit. Factory cost is reduced to a considerable extent by the motor-drive system, and has already resulted in reductions in wholesale prices for manufactured articles.

The Flint Auto Top Company, of Flint, Mich., organized and incorporated last week for the purpose of manufacturing automobile and launch tops. It is capitalized at $10,000, with the following officers: M. L. Dyer, president; S. D. Bolton, vice-president; C. A. Fot, secretary and treasurer; A. W. Myers, superintendent, with temporary offices and factory at 1104 North Saginaw street, allowing a daily output of from 75 to 100 tops. Within the course of 60 days they will be able to triple their capacity, as their new factory will be ready for occupancy by that time.

A number of changes have taken place in Hartford, Conn., local selling field. S. C. Hutchinson has succeeded Robert R. Ashwell as the head of the Franklin agency. Russell Faber, who recently acquired the Reo, has also taken on the Knox. George B. Knox, the Peerless representative, will handle the Hudson. Alexander Smith has given up the Regal. E. H. Harris will succeed A. W. Peard as agent for the Overland. The Hupmobile and Everitt 30 are represented by C. K. Hanson. All the local agencies report very bright prospects and many immediate sales.

J. C. Zimmerman, of the Green Bay (Wis.) Motor Car Company, which recently succeeded to the business of the motor car department of Gottfredson Bros. Co., wholesale hardware, has sold his interest to W. H. St. John, of Oshkosh, Wis., and will retire. H. J. Malchow, who, with Mr. Zimmerman, organized the Green Bay concern, remains. The company's garage on North Jefferson street has recently been enlarged to nearly twice its former capacity, and 60 cars can be handled with ease. The repair shop has been made a feature.

As an instance with which the Diamond quick detachable demountable rim can be handled it is but necessary to say that during the Madison Square show this device was demonstrated to a prospective buyer who, after making inquiry concerning its points, said that while the rim was being demonstrated it was removed and applied no less than a dozen times and apparently with the same ease with which a man takes his watch from his pocket and puts it back.

Recent consular records from all sections of the globe indicate a slow but sure increase of imports of American cars into foreign countries. The Royal Tourist car company is making bids for business in this field in a conservative but effective way. As an instance of this it may be cited that Clifford W. Fuller, secretary of the Royal Tourist company, and K. V. Painter, a stockholder, are carrying the Royal propaganda into South Africa.

The Ohio shaft-drive electric, manufactured by the Ohio Electric Car Co., of Toledo, Ohio, has placed three new agencies: In Denver, with the Mathewson Automobile Co., 1624 Broadway street; in Louisville, Ky., with the Dunham Automobile Co., 444 South Third street, and in St. Louis, with the Smith Automobile & Battery Co., 5027 Delmar Boulevard. This new electric is the only shaft-driven automobile ever made without a universal joint.

The Colonial Tire and Rubber Company, which controls the Firestone tires in Europe, has declared a 10 per cent. dividend, and elected F. S. Lahm, the noted aeronaut of Paris, as president; J. A. Swinehart, vice-president; P. D. Hall, secretary and treasurer. The other directors are William Byrider, John Byrider and Frank E. Whittemore. The Firestone patents in America were originally owned by J. A. Swinehart, who recently returned from Europe.

The Penn Motor Car Co., of Philadelphia, entertained all of the sales managers throughout the State of Pennsylvania, as well as the officials of the Mitchell car as its guests, at a banquet at the Hotel Walton in that city. A. B. Berrian, of Racine, Wis., representing the factory end of the company, and Charles B. Skinner, the New York manager, was present as the Eastern delegate. More than eighty guests were present.

The Wilcox rubber plant at Mansfield, Ohio, headed by F. A. Wilcox, of Akron, suffered a $16,000 loss last week on account of fire. The company manufactures tires. At the annual election officers were elected as follows: President, F. A. Wilcox; vice-president, C. H. Walters; treasurer, F. M. Bushnell; secretary, F. W. Walters; these, with C. R. Grant, Dr. James E. Waite and Dr. R. C. Kinnaman constituting the directors.

The Holbrook-Armstrong Manufacturing Company of Racine, Wis., is perfecting a new type of four-cylinder motor, which, it is reported on reliable authority, will be used exclusively by the Racine-Sattley Company for the production of gasoline cars and trucks. The Holbrook-Armstrong Company is said to have contracts for delivery of its motor to the Sattley concern beginning in 30 days.

The Yeomans Body and Box Company, of Detroit, will make an extensive addition to their plant. This is made necessary by the growing requirements of automobile manufacturers. The board of directors of the company are: Arthur Yeomans, president; Albert Fritzsche, vice-president; Fred H. Yeomans, secretary and treasurer, and John T. Lombard.

With W. C. Durant, general manager of the Buick Company in Flint, Mich., as host, a large party filling a special train of 12 cars journeyed from Detroit to Flint, where a complete inspection of the Buick plant was made. Some idea may be had of the size of this institution when it is stated that the Buick payroll exceeds $192,000 every two weeks.

Lang & Scharman, agents for the Maxwell at Marshfield, Wis., have produced a "sleighmobile" by remodeling a Maxwell runabout into a sleigh. The front wheels have been removed and replaced with runners, while heavy anti-skid chains have been attached to the rear tires. The contrivance makes excellent speed on snow-covered roads.

Entire K-R-I-T product for 1910 has been sold, its final agencies having been closed several days ago. Three hundred and twenty-five cars were allotted to Cleveland, Buffalo and San Francisco, and the entire output of the company, 1,000 cars, has already been taken care of. It is said that the demand was much larger than the supply.

The Sheldon Axle Company, of Wilkes-Barre, Pa., for thirty years makers of axles, have for seven years been making commercial automobile axles and it is said that during this time they have never lost a customer and have built the largest factory of its kind in the world.

Goodrich tires were well represented in the two New York shows. Out of fourteen makes of tires represented at the Madison Square Garden show, the Goodrich had a natural representation. In Detroit also this tire had a very large representation, especiallv on the high-priced cars.

The story which has been circulated to the effect that the Chalmers-Detroit Motor Company is interested in the building plans of the Hudson Motor Car Company was denied by Chalmers-Detroit by wire just as The Automobile was going to press—particulars not available.

It is stated that more than eight thousand Franklin air-cooled motor cars are now in use, the total of shipments from the factory in Syracuse having passed that number a few days ago. The Franklin is making some splendid road and hill records in the far West.

Realizing chain defects as they exist under unfavorable road conditions, the Baker Motor Vehicle Company, after experimenting with various types of transmissions, has announced that all their 1910 models will be equipped with bevel gear shaft drive.

Bacon's Garage Co., Inc., of Hackensack, N. J., are the Bergen County agents for the Mercer Car, and represent locally the E. M. F. and Flanders and Buick. James Bacon is president and Ralph D. Early is secretary and treasurer.

The Brown Automobile Company has taken the agency for the sale of National cars in Louisville, Ky., and New Albany, Ind. The Velie will be represented in Louisville by the Dunham Automobile Company.

The Ajax-Grieb Rubber Company, of New York, has issued a very pretentious and handsome calendar, ingeniously contrived, and embracing a distinct novelty. It is much appreciated by the trade.

PERSONAL TRADE MENTION

"Bud" Moran, who recently became manager of the Craig Auto Company, of Detroit, will handle the output of the new Abbott Motor Company in Michigan. John B. Philip, formerly with the Chalmers-Detroit Motor Company, is in charge of the Abbott factory, and with perfect organization this concern promises prompt delivery.

Gordon MacGregor, in charge of the Canadian interests of the Ford Motor Co., has just completed a trip around the world in the interests of the company. Mr. MacGregor left Watervliet, Canada, in the middle of August, and has since then traveled 140,000 miles.

Jack Barnes, for three years a well-known mechanician, and more recently a driver of racing cars, has accepted the position of superintendent of the Delavan Lake Boat and Engine Company. The company operates a large shop for motor car repairs and has a garage.

W. N. Booth, for several years connected with the sales department of the Olds-Oakland Company, Cleveland, has invented a demountable rim, and has organized the Booth Demountable Rim Company to manufacture it.

A. A. Grimes, formerly connected with the sales department of the Cleveland, Ohio, branch of the Warner Instrument Company, has accepted a position as sales manager of the Cleveland Speed Indicator Company.

R. Harry Croninger has assumed the management of the American Locomobile's plant at Providence. He was formerly connected with the Pennsylvania Auto Motor Co., at Bryn Mawr, Pa.

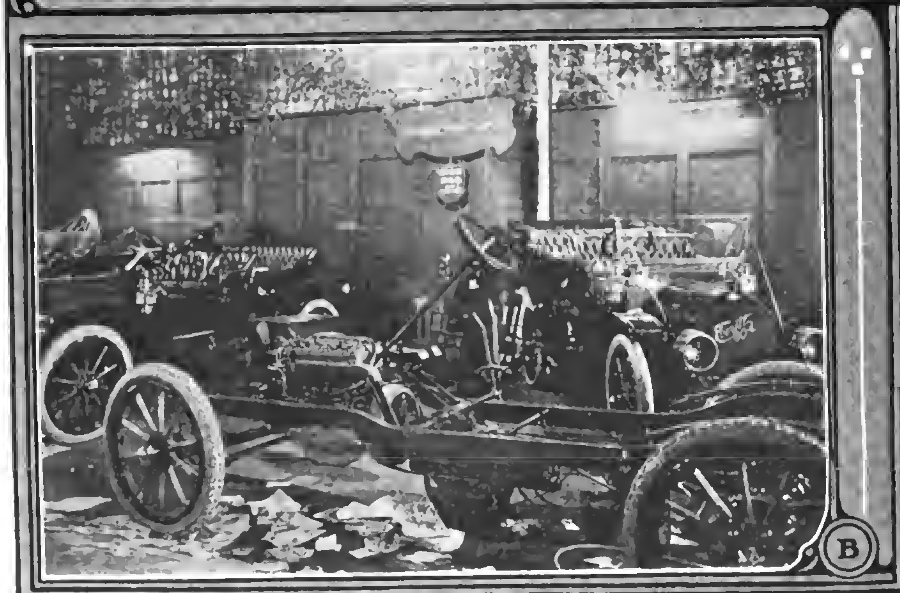
B. T. Strickland, of Fitzgerald, Ga., has sold his garage and will open an automobile livery.

H. S. Larzelere will be in charge of the Chadwick exhibit at the Chicago Show.

THE AUTOMOBILE

PUTTING an estimate on the attendance at the Coliseum during the opening time would be fully as inaccurate as many of the wild estimates which are now being made for the purpose of disclosing the extent of the automobile industry. The Coliseum, the Coliseum Annex and the First Regiment Armory were jammed to a state of suffocating congestion by an audience which by its dress and tone disclosed the presence of Chicago's four hundred, flanked by the Old Guard of autoists from all the automobile centers of America, with a fairly good presentation of the foreign contingent. The daily attendance after the opening has been fully up to the comfortable capacity of the entire space afforded, and that the audience has been entertained, as well as interested in the cars and accessories which were exhibited, was proven in a hundred ways.

Henry Thiede, the artist, whom Manager Miles placed in charge of the decorative scheme while he treated the Coliseum as the heart of the show and put forth his best effort there, he, nevertheless, made much of the Annex, the Armory and even the basement received a quota in the distribution of the decorative idea. In order to appreciate best the scheme of decoration it is necessary to visit the Coliseum, which, when properly described, would compare most favorably with any one of the many beautiful park scenes which abound in the metropolis of the West. The oak trees from Wilmette and the vicinity along the north shore were in a double line, towering above the exhibitions, reaching to the blue of the dome of the building, and the deception was carried to a fitting conclusion by the nature-faking way that stumps and roots, shrubs and moss were scattered about after a fashion, carelessly. Beneath all this haphaz-



A—Maxwell-Briscoe exhibition, presenting a bared chassis in the foreground, and types of touring cars in the background.

B—Metzger Motor Car Company exhibit, with a chassis in front and touring cars on the flank and rear.

C—Exhibit of the American Locomotive Company, presenting the Alco chassis in front and a touring car in the background.

ard imitation of nature's handiwork, the trees, which were very large in some instances were anchored to the floor and structure most securely by proper bracing and irons, so that the safety of the public was cared for.

Expressions of satisfaction were in evidence at every hand, due to the excellent manner in which Manager Miles took care of the automobile contingent, somewhat, it is true, to the detriment of the accessory exhibitors, although there were so many applicants for space that it was simply beyond the range of possibility to care for the close approach to 200 of them who were left out. Under the circumstances it was a wise move to afford space to the car exhibitors and to improvise for accessory makers to the greatest possible extent. The 89,000 square feet of floor space available, having been used to the best advantage, was bound to terminate the effort of Manager Miles, and those who failed to draw the lucky number had but the one expedient to fall back upon, *i. e.*, an outside nearby exhibition.

In a few instances car makers preferred to exhibit their wares outside of the big show, and notably the Ford Motor Company. Its policy is to exhibit at the New York Show only. The Ford branch in Chicago is turned into a showroom and, while it is in a relatively small way, it is putting up excellent op-

D—Franklin air-cooled exhibit, with a chassis on blocks in the foreground, the front of a touring car to the right, and another example in the background.

E—Buick exhibit, showing a bared chassis, and several examples of this make as a setting for the chassis.

F—Premier exhibit guarding the gate in a setting with a big tree to mark the place.

position to the Coliseum. Velie does not favor shows, and his company is keeping "open house" at the Chicago branch. Including the above-named companies there are 28 makes of automobiles which are being exhibited in branches outside of the show, 10 of which were not present at any of the big shows this year. They are: Davis, Cino, Enger, Westcott, Continental and Henry in the pleasure class; Schmidt and Duntley in the commercial line, with the Ohio and Ideal in the electrics.

Of the remaining cars which were unable to draw space, the following will be mentioned: Anhut, Panhard, Firestone Columbus, Simplex, Standard, Palmer-Singer, Isotta, Randolph, Saurer truck, Demot and Middleby. A number of the accessory makers also put up private exhibitions, among which is Michelin, with an elaborate window show; and in the new building of the Simons Hardware Company at the northwest corner of Michigan avenue and Fourteenth street, activity is rife, space having been leased to a half dozen concerns of prominence, including Anhut, DeTamble, Grout, Westcott, Continental, Paterson and Henry. At 1233 Michigan avenue Davis and Enger have taken space with Cornish and Friedburg, who handle the Schacht. In the Regal store at 1502 Michigan avenue the Duntley truck and the Cino pleasure car are shown.

CLOSELY examining the automobiles at the Ninth Annual National Show discloses many points which must impress the autoist of experience, some of which will surely appeal to designers as requiring slight attention in the long run, although the situation, from the user's point of view, is on such a high plane that criticism becomes extremely difficult, and for the most part unprofitable. This being the third large show within a few weeks, it has enabled spectators of acumen to reach conclusions of a more or less definite character bearing on the industry, with the idea of noting advances made, and the time is ripe to handle the subject on a basis of cold judgment, rather than to evade such of the facts as may be disconcerting.

With 81 makes of gasoline pleasure cars lined up for inspection, eight makes of electrics and nine separate makes of commercials on the flank of the pleasure automobiles, it is possible to go down the line and note just what the differences are. The first glance is enough to indicate to even a casual observer that there are many divergences. Some of the ideas are accounted for by circumstances, more by point of view, and, for the rest, they present evidences of differences of opinion of designers.

That there should be several schools of designers is to be accepted as a matter of fact, and in making comparisons it is necessary to differentiate as between the schools. Within a given school of design it does seem as if there should be a certain uniformity, and the few divergences from standard methods within schools are not so prominent as to defeat the main contention, i. e., the general situation is thoroughly healthy, and autoists, if they exercise a little care in making selections, should be rewarded by automobiles which will come up to all reasonable requirements in actual hard service.

SELECTION IS PUZZLING IN THE FACE OF NUMBERS

A count of the separate automobiles which are on exhibit discloses the presence of 266 different models, and this very fact adds to the difficulty which a man of even a fair amount of skill would experience in attempting to select the best automobile for him. The very fact that there are so many selections, each one differing from the next in some important particular, is proof positive that there is a demand for each.

It is on this account that a prospective purchaser is justified in consulting his requirement, rather than to be guided by the arguments of the salesman; it makes no difference what the salesman has to say if the automobile which he has to offer is not designed to do the work which must be performed. Satisfaction is not bound up in the style of a particular automobile in comparison with the modest bearing of the one next to it. If a prospective owner is to act as his own chauffeur, for illustration, provided he is not a mechanic, it stands to reason that he will want an automobile of the greatest simplicity, one which is get-at-able in all particulars, and sturdy rather than stylish.

Much power means fast going, many chances of damage in the hands of men of little or no skill, and, it is the height of fallacy for a purchaser to make such a

Presenting decorations, the iron fence and ornamental gate to the rear of the Packard exhibit, and Packard cars guarding the gate. The make is too well known for comment.

selection. A repair bill, when it is footed up at the end of the year, is bound to reflect the speed which the car may attain, on the ground that the energy which may be stored when a car is running on the road, is proportional to the weight on the one hand, and to the velocity squared on the other.

NEW MODELS STUDIED BY SPECTATORS WITH INTEREST

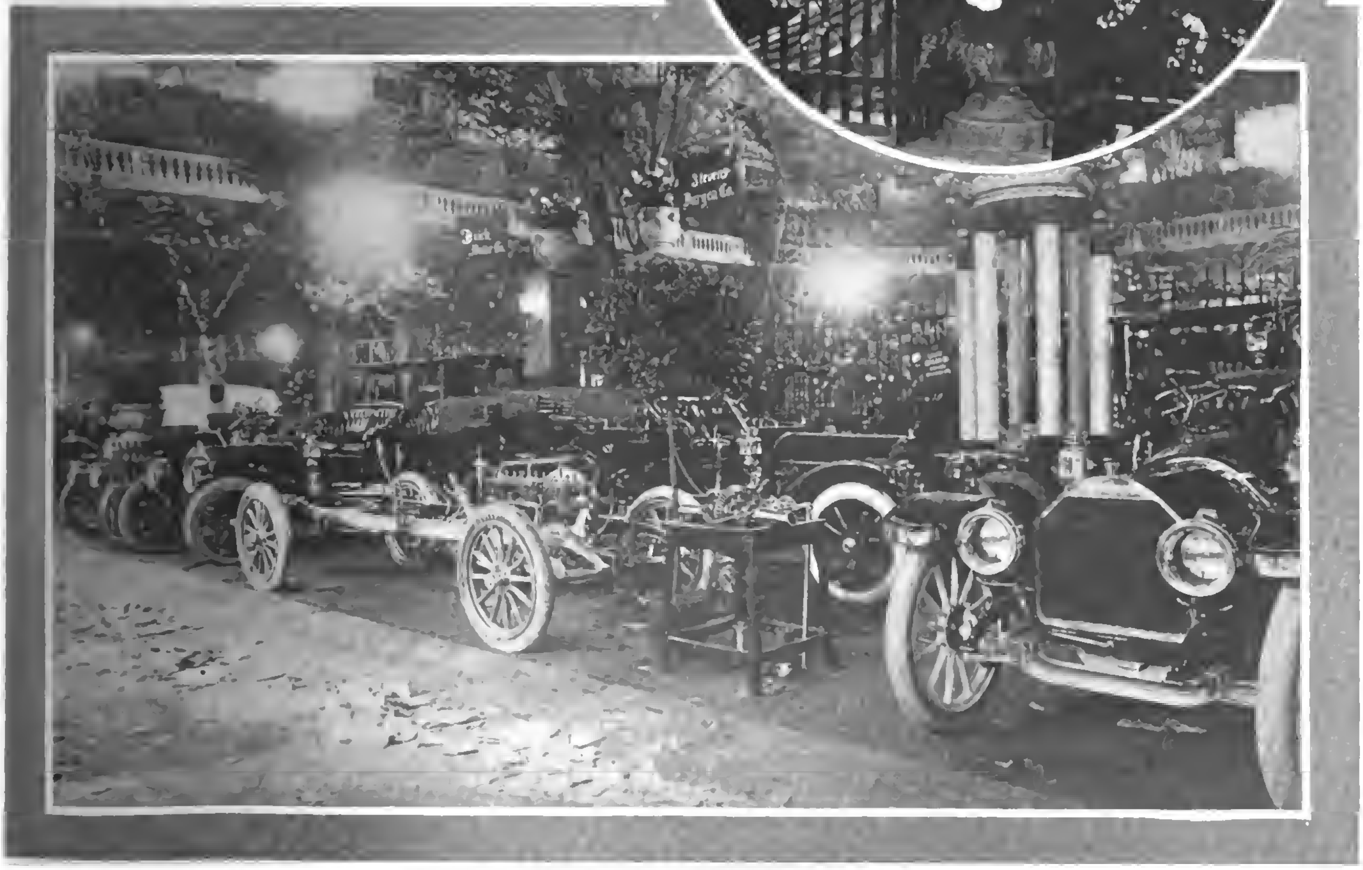
Before discussing the phases of the cars as shown, it will be profitable to understand that the new models (those which came out this year) would naturally have to be considered separately, if they represent radical differences in point of design from cars which were previously reduced to a settled plan. It is for this reason, perhaps, that spectators exhibit rare curiosity as they gather around the displays of the companies which have the most recent origin. The particular cars of the 266 shown which are less than a year old include Flanders, Hudson, Everitt, Ohio, Clark, Fuller, Cole, Lexington, Lion, Metz, Monitor and Springfield.

The Everitt probably represents an entirely new school of design; it differs from all other automobiles thus far offered due to the design of the motor, in which the cylinders are not only cast en bloc, but they are integral with the top half of the crankbox. This motor, beyond this fundamental difference, has some features which were brought out abroad, among which is the practice of casting the inlet and exhaust manifolds integral with the cylinders, thus making the exterior perfectly smooth, and reducing the whole process to one of coring in the foundry. One of the advantages obtained lies in the transfer of heat in the mixture, as it is transferred from the carbureter, so that the liquid gasoline, in spray form, is afforded sufficient heat.

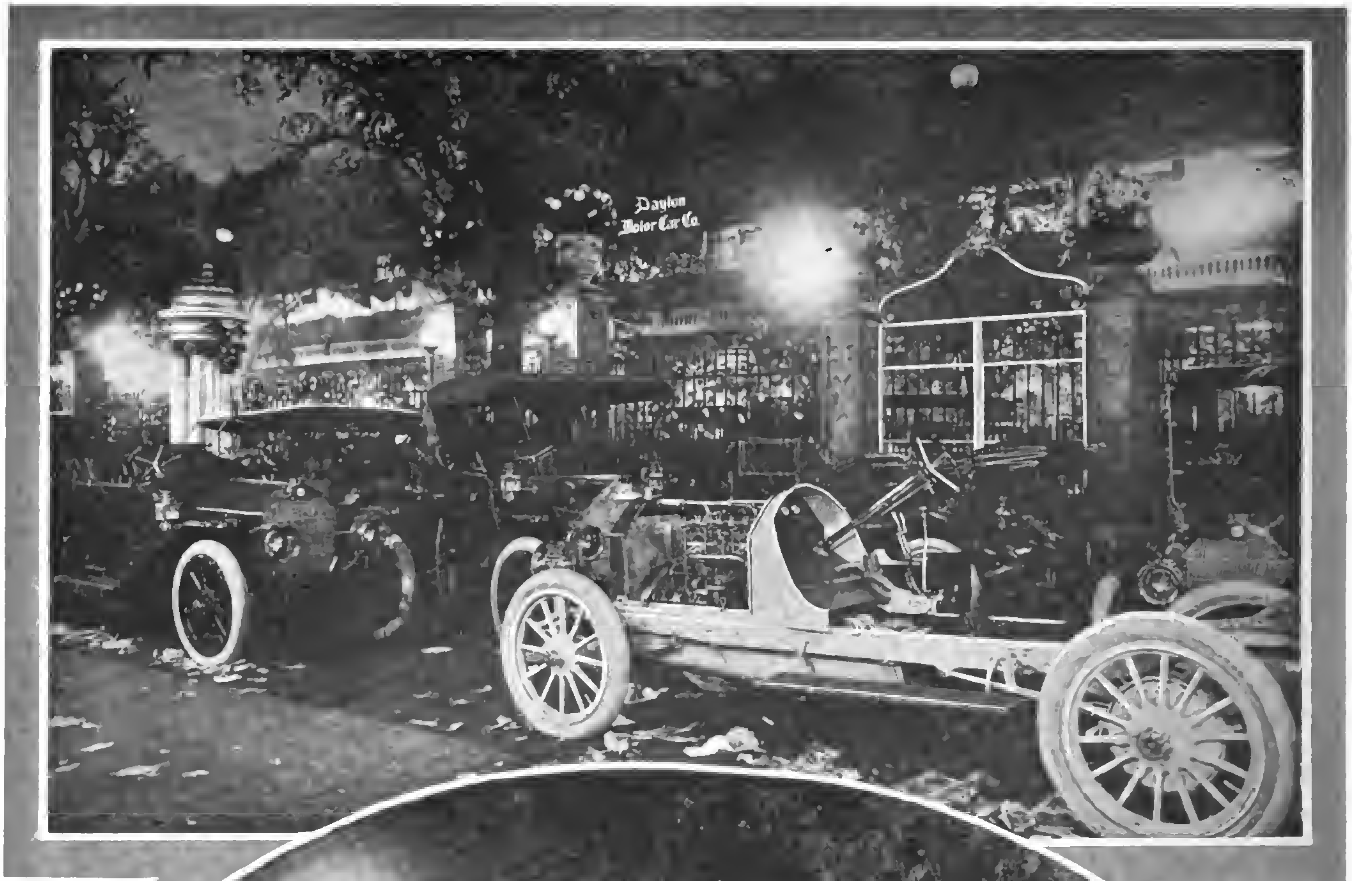
There is one other important deviation this year as compared with the practice which obtained a year ago. High-wheeled types of cars are on the wane, and among the former makers who confined their efforts to high-wheeled work, the following came into the National Show with conventional types of automobiles:

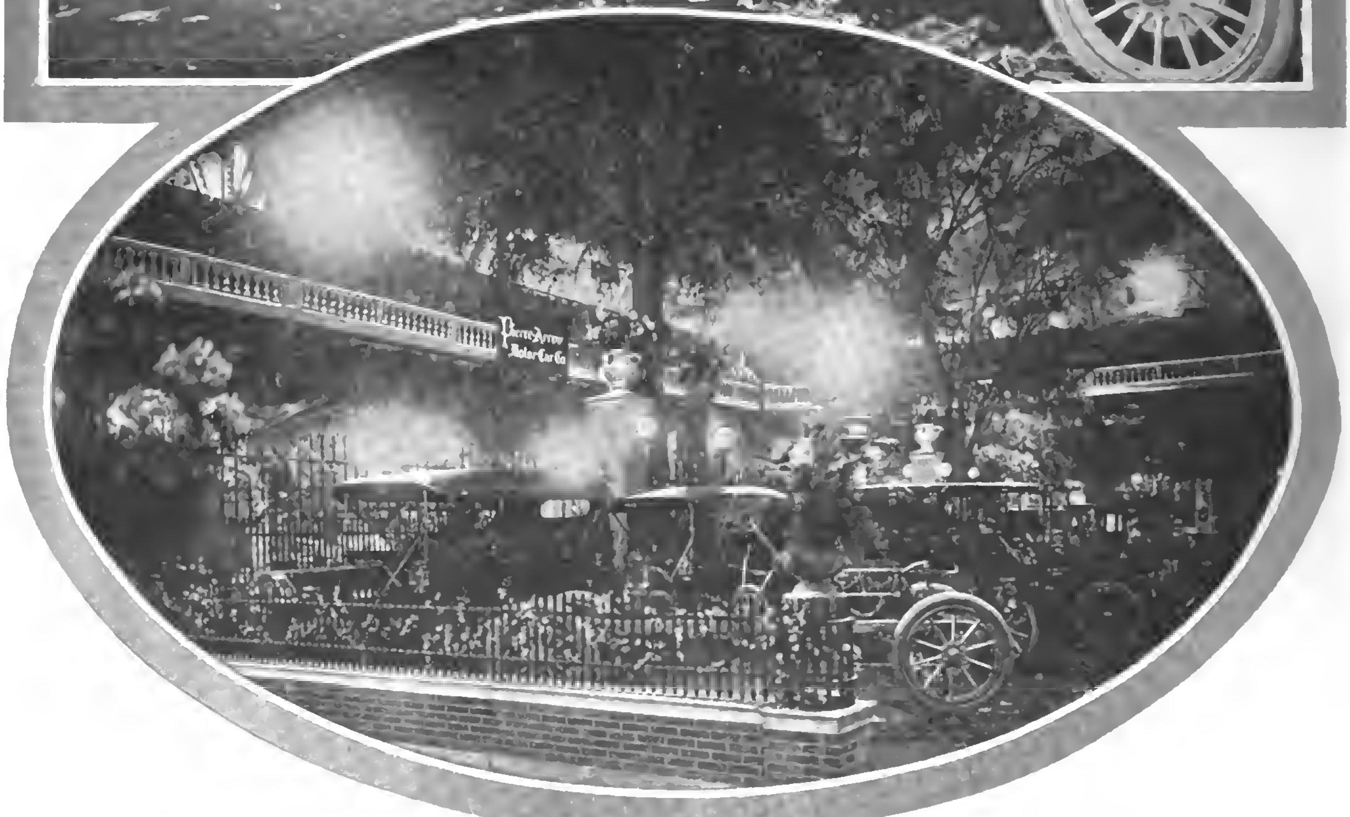
McIntyre, Staver, Black, Fuller, Schacht, Zimmerman, and Richmond. The failure of the Holsman Automobile Company, which went into the hands of a receiver after it applied for space in the National Show, will have a marked dampening effect on the high-wheeled situation, since this concern was the pioneer in high wheel work, and despite the large number of cars put out and their performance, the end does not seem to be promising.

Visitors to the Chicago Show will encounter a number of makes of cars which were not exhibited at either of the two big shows in New York, and they will add something of interest. Some of these cars are very well known to the automobile fraternity, and but few of them are so new as to be wholly unknown to the casual visitor. These cars include Rambler, R. A. C., Auburn, Austin, Berliet, Dorris, Richmond, Lexington, Great Western, Springfield, Rider-Lewis, Fuller, Monitor, Clark, Diamond T, and Zimmerman. In addition to the Berliet, Fiat and Renault were in the foreign contingent, which made up in quality what seemed to be lacking in quantity.



Presenting the exhibition of the Stevens-Duryea, showing a chassis in the foreground, details of the differential on a stand, and touring cars to the flank and rear.





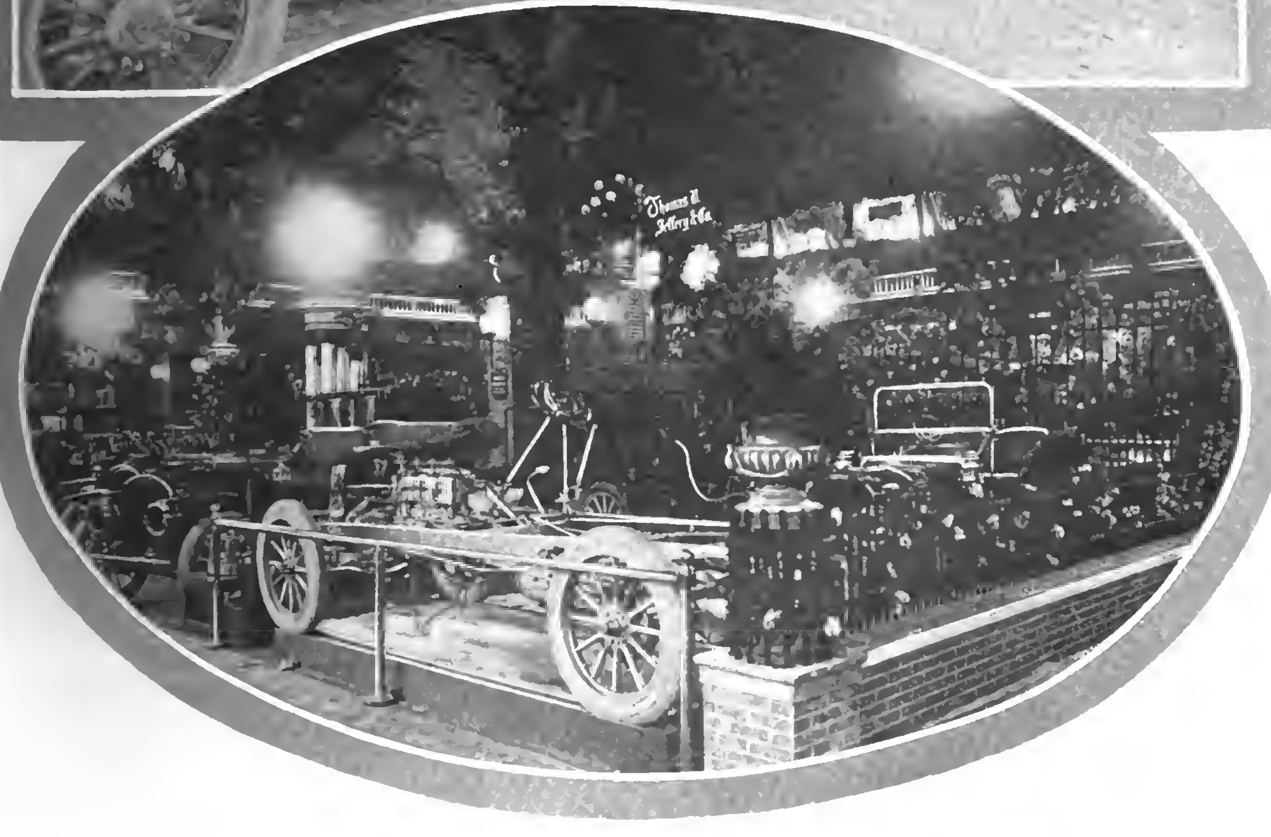
At the top, presenting the background for the exhibition of Stoddard-Dayton cars, showing a bare chassis in front, and several types of touring cars to the flank and rear.

At the bottom, presenting the Pierce-Arrow exhibition, which includes a "Six" chassis, touring car with cape top, and a limousine to the right.

INFLUENCE OF THE PATENT SITUATION ON THE FUTURE

Before this discussion, which has for its basis the types of automobiles as they are to-day, with a reflection of the future, it may be a point in favor of accuracy to take up the patent situation and discuss its merits. When Judge Hough rendered the decision to the effect that the Selden patent was valid, he put into the hands of the A. L. A. M. a lever which has already rendered it unnecessary for the A. M. C. M. A. to exist. This condition not only eliminates the A. M. C. M. A., which is about to be dissolved, but it bands together the great majority of makers of automobiles in this country, gives them the advantage of stability, in the absence of ruinous competition, and will have its bearing in the direction of standardization in the future.

In the past ideas, merely because they were different, were

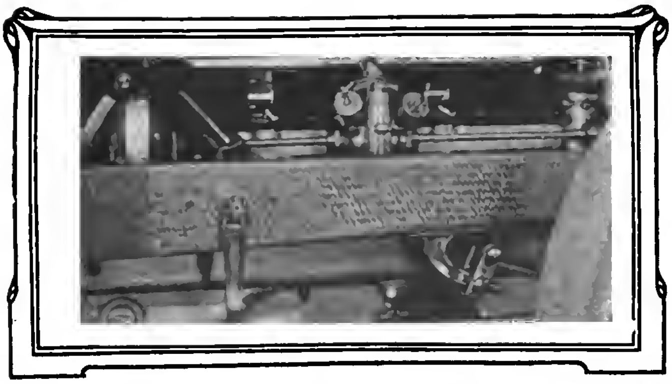


At the top, depicting the central figure of the scheme of decoration, and the Peerless exhibition in the foreground, numbering among its fine examples a bare chassis and types of enclosed cars.

At the bottom, exhibition of the Thomas B. Jeffery Company, presenting a Rambler chassis in the foreground, and other examples of Rambler cars surrounding.

looked upon as novel, and they were adopted by the respective companies in star-chamber session, and sprung upon an unsuspecting public at the shows. In many cases these ideas were half baked; in some instances they were tried out just enough to discover that they had the germ of practicability, without being sure that the factor called service efficiency resided within them sufficiently to take notice of.

While it is highly improbable that the automobiles which are now to be seen represent finality, the fact remains that they do represent a high degree of stability, are rational in their inception, and carry out the intent of the makers so thoroughly well that a user, if he selects the automobile in view [illegible] is real wants, will have no legitimate grounds for compl[illegible]atisfaction is now more of a certainty than an [illegible]



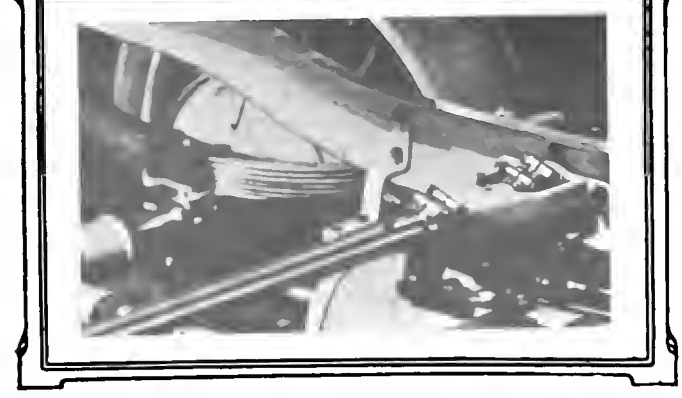
Oldsmobile, showing the steering arm and the spindle which projects through the chassis frame, also the front spring shackle.

BODY WORK SEEMS TO BE RAPIDLY CRYSTALLIZING

The influence of the carriage makers' art left its mark on the automobile, which has only been erased after several years of consistent advance, but last year, when straight-line effects were brought into prominence, it was then said that the body situation was adequately cared for. Torpedo types of bodies, which rather suddenly presented themselves almost at the show, before they were definitely known to obtain in this country, are not only promising, but they upset all earlier prediction. These bodies are more nearly in accord with the locomotive idea than anything which was heretofore presented, and that the automobile is properly classed as related to the locomotive rather than the horse, is a point which will scarcely require bolstering up. The word "locomotive" is used here in the sense that it distinguishes as between a self-propelled kinetic machine and a horse-drawn vehicle. The character of the stresses which are set up in the kinetic machine are entirely at variance with those which obtain when a vehicle is drawn.

WOODEN WHEELS ARE PREFERRED IN AMERICA

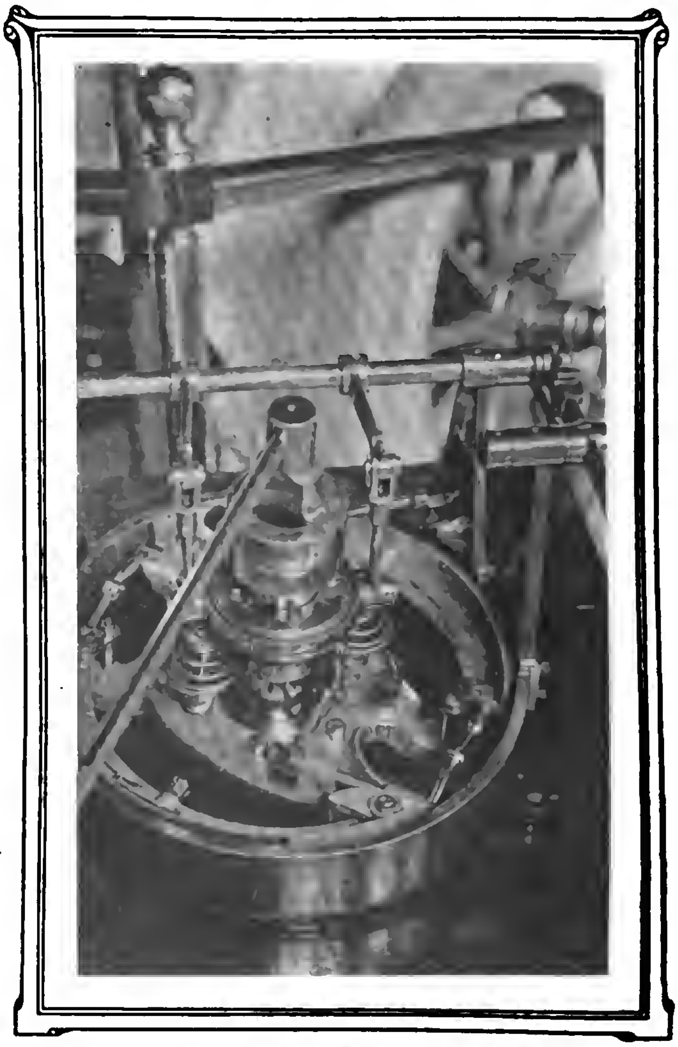
In England, where second-growth hickory or equally good wood for wheels is very much at a premium, wire wheels have reached the highest state of perfection, and are rapidly supplanting wood. This condition is not to be taken as evidence of superiority of wire wheels over wood; it has never been shown that wood, when it is properly selected, and the wheels are suitably made, offers any drawback at all. What the year does indicate, however, is that pneumatic tires were not large enough heretofore, and that in the long run the cost will be very much lower to the autoist if he pays more, provided he secures larger tires in the first place. Larger tires are in evidence in every make of automobile this year, but in purchasing a car it will be the height of wisdom to differentiate as between the cars which are obviously well equipped from the point of view of tires and those which may represent the contrary view.



Locomobile chassis just back of the kick-up of the frame, showing the brake equalizers, spring perch, and U-bolt fastening.

EFFICIENT AND DURABLE BRAKES ARE BEING USED

The most important difference which will be noted in the application this year over last will be found in the location, to a very considerable extent, of the service as well as the emergency brakes upon the traction wheels. There are two schools of design represented in this situation, in one of which it is truthfully claimed that the service brakes will be extremely effective if the drum is applied to the differential shaft, which operates at a higher angular velocity, and since the braking effort is transmitted through the side chain drive, or other mechanism, the inefficiency of this mechanical system helps to stop the car. The braking effort then is maximum for a given applied pressure on the periphery of the brake drum, but, as the other school of design points out, the transmission system must sustain under the work which is induced in the endeavor to stop the car.



Rambler clutch, which is an expanding shoe type within the flywheel, actuated by a double toggle motion.

SELECTIVE SYSTEMS OF TRANSMISSION GEARS DOMINATE

No attempt is ever made to deny the accelerating efficiency of a four-speed transmission system, but motors are now so relatively flexible that the three-speed sliding gear seems to serve every end, excepting, perhaps, in the very large examples of touring cars. That the four-speed system of transmission is limited to the relatively large and high-powered automobiles is proven by its presence in the limited number of cars as follows: Buick Model C, Chadwick "Six," Colburn Model M, Crawford Model G and F-G, Houpt, Keystone 6-60, Kissel Kar Model D-10 and G-10, Locomobile Models 1 and I, Lozier Models H and I, Matheson "Four," Oldsmobile, Palmer-Singer, Peerless Models 27, 28 and 29, Pierce-Arrow Models 36, 48 and 66, Premier 6-60, Rainier, Royal Tourist Model M, Schlosser 24, Simplex 50, Stearns

30-36 and 45-90, Studebaker Model G-7, Thomas Models J and K, White Models G-A and G-B, Winton Models 48 and 60.

Selective transmission gears are now so much used that the progressive systems are only discovered as the result of a diligent search. The best way, perhaps, to indicate the small extent to which progressive systems are employed is to enumerate the cars which have them: Great Smith Model 45, K-R-I-T (two speeds), Middleby, Mora 20, Stevens-Duryea, all models; Autocar, Buffalo (commercial), Gramm-Logan Models X, Y and V (commercial), and Packard (commercial).

ALMOST NO EVIDENCE OF STANDARDIZING PRESENTED

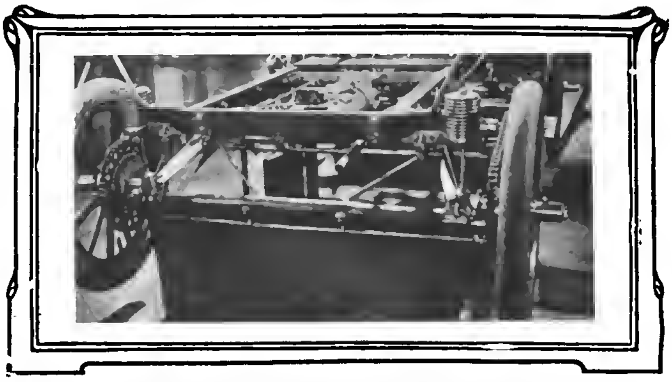
Autoists frequently complain of the varying methods employed in connection with selective sliding-gear systems. Considering three-speed selective systems, it is claimed by many autoists that

Front wheel of the Oldsmobile, showing hexagon hole in the hub and other nice features in design.

they should all be exactly alike, in order that an autoist could take hold of the lever in any car and without the slightest hesitation manipulate the same with absolute confidence, as a matter of habit, and the speed changes should then respond in precise accord with the dictates of his previous experience. Just when this condition will be brought about is difficult to state, but that matters of this sort will ultimately be reduced to a common standard has slight ground for prediction.

BEARINGS USED AND THE LUBRICATING PROBLEM

Plain bearings are now reduced to those which are employed on the crankshafts and connecting rods, insofar as work of great responsibility is concerned, and for the considerable number of bearings in and about the chassis for brake and control levers,



Rear of Brush Runabout, showing the side chain drive, substantial axle, wooden chassis frame and helical springs.

steering gear, spring eyes, and like parts. Beyond this point anti-friction types of bearings are looked upon as desirable, and they are almost exclusively used. When it comes to a classification of these anti-friction types of bearings, however, it seems futile to attempt the task on the ground that in many cars three or four different types of bearings are employed, and, for that matter, there are very few automobiles in which any one type of bearing is used to the exclusion of all others.

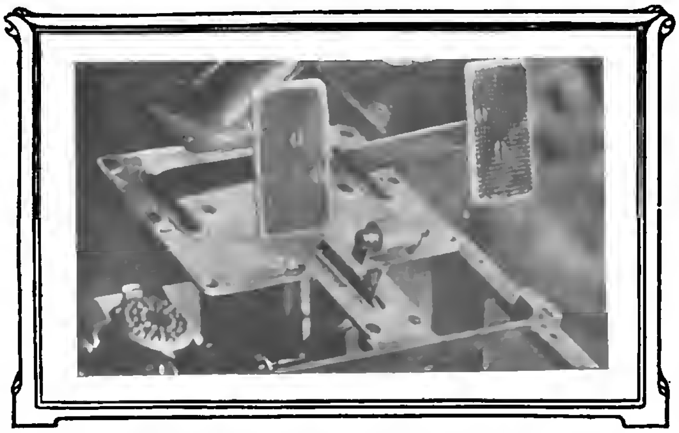
Water cooling obtains in all examples excepting the following: Adams-Farwell, Cameron Models 11, 15 and 16, Franklin Models D, G, H, K-4; Illinois, Kauffman, Kenmore, Metz, Middleby, Ranger Model D.

The block type of motor, which is the most recent idea in cylinder work, will be found on the Acme, Bergdoll "30," Billy Four, Continental "30," Courier, Eastern, Empire "20," Everitt "30," Flanders "20," Ford Model T, Hudson "20," K-R-I-T, Lambert Models 17, 28 and 36, Rider-Lewis, Stearns 15-30, Warren-Detroit, Welch Model R, White Models G-A and G-B, Hudson "20" and Chalmers "30."

POPPET TYPES OF VALVES ON THE WANE

The introduction of the Knight type of motor into the British Daimler in England, Mercedes in Germany, Minerva in Belgium, Panhard in France and Deluca Daimler in Italy, each one of which concerns having experimented for upwards of two years, now report very satisfactory results, and have adopted the Knight motor for the future. In this country four of the big makers have had cars on the road for several months.

Two-cycle work is advancing steadily; the improvements made within the last year were such as to lend encouragement, and the cars which include the two-cycle principle as they were exhibited at Chicago or elsewhere may be set down as follows: American Simplex, Atlas Models F, G and H, Bailey Olympic, Elmore Models 36 and 46 and Paige-Detroit.



Lozier footboard, presenting details of the pedals and method of fastening the steering column.

VARIED FEATURES AND ITEMS OBSERVED AT CHICAGO

CHICAGO, Feb. 5—One hundred and one exhibits of complete cars—that is Chicago's boast. It is the largest number on record for any show ever held in this country. In addition there are close to 200 exhibits of accessories, including 120 members of the Motor and Accessory Manufacturers, and a number of motorcycles. Motor buggies, strange to relate, have almost disappeared. Many new productions of the Middle West are shown for the first time, nearly all of them being of the conventional type, with four or six-cylinder motors, sliding gears and shaft drive. Most of them, too, give a remarkably large amount of "car" for the money, the average being 30 A. L. A. M. horsepower at a price of $1,600.

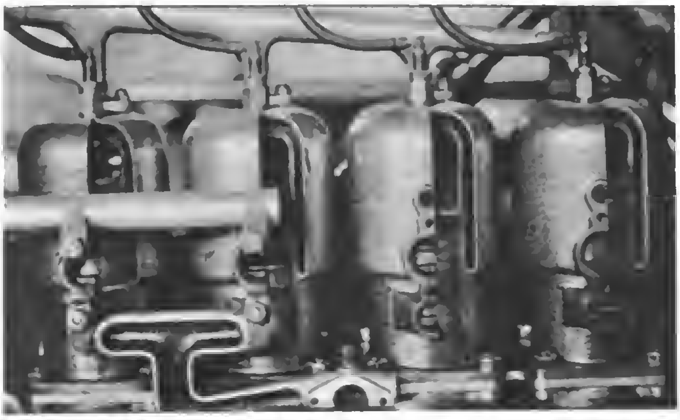


Fig. 1—Elmore four-cylinder, two-cycle motor of the valveless type, with cylinders cut away to show absence of complication.

In its decorative effect the show is exceptionally fine. The Coliseum conveys almost perfectly the illusion of an English garden. Gigantic oaks tower into the blue sky above; beneath, the spaces are divided off by fences of brick and iron, covered with trailing rose vines. In the Annex the scenic effects were limited by a low ceiling, but an impression of spaciousness has been secured by cleaning out the backgrounds between the spaces, and the rose garden decorations give a good effect. The Armory, too, has been enlarged in appearance, and the decorations are attractive and in keeping with those of the other buildings.

As usual, the newspapers, in attempting to spread themselves on show news—for which no one will criticise them—have by the mistaken efforts of cub reporters added considerably to the gayety of the show. One scribe undertook to discuss the Thomas revolving chassis, the same which was shown at New York, on which electrically lighted signs appear to call attention to various mechanical points. His account read as follows: "Tiny lights are distributed through the mechanism of the engine. A touch on a button lights these and the interior of the car then is ready for inspection. A rainy day or a cloudy one is all the same to the mechanicians whose car has broken down far from home. A touch of the button, the break is displayed by the electric light and hours are saved that otherwise would have been consumed in the effort to locate the trouble."

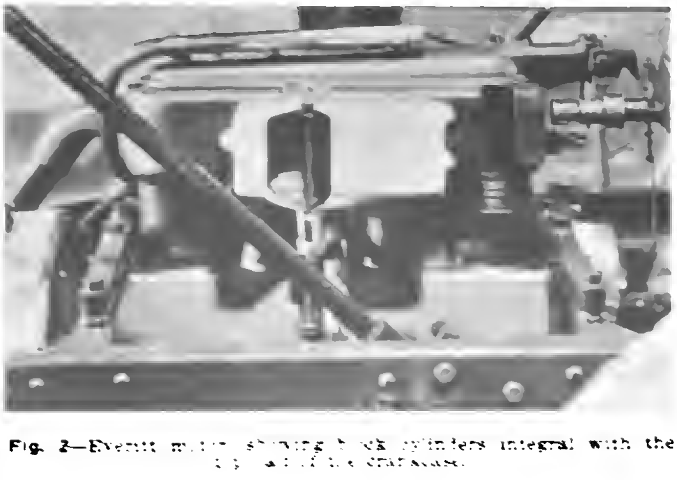


Fig. 2—Everitt motor showing block cylinders integral with the top half of the crankcase.

For almost the first time in history, the opening of the show was attended by good weather. Though the air was a little snappy, still the skies were clear, and the wind was only a zephyr, compared to the blasts of former years. However, Wabash avenue, the stamping ground of the demonstrators, is half blocked with piles of frozen snow from the recent storm.

The Thomas B. Jeffery Company has set into operation a novel idea, in running daily excursions from the show to the new Rambler plant at Kenosha, Wis., for the benefit of prospective buyers and agents. The daily attendance is very considerable.

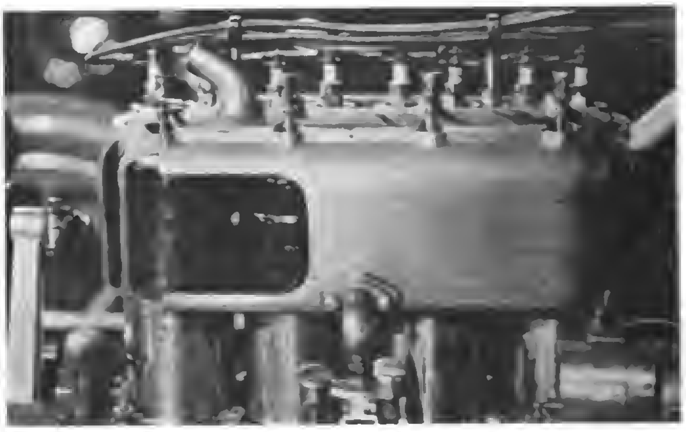


Fig. 3—Hudson Motor of the block construction, with the water jacket cut away and one cylinder sectioned.

Not all the exhibits were ready when the doors were thrown open Saturday afternoon. Premier did not get its cars in till supper time, and on account of its prominent position at the intersection of the two main aisles this was particularly noticeable. Midland was another sufferer from the congestion of railway traffic. At the stand of the Everitt-Metzger-Flanders Company only one car was to be seen, an E-M-F "30." One of the new Flanders "20" runabouts is expected to arrive shortly to round out the exhibit. It is eagerly awaited by the enthusiasts.

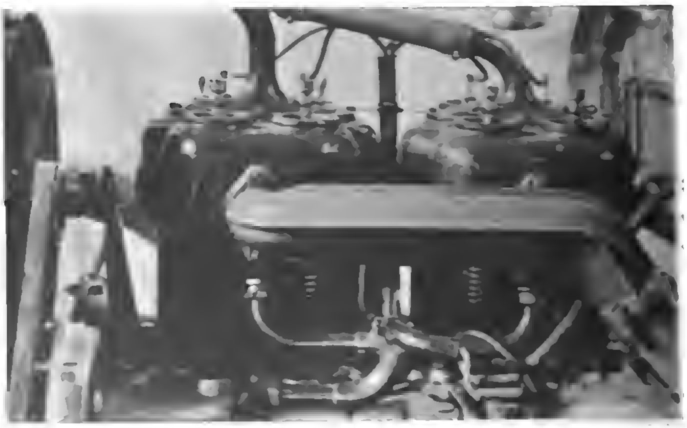


Fig. 4—Four-cylinder Nordyke & Marmon motor, showing large exhaust manifold and capable water connections.

So far as could be seen during the first night, there are only three racing cars in the show. The Alco that won the Vanderbilt Cup, and with it of course the cup itself, appear prominently on the stand of the American Locomotive Company. Thomas has the car that won the New York to Paris race, and Chalmers the "Bluebird" which carried off the Indiana trophy last Spring.

Among the trophies shown, besides the Vanderbilt Cup, are the New York to Paris one on the Thomas stand and the Santa Monica and Portola by the Apperson; Knox, Chadwick, Chalmers and Buick all have extensive collections.

Among the news items which are floating about the show, is one concerning the reorganization of the Grout Brothers Automobile Company into the Grout Automobile Company. The new officers are: Hon. J. W. Wheeler, president; Elisha S. Hall, treasurer; G. E. Dexter, secretary, and Walter J. Gould, sales manager.

One of the newcomers which could not secure space in the big show was Cino, made by Haberer & Company, of Cincinnati. It is shown instead at 1502 Michigan avenue. Four cylinders, 4 3-8 by 5 inches, supply the motive power; the cylinders are cast in pairs with valves in the heads. Constant oil level is maintained

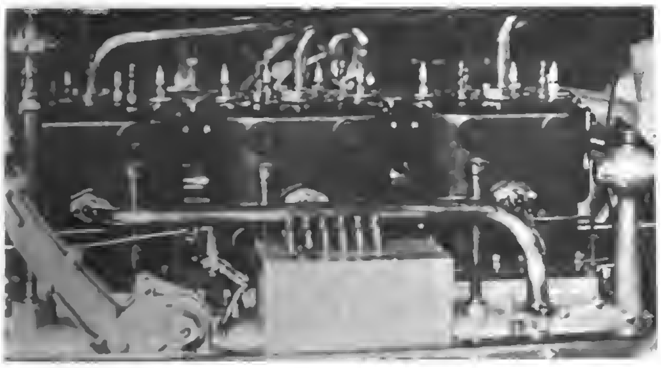


Fig. 5—Stevens-Duryea "Six," with cylinders in pairs, showing the four-feed oiler to the right and timer above cylinders.

by a pump, and a magneto is standard equipment. Multiple disc clutch, three-speed selective gears and a doubly jointed shaft carry the power to a Timken semi-floating rear axle.

Davis is another name hitherto unfamiliar among the ranks of the manufacturers. This standard touring car has four paired cylinders, 4 3-4 by 5 1-4 inches. The wheelbase is 120 inches, and the tires are 36 by 4 both front and rear. The springs are semi-elliptic in front and platform in rear. Multiple disc clutch

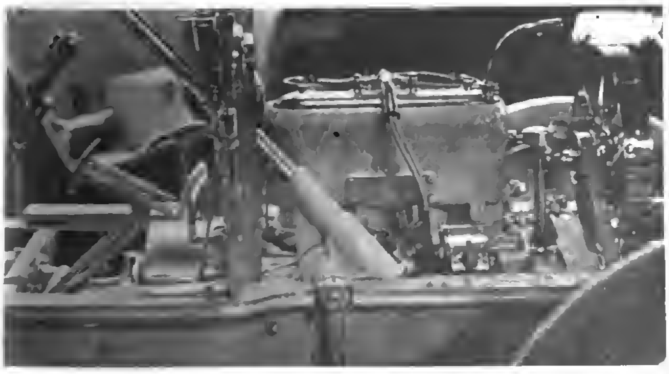


Fig. 6—White motor, showing block castings, long bearing for fan, steering post with shaft passing above chassis frame.

and three-speed selective gear set form the transmitting means; the rear axle is full floating, the shafts running on large imported bearings.

Evidences of quality are shown in the Westcott, among the little details being the milling of integral keys on the gear shaft for the sliding gears, instead of using a square shaft or inserted keys. The motor has 4 1-2-inch square cylinders, cast in pairs with all valves on one side. The multiple disc clutch forms a single unit with the change gear. The wheelbase is 112 inches and the tires 34 by 4.

In the low-price division, the limits of which are now considerably lower than ever before, is the Kenmore, on view at the corner of Michigan avenue and Fourteenth street. This has a two-cylinder horizontal opposed motor, air cooled, rated at 12-14-horsepower. The wheelbase is 82 inches, and either pneumatics or 32-inch solid tires are fitted.

The ranks of the commercial cars have been increased by the advent of the Duntley, made by the Chicago Penumatic Tool Company. This is a light delivery car with a two-cylinder horizontal opposed motor under the driver's seat. The cylinders

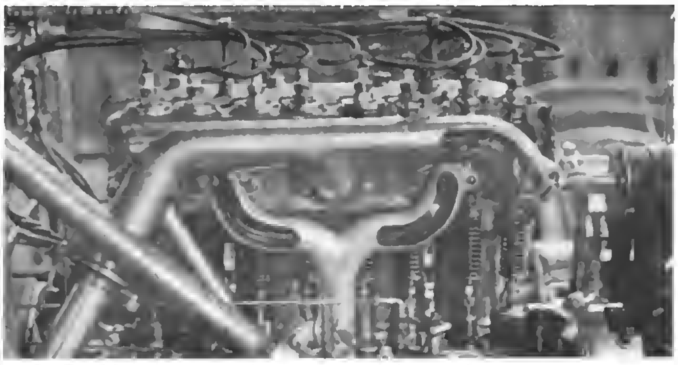


Fig. 7—Hudson block motor sectioned, and manifolds also sectioned to show uniform thickness of walls.

are 5 inches in bore and 4 inches stroke. Cooling is by thermosiphon, ignition by double-unit coil and dry cells, and lubrication by a four-feed mechanical oiler. The gear change is planetary, and drive by side chains in the approved commercial fashion. The wheelbase is 86 inches, and the wheels 36 inches in diameter, shod with 2-inch solid tires.

A foreigner which is almost unknown in this country, outside of Chicago, is the Berliet, imported by Walden W. Shaw. The Berliet design, it will be remembered, was the original of the Alco, although the American car has long since departed from the designs of its French parent, and now it would be a clever man who could trace a resemblance. The Berliet cars range from a 12-horsepower up to a 60-horsepower limousine, and are a fine example of the best French construction.

Torpedo bodies are still quite a novelty in Chicago, and as a result those shown by Knox, Marmon and Winton come in for a good deal of attention. The Knox car with this equipment is a six-cylinder, with a very long, rakish look, due partly no doubt to its wheelbase of 134 inches.

Motorcycles as usual are in considerable prominence, having pre-empted the whole of the second floor of the Coliseum Annex. They do not seem to be quite as strong in numbers as last year, the roll call revealing but twelve makers. Still, they make a gallant showing, and are visited, despite their rather isolated position, by many people to whom their handiness appeals. Many professional men find advantages in their use.

Fig. 8—Mitchell "Six" with cylinders in pairs, exhaust valves in the head, and details of the valve motion.

LATEST NEWS FROM THE CENTERS OF AUTOMOBILE ACTIVITY

FOUR NEW COMPANIES ADDED TO SELDEN PATENT LIST

A. A. A. SOLVES PROBLEMS AT MEETING IN CHICAGO

CHICAGO, Feb. 9—The first session of the Chicago meeting of the A. A. A. was held on Tuesday at the Armory, President Speare in the chair. Those who responded to the call of the roll included Ralph W. Smith, president Colorado State Automobile Association; M. C. Moore, president, and James J. Drought, secretary, Wisconsin State Automobile Association; E. J. Brochannon, of the Kentucky State Automobile Association; Chas. P. Root, president Illinois State Association; John Wilson, of the Pennsylvania Motor Federation; S. M. Butler, of New York, chairman of the Contest Committee; A. G. Batchelder, from New Jersey, chairman Executive Committee; S. A. Miles, general manager N. A. A. M.; Alfred Reeves, general manager A. L. A. M.

The Federal Registration bill came up for discussion, and the consensus of opinion as based upon this discussion was that the bill has an excellent chance of passing during the present session of the Congress, but it was concluded that the chances of success will be much enhanced if the various State automobile associations and the 240 clubs scattered throughout the country will exert a timely effort in the interest of this much-desired legislation.

The best time to select for the presentation of petitions with a view to favorably impressing the Congress will be at the time of the National Legislative Convention of the A. A. A., which will be convened in the City of Washington on February 15 and adjourned February 17. Secretary Elliott's report of the support which this convention is receiving included 33 State associations, and it is contemplated that the National Organization will soon be increased by additions from Florida, Oregon, Tennessee and North Carolina.

Chairman Butler, of the Rules Committee, in his report for 1910 covered the situation most thoroughly, resting it in front of the Board of Directors. Chairman Speare in his address, which was graceful, terse, and comprehensive, stated, among other pertinent matters, that the automobile center is moving westward, and its influence on the good roads situation is being felt, due to the pressure which farmers exert, now that they ride in automobiles. It is the belief of President Speare, that the final solution of the good roads problem lies in the widely disseminated use of automobiles.

During the meeting of the Executive Committee of the A. A. A., which was held in the afternoon at the Armory, this being the regular quarterly session, President Speare made a lengthy address, reviewed the activities of the Association adequately, and among the timely matters acted upon was the passing of a resolution expressing sincere regret over the death of John Farson, who, at the time of his death, was a member of the Chicago Automobile Club, and who will be remembered for his indefatigable activity and wise rules during his occupancy of the presidency of the A. A. A.

Secretary Elliott, in rendering his report, showed that there are 33 States represented in the A. A. A. The revised rules of the Contest Committee, after presentation, were referred to a sub-committee of the Board, which is empowered to act.

After voting to award tokens of esteem and appreciation to H. O. Smith, chairman, Alfred Reeves, the former general manager, and Job E. Hedges, the counsel, arranged for the distribution of a surplus which is in excess of $60,000, which the American Motor Cars Manufacturers Association kept as a balance, the meeting was held at the Southern Hotel yesterday in compliance with the terms of the five-year contract constituting the agreement under which the A. M. C. M. A. was originally banded. The Association was formed in Chicago in 1905, and its unusually successful career could scarcely be terminated without some mention being made of the shows which represented its important annual events. Its membership included 43 companies, all of which were represented yesterday at the gathering. There were speeches of congratulation on the work which was accomplished by the organization, and Chairman Smith was presented with a gold watch, which happy act was duly supplemented by votes for tokens to be presented to General Manager Reeves and Job E. Hedges.

The final resolution which was passed had for its purport the closing of the affairs of the A. M. C. M. A., and it was resolved that the A. M. C. M. A. expressed its high appreciation of the management of the Chicago Automobile Show for 1910, for the completeness of the arrangements and the purity of the artistic display, which was rendered none the less apparent by the interlacing of practical features which had a wide influence for success.

ORGANIZATION OF LICENSED DEALERS

NEW YORK, Feb. 10—At a meeting which is being held to-day, the selling agencies in New York, which confine their operations to licensed automobiles, is busy through its select committee in discussing the details of the organization, formulating by-laws and setting down the preliminaries of the policy which will be pursued by the licensed agents from this time on.

In the meantime, the Selden list has been augmented by the addition of the makers of the Grabowsky, Oakland, Randolph and Reliance, bringing the grand total up to 72 separate makers of automobiles, two of which are foreign makes, namely: Delaunay-Belleville and Lancia. It was stated last week that the licensed association dealers were backed up by the makers of cars under the Selden license, and this prediction seems to have come true. The licensed association is showing evidence of activity in the direction of indicating to purchasers of automobiles that they may expect "squalls" if, in selecting automobiles, they overlook the fact that patent 549,160 has been decided by Judge Hough to cover the basic principle of the automobile.

OVERLAND COMPANY GIVES BANQUET

The Overland Company gave a banquet to its dealers at the LaSalle Hotel on Monday night, which was attended by more than 200 agents from all parts of the country. One of the trophy displays along the row is the showing of the Wheeler & Schebler trophy which is on view in the windows of the Ralph Temple Automobile Company, which handles the Jackson and Fuller. This has occasioned some comment among those who remember the legal war which was threatened following the decision.

GLOOM CAST OVER SHOW CIRCLES

The sad demise of the mother of Manager Miles, which took place in Bristol, England, as the result of shock following a minor operation, was discovered following a cable from England to that effect, and when the executive departments learned of the unfortunate situation they were much affected. The news was not given out, but in some way it became known, and it cast a mantle of gloom over the further activities of his collaborators.

FORD MOTOR COMPANY ACQUIRES PRESSED STEEL PLANT

TO BE INDEPENDENT OF ALL OUTSIDE INFLUENCES

IN CASE OF A GENERAL MIX-UP FORD WILL BE READY

DETROIT, Feb. 9—When the A. M. C. M. A. is disbanded, as it certainly will be within the next few days, the Ford Motor Company will be alone in its fight against the owners of the Selden patent, and according to the Ford attitude, there is little to be feared from Selden interests by way of a direct Court attack. The Ford idea is to look out for flank movements. If the Selden interests should cut off his source of supply, Ford would have to come to terms, and in order that this condition may not be brought about, the Ford Company is closing in on its source of supplies. That is to say, Ford is making complete and thorough provision for all contingencies.

The John R. Keim mill, which is located at Buffalo, and employs about 600 men, has fallen into the control of the Ford Company by the purchase of the Spaulding interest (for Ford account) in this plant. The Keim plant is especially well fitted out to make such pressed steel products as are necessary in the production of Ford cars. It will be remembered that the Ford design is one which utilizes pressed steel to a marked extent, and the acquisition of this well-equipped plant by the Ford Company represents a move of the greatest importance. The John R. Keim mills is incorporated and has a capital stock of $350,000.

OFFICIAL AUTOMOBILE BLUE BOOK WORK

CHICAGO, Feb. 10—The Automobile Blue Book Publishing Company, who are hard at work on their 1910 editions, report very satisfactory progress in all branches of their work. During the driving season of 1909 they had three, and frequently four, crews of two men each covering the roads embraced in the several sections they publish.

Messrs. Robert Bruce and John F. Mixer traveling in New Jersey, New York, Pennsylvania, Delaware, Maryland, the District of Columbia and Canada, revised several thousand miles of old routes and added approximately 10,000 miles of new route matter—Canada, west of Montreal having about 2,500 miles.

Messrs. E. R. Mixer and Henry MacNair devoted their time and energies to the New England States and Canada east of Montreal, revising many of the old and connecting them with new routes and compiling text for about 11,000 miles never before routed. Covering Maine as thoroughly as Massachusetts, something heretofore not done.

Messrs. John P. Dods and Fred E. Lee have spent their time in the Western territory adding many connecting routes in Ohio, Indiana, Michigan, Illinois, Wisconsin and Iowa, and have invaded Minnesota, Nebraska, Kansas, Missouri and Kentucky. They have run three routes to St. Paul and Minneapolis from Illinois and Iowa points, two trunk lines across Iowa with many connecting links. A new route from Sioux City, via Omaha, Lincoln and Kansas points, to Kansas City, and a route from the latter city to St. Louis—a route never before published—securing about 10,000 miles of additional mileage.

Messrs. N. H. Van Sicklen, Sr., president of the company, and E. R. Mixer made the New York-Atlanta-Savanah and return trip, which will, with other matter since secured, give a direct route from all northeastern points to the South as far as Jacksonville, Fla., adding over 3,000 miles of new matter in a territory heretofore practically unknown to tourists.

A new style text, more easily followed, has been adopted, new and more explicit maps are being prepared and an entirely new system of indexing will be used, rendering the information contained in the various routes more easily located.

All sections will be ready for delivery April 15, and will undoubtedly surpass anything heretofore attempted in automobile road book and route work.

FEBRUARY MEETING A. S. M. E.

The American Society of Mechanical Engineers will hold its monthly meeting on February 8, in the Engineering Societies' Building, West Thirty-ninth street, New York City. This meeting will be devoted to the dedication of the memorial tablet to Dr. Robert H. Thurston, first president of the body.

CHICAGO AUTO TRADE ASS'N BANQUET

CHICAGO, Feb. 5—The fourth annual banquet of the Chicago Automobile Trade Association was held last night at the Chicago Athletic Association, there being 150 of the local dealers and their friends in attendance at the dinner, Thomas J. Hay, president of the association, acting as toastmaster. It was the most successful affair ever promoted by the dealers, and the speechmaking was most interesting. Prominent in the talkfest was Father M. J. Dorney, a priest from back of the yards, who delivered a running fire of witticisms on motoring in general, declaring that although he used to be an ardent admirer of horses, he had been converted, and that now he would not give up his motor car for a seat in kingdom come. Walter J. Moody, manager of the Chicago Association of Commerce, spoke on co-operation, and told of the mighty deeds that were possible if the dealers would only work as a unit in striving to promote the interest of the association. Howard W. Hayes, assistant corporation counsel, was much wrought up over the fact that the Illinois state motor law took away from the city the right to set a speed limit, but is somewhat reconciled because of the passage of an ordinance which makes it compulsory the examination of chauffeurs on public-hire vehicles. Mr. Hayes hung out a ray of hope to Chicago motorists who have been fighting against the wheel tax, declaring that the license committee of the city council was even now considering a reduction of the tax with a view to taxing by horsepower rather than seating capacity. Ira M. Cobe, president of the Chicago Automobile Club, intimated that the Cobe cup race this year will be run on a speedway, which is to be built within 40 minutes of Chicago. At the same time he gave an inside light on the loss sustained on the Crown Point carnival last summer, declaring that the club went $1,500 into the hole, largely because of the construction of fifty-four private grandstands around the course, thus depriving the club of revenue which was its due. Samuel A. Miles made a clever speech on shows, while David Beecroft, president of the Chicago Motor Club, wound up with a dissertation on the American Automobile Association, in which he urged the Illinois motorists to rouse themselves from their lethargy and assist the national body in the control of motoring sport.

LICENSED RANKS BULGING WITH MEMBERS

The latest announcement of the A.L.A.M. is to the effect that the membership is now 72, which includes two foreign makes of automobiles, i. e., Delaunay-Belleville and Lancia. The dealers who handle licensed automobiles are making a campaign in the interest of licensed interests, and, from all accounts, they are in close touch with the situation from the licensed point of view.

Small Cars Prominent on the Stand of the Belgian F. N.

BRUSSELS SCENE OF

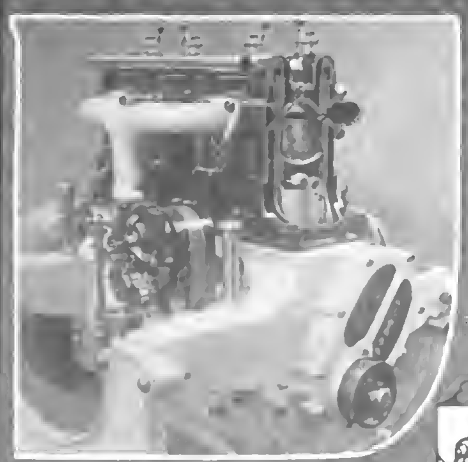
BRUSSELS, Jan. 30—Automobile expositions are rare in Continental Europe, and the one which closed this week in the Belgian capital therefore had all the more success. This, the ninth annual event, was held, like its predecessors, in the Palais du Cinquantenaire, a large hall well suited for the purpose, and tastefully and uniformly decorated for the reception of the automobiles. Although all the leading European firms are present, the show is not distinguished by the appearance of any new models, as in the absence of the Paris salon the makers did not think it worth their while to get these out.

The American exhibits comprise Mitchell, with a full line shown by the recently appointed Paris agent, René Petard, and Ford, which has been on the European market for a considerable time. There are also several American exhibits of tires and accessories.

Aeronautics are an important section. The dominant feature of the hall is the dirigible balloon "Belgica," built in France, but fitted with a Pipe (Belgian) motor of 160 horsepower. This is partially inflated and suspended from the roof. The car beneath it can be reached by the spectators from stairways on each side, and this opportunity to inspect at close range the fittings of a large dirigible is not neglected. Practically all the well-known aeroplane firms are exhibiting, among them being Antoinette, Santos-Dumont, Blériot, Voisin, Farman, Hanriot and a number of lesser Belgian constructors. Hanriot, though a comparative newcomer in this line, shows a monoplane of neat design, with skids for landing in addition to two wheels for starting.

Minerva, a native Belgian, is attracting much attention with its exhibit of motors using the Knight slide valve. The 1910 line of this company uses this valve system exclusively, the motors being built in 16, 26 and 38-horsepower sizes, all four-cylinder. The exhibit includes a motor completely sectioned to show the working of the two sliding sleeves inside each cylinder. The camshaft which operates the sleeves is chain-driven.

On the Pipe stand interest centers about a large car with what may, in the lack of a more appropriate term, be designated as a limousine body; the outfit was specially designed for the crossing of the Sahara Desert. The car has a six-cylinder motor of 105 and 125 millimeters bore and stroke (approximately 4 1-8 by 5 inches). The rear wheels are fitted with twin pneumatic



Minerva Motor with Knight Slide Valves

Rochet-Schneider Idea of a Torpedo Body, with Left-hand Control

Complete Exhibit of Daimler, the Prominent English Firm

tires, like those used on light commercial cars. The body, however, is the real feature. The front part has two transverse open seats, like a wagonette; behind this is the closed part, which can be adapted for sleeping purposes. The rear end of the closed part is made in one solid piece, which can be let down flat on the ground to form a floor. A folding table, camp stools and an awning can all be stowed away in the body; when they are brought out and suitably disposed on the floor, the mid-Saharan desert will be transformed into a lunch-room.

Vivinus having had some success in the building of aeronautic motors is striving for more. It will be remembered that Roger Sommer once used an ordinary automobile-type Vivinus motor on his Farman biplane, and established a duration record with it. Now Vivinus has brought out a motor specially designed for aeroplane use, a four-cylinder said to develop 70 horsepower, and weighing 140 kilograms (about 300 pounds). The motor is very simple and clean in appearance; the cylinders are paired and fitted with copper water jackets, and all valves are in the heads side by side.

Among the other Belgian firms exhibiting are the Fabrique National d'Armes de Guerre, usually abbreviated to F. N., and Germain. The F. N. company concentrates on small cars, and its productions are well known in Europe, although they have never penetrated to America. Germain shows a block motor with overhead valve action, which, even for this type, is surprising in its simplicity. Not a working part is visible except the flywheel and the front extremity of the crankshaft.

The French firm of Rochet-Schneider has a fine example of the torpedo type of body, which is just penetrating to the Continent from its natural habitat, England. This car has the driver's seat on the left, with the levers in the center; this is a very convenient method of dodging the usual issue in torpedo bodies, namely, whether the levers are to be inside or outside of the body wall. Daimler, the first firm to adopt the Knight slide valve, has a good exhibit. All of its cars are fitted with detachable wire wheels. The worm-driven models are quite prominent. Some very neat body work, although not of the torpedo type, distinguished this English exhibit.

The Belgian constructors are jubilant over the success of their show. The obstinacy of the French manufacturers in refusing to back the Paris salon has resulted in a great boom for the industry in the sister country.

Pipe Car for Crossing the Sahara Desert; Showing Collapsible Lunch-Room

Vivinus Four-Cylinder Aeronautic Motor

AUTOMOBILE TRADE CREDIT MEN MEET

THE fourth annual meeting and dinner of the Automobile Trade Credit Association was held at Hotel Astor, New York, on January 19. This association is a very broad one, and its influence upon the trade at large is far greater than would be suspected. Believing that there is strength in union, this meeting is held each year for organization and a review of the situation.

The following were represented:

Lovell-McConnell Mfg. Co., by Messrs. Lovell, Turner & McConnell.
C. Cowles & Co., by L. C. Cowles.
Hartford Suspension Co., by Messrs. Waterman, Montgomery and Burnett.
N. Y. & N. J. Lubricant Co., by Mr. Barnes.
Continental Caoutchouc Co., by Mr. Lemal.
American Thermo-Ware Co., by Mr. Marshutz.
Motor Car Equipment Co., by Messrs. Kaufman & Lowe.
Nonpareil Horn Mfg. Co., by Messrs. Cohn & Arlitz.
Royal Equipment Co., by E. B. Knowles.
Nathan Novelty Mfg. Co., by Edwin B. Nathan.
Westchester Appliance Co., by Henry M. Duncan.
Ajax Trunk & Sample Case Co., Messrs. Kallis and Berg.
Patterson, Gottfried & Hunter, Ltd., by Charles H. Kreuger.
Mutual Auto Accessories Co., by Messrs. Phelps and Nesbit.
N. Y. Sporting Goods Co., by C. T. Hutcheson, J. B. Koebler.
Class Journal Co., by E. M. Corey.
Automobile Topics, by E. E. Schwartzkopf.
Motor World, by Jos. Goodman.
C. F. Splitdorf, by Messrs. W. J. Murray, Murphy and Schindler.

During the past year the following firms were elected to membership:

Aluminum Foundry Co.,	Manitowoc, Wis.
Ball-Fintze Co.,	Newark, O.
Grossman Co., Emil,	New York City.
Hoyt Electrical Instrument Works,	Penacook, N. H.
Havoline Oil Co.,	New York City.
Hagstrom Bros. Mfg. Co.,	Lindsborg, Kan.
Hazen-Brown Co.,	Brockton, Mass.
Jeffery-Dewitt Co.,	Newark, N. J.
Lovell-McConnell Mfg. Co.,	Newark, N. J.
Mutual Auto Accessories Co. of America,	New York City.
Motor Field,	Denver, Colo.
Nonpareil Horn Mfg. Co.,	Brooklyn, N. Y.
Reading Steel Casting Co.,	New York City.
The Rutherford Rubber Co.,	Rutherford, N. J.
Swan & Finch Co.,	New York City.
Standard Automobile Supply Co.,	Chicago, Ill.
Sonneborn Sons, Inc., L.,	New York City.
Union Battery Co.,	Belleville, N. J.
Westchester Appliance Co.,	New York City.
Wright Cooler & Hood Mfg. Co.,	Chicago, Ill.

Messrs. Carl Kaufman (Motor Car Equipment Co.), Michael J. Martin (Geo. A. Haws) and J. J. Cohn (Nonpareil Horn Mfg. Co.) were elected to fill vacancies on the Board of Directors.

Acting President Carl Kaufman was in the Chair during the business session, and Charles H. Krueger, of Patterson, Gottfried & Hunter, acted as toastmaster during the dinner, which was much enjoyed by all in attendance, as well as the guests.

THE AUTOMOBILE CALENDAR

Feb. 5-12.........Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.
Feb. 8-14.........Los Angeles, Cal., Grand Avenue Rink, Automobile Dealers of Southern California, Automobile Show.
Feb. 14-19........Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dai H. Lewis, Manager, 760 Main street.
Feb. 14-19........Hartford, Conn., Foot Guard Armory, Third Annual Show, Hartford Automobile Dealers' Association.
Feb. 14-19........St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington avenue.
Feb. 14-19........Rochester, N. Y., Convention Hall. Third Annual Show, Rochester Automobile Dealers' Association. Captain C. A. Simmons, Manager.
Feb. 15-19........Washington, D. C., American Automobile Association's National Legislative Convention.
Feb. 17-19........Grand Rapids, Mich., First Annual Automobile Show, Grand Rapids Automobile Club.
Feb. 19-26........Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.
Feb. 19-26........Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.
Feb. 19-26........Los Angeles, Cal., Hamburger Building, First Annual Show, Licensed Dealers of Los Angeles.
Feb. 19-26........Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South street.
Feb. 19-26........Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.
Feb. 21-26........Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.
Feb. 22-26........Baltimore, Second Annual Automobile Show, Auto Club of Maryland, Fifth Regiment Armory.
Feb. 21-26........Portland, Me., Auditorium, Fifth Annual Automobile Show. F. M. Prescott, Manager.
Feb. 22-27........Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.
Feb. 24-26........Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.
Feb. 24-Mar. 3....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Mgr.
Feb. 28-Mar. 5....Omaha, Neb., Auditorium, Automobile Show, Omaha and Council Bluffs Automobile Dealers.
Feb. 28-Mar. 5....Kansas City, Convention Hall, Fourth Annual Automobile Show, Kansas City Automobile Dealers' Association.
Mar. 5-12.........Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.
Mar. 5-12.........Des Moines, Ia., Coliseum, First Annual Automobile Show, Des Moines Automobile Dealers' Association.
Mar. 7-12.........Albany, N. Y., Armory, Automobile Show.
Mar. 12-19........Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.
Mar. 17-19........Louisville, Ky., Armory, Louisville Automobile Dealers' Association Annual Automobile Show.
Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsman's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.
Mar. 21-28........Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.
Mar. 26-Apr. 2....Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.
Mar. 26-Apr. 2....Montreal, Coliseum, Motor and Sportsmen's Show. E. M. Wilcox, Manager.
Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

THE AUTOMOBILE

Vol. XXII Thursday, February 10, 1910 No. 6

THE CLASS JOURNAL COMPANY
H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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MORRIS A. HALL GEORGE H. GODLEY
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ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rne Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Antomobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Antomobile Magazine (monthly), July, 1907

WHAT ARE DANGERS OF IMMEDIATE FUTURE?

It is claimed by some that the growth of the automobile business is at a rate so rapid that it will act as a sponge and draw wealth from other industries so appreciably that they will suffer, and, in the course of time the reaction which will set in will be to the detriment of the automobile industry.

This claim, if it has any foundation at all, is not working out in the fullest accord with its sponsors. The machine-tool industry would have gone to the wall just after the panic were it not for the demands which the automobile business made on the machine-tool manufacturers; a demand which has been so heavy and persistent that it has pre-empted nearly all the time of every machine-tool maker who was capable of doing even reasonably fair work.

There is no reason why an industry, even if it does grow and prosper, should damage any other branch of trade or manufacture; if some other industry is in the throes of overproduction, as the machine-tool situation seemed to have been, business from some newer source will always be the medicine which will cure the malady.

The real way to get at the facts in a matter of this sort, is no different from the method which must be pursued in an attempt to ascertain as to the food value of potatoes, or the fuel value of coal. Energy is what must be kept track of in every case. Food is measured, in determining its value, by ascertaining its heat units (the energy contained in a pound of the food). Fuel is counted in the same way, and, when the force of an industry is properly gauged, it will be found that accuracy will creep in if the energy engaged is counted.

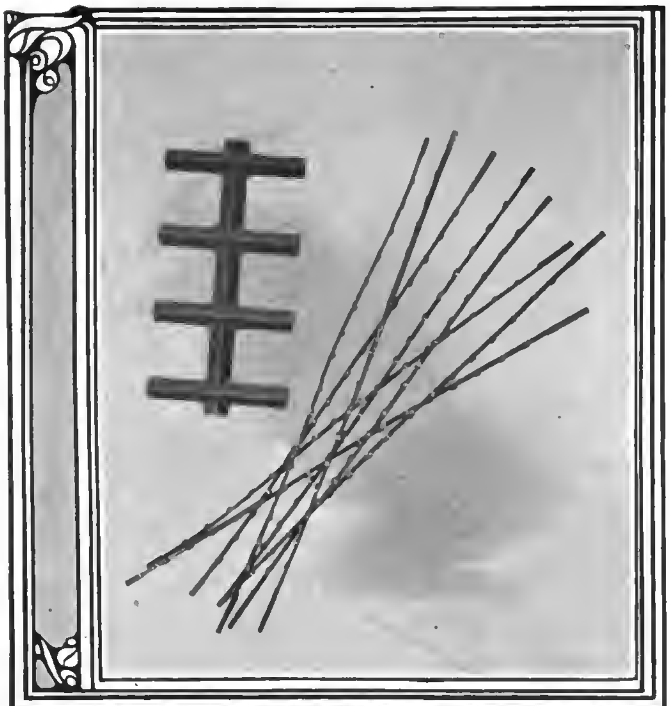
Fuel, if it takes on the characteristics of dynamite, is so concentrated that it must be handled with care, and food, when it is too rich, is likely to result in indigestion. In the same way, if an industry is over energized, it will become congested. This was the condition of the machine-tool industry—showing an excess of energy, and, when the automobile situation hove in sight, in want of energy, it tapped the excess of the other, resulting in good to both.

Over production, then (excess of energy), is the condition which must be watched, and, that the automobile industry is on this basis is not believed. The time may come when the fathers of the industry will see the need of applying the brakes; that they have a set, is well understood by all who have skill enough to appreciate the status of the industry.

The second-hand car situation is a little threatening; some phases of it must be treated with, and it is a question of some portent; a matter which may have to be mastered by the makers before the end of the chapter. Perhaps, as once before suggested, makers will find a way to control the repair and further exploitation of second-hand cars, and, if they are in a state of decay beyond repair, it may be desirable to fund a holding company which will sustain the loss.

In the rush to deliver a larger number of automobiles than last year, it may be that some of the relatively unimportant details will be given less attention than they should receive; this will be a great detriment to the industry; each person wants but one automobile; he is entitled to a good one; the price demanded should suffice for the purpose, but there should be no question as to the quality of the automobile any more than there should be a question as to the soundness of the currency demanded.

Materials, when they are required to do kinetic work, must be especially fabricated for the purpose, and if this important matter is overlooked, it is a corps of failures that will greet the eye of the historian. It is to be hoped that history will not be of the kind which will tell of failures of this character, nor is it to be expected that the makers who have gone through this phase of the undertaking will be so short of vision as to play the part of the penny wise. Progress has been made in this direction, but it is difficult to get steel men to realize the necessity of doing their best, and unfortunately, it takes months, even years, to bring a series of experiments to a point where the deduction may be relied upon.



NEW EDISON BATTERY

SIX years ago Thomas A. Edison announced that he had succeeded in solving what was then termed "The storage battery problem." The first battery which Mr. Edison placed upon the market was known as Type E, and it differed from the then prevailing types of storage batteries. The Edison battery belonged to the alkaline electrolyte series, whereas the prevailing types of batteries at that time were of the lead-lead series, in which the active material was peroxide of lead and the electrolyte was diluted sulphuric acid. There were other types of batteries, but they failed to impress commercial users for divers reasons which will not be explained at this time.

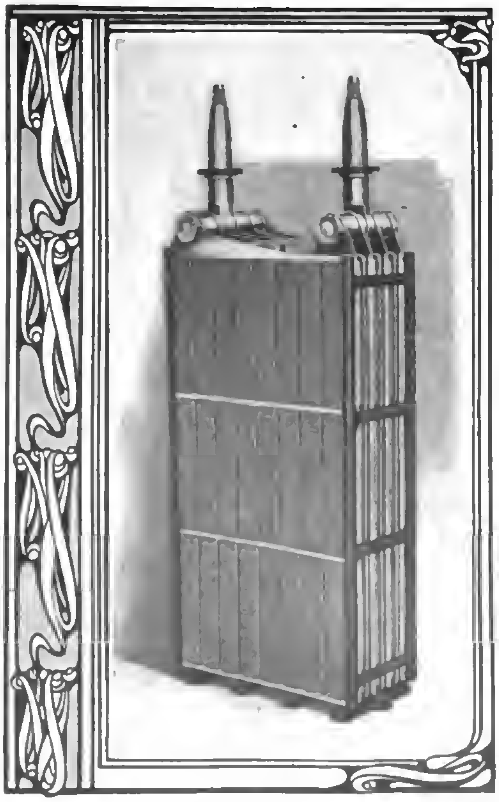


Fig. 1—Showing positive and negative plates of the A-4 Cell assembled together, but removed from the container.

The type E Edison battery, while it may not have accomplished as much by way of an invasion of the market as the public might have expected, did survive, and the electric vehicle problem was given an extra impetus as a direct result of its use.

That Mr. Edison was not as well satisfied with the Type E battery as the users thereof, is proven by the fact that the Edison Storage Battery Company of Orange, N. J., is now offering what is known as the new Edison battery, and is commercially catalogued as Type A. A cell of this battery is composed of four positive plates, when it is called Type A-4; likewise, if the plates are increased to six it is then called a Type A-6 battery.

Fig. 2—Type A-4 Cell with contents of container partly lifted, showing alternating positive and negative plates assembled and connected with positive and negative poles, respectively.

The alkaline electrolyte is used in this battery just as it was in the first battery produced by the Edison Company, and the difference lies in structural refinements, a better understanding of the electrochemical phenomena, and data which has been turned to good account. In battery construction, as in other lines of work, experience is the best teacher.

In the new Edison battery the active materials are oxides of nickel and of iron. The nickel oxide is placed in the positive grids and the iron oxide is lodged in the negative electrodes. The electrolyte is a solution of caustic potash in water.

The retaining cans are made of sheet steel. In the process of manufacture, the sheets are rolled into the required shape, and the seams are made permanent and tight by the autogenous welding method. To limit weight as much as possible, the sheets of steel are selected with the idea of having to corrugate them in order to induce the required measure of strength. The cans, when so made, are electroplated with nickel, and the desired close union of the steel and nickel is obtained by fusing them together. This coating of nickel is primarily given to prevent rusting, but it is also recognized that it adds materially to the general appearance of the cans.

Since the only diperence between the Type A-4 and the Type A-6 cells is due to a difference in the number of plates used, any further description may well be confined to the Type A-4 cell, and its combinations. As before stated, the Type A-4 cell is made up with four positive plates, and since it is desirable to have a negative plate on each side of each positive plate, five negative plates are employed.

Each positive plate consists of a grid of nickelplated steel, binding into intimate relation 30 tubes, each one of which is filled with active material. These tubes are arranged in two rows of 15 each.

The tubes are made of sheet steel, relatively thin, after the sheets are perforated, and when the tubes are completed they are then nickelplated. Eight stout ferrules are placed over each tube, the object being to so reinforce and strengthen the tubes that they will resist expansion which takes place when the battery is in active service.

The tubes are filled with a combination of active material and thin layers of pure metallic nickel in the form of leaves or flakes. The pure nickel flake is a product which is especially manufactured for the purpose by an electro-chemical process which was instituted in the Edison plant.

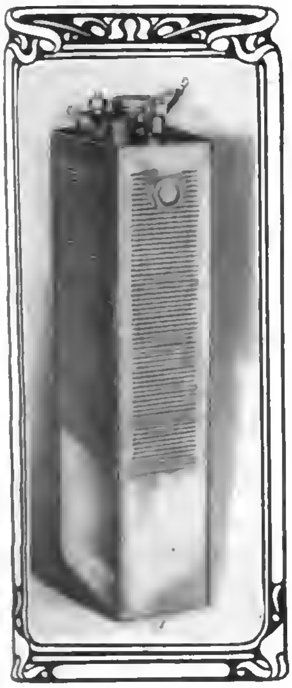


Fig. 3—Cell complete ready to go into a battery of cells.

Each negative plate comprises 24 flat rectangular pockets, supported in three horizontal rows in a nickel plated steel grid. These pockets are made of thin nickel plated steel, perforated with fine holes. The pockets are filled with oxide of iron.

The positive and negative plates are assembled alternately as shown in Fig. 2, and, as will be observed, all the positive plates are connected together by means of one cross bar, and all the negative plates are connected together in the same way by a second cross bar. The plates are exactly spaced by means of spacers which are made of tubing, and which measure the distance between the respective plates, being held in proper relation by the bolts, which serve as the connecters.

Each cell of battery, according to this description, is composed of an even number of positive plates, which are flanked by an odd number of negative plates. The outer surfaces of the outer negative plates are insulated from the retaining can by means of hard-rubber sheets. As a further means of insulation, hard-rubber pieces are fixed between the cans and the sides and bottom edges of the plates. Additional protection is maintained through the use of hard-rubber rods inserted between the plates. When the elements are placed in the cans, the covers are put on and tightness is secured by autogenously welding the covers to the cans.

The covers are designed in such a way that the columns of the positive and negative plate connecters pass through stuffing box apertures, these boxes being a snug fit in order that the electrolyte will not slop out, and are shown in the cover, which is placed beside the can in Fig. 6. In order that the electrolyte may be replenished from time to time as the exigencies of service will demand, a filler opening is provided, and a cover maintains tightness of the filler, excepting when it is removed for the purpose of adding distilled water to take the place of that which is evaporated during the time when the battery is in operation or undergoing the process of charge. There are many nice refinements in connection with the design, as, for illustration, the water cap is so made that it will fly open unless the catch is properly adjusted, the idea being to indicate to the operator when the caps are properly secured.

The strength of the electrolyte is that which will follow when 21 per cent. solution of caustic potash is dissolved in distilled water.

CAPACITY OF TYPE A-6 EDISON BATTERY

Charged Seven Hours at 45 Amperes. Discharged at 45 Amperes.

Ampere-hour input	315.0
Ampere-hour output	268.5
Average potential difference of charge	1.692
Average potential difference of discharge	1.202
Watt-hour input	533.0
Watt-hour output	322.7
Ampere-hour efficiency (per cent.)	85.2
Volt efficiency (per cent.)	71.1
Watt-hour efficiency	60.6
Output per pound in watt-hours	16.8

The curve falls quite rapidly from 1.50 to 1.30 volts within 30 ampere-hours discharge, falls from this level to 1.20 between 30 and 150 ampere-hours discharge, and falls to 1.11 between 150 and 240 ampere-hours discharge. From this point on, the voltage falls with great rapidity, reaching as low as 1 volt per cell between the discharge 240 and about 268 ampere-hours. These values are approximate, and would necessarily vary over a considerable range under different conditions.

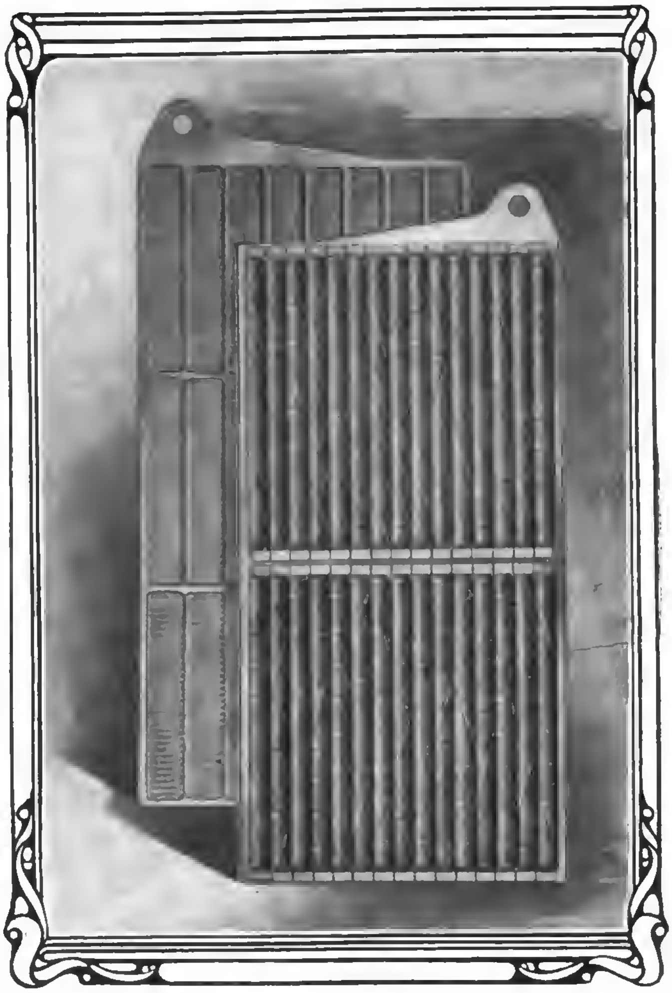


Fig. 4—Type A, positive and negative plates, showing the different structures of each, one tubular and one rectangular.

On charge the voltage goes up from 1.45 approximately to 1.64 at a steep rate, say, before the input reaches 40 ampere-hours. The charging voltage remains at about 1.67 until the charge reaches a little more than 180 ampere-hours. Beyond this point in the charge the voltage increases and reaches 1.80 when the input is equal to about 285 ampere-hours. The watt-hour output is equally high.

Fig. 5—Type A-4 Cell, showing the positive and negative plates in the container, and also showing the removed cover with openings.

IN THE GARAGE REPAIR SHOP

OVERHAULING an automobile seems a simple undertaking, if machinists of some skill are employed in the process. It would be perfectly simple were all automobiles so made that the parts would be interchangeable in fact. This condition, while it is said to obtain in every car made, is, nevertheless, so very difficult to realize that it is doubtful if it positively exists in even a reasonable percentage of automobiles.

This question of interchangeability has two important phases. They may be separated from each other as follows:

(A) Connecting members of ordinary importance may be so nearly interchangeable that a little "shake" makes no great difference, unless its magnitude is sufficient to induce noise.

(B) Relating members of ordinary importance may be so near a proper fit that a little "lapping" will suffice to make them go together.

(C) Certain members, as ball bearings, may require a "sucking" fit, and this precise condition may demand that the very bearing which is removed from a given spindle will have to be put back on the same spindle.

Considering the specific conditions as above enumerated, it follows that an artisan may be skilled in some of his divers ways, but he may not have the acumen which will be necessary if the parts, as ball bearings, have to be marked, kept track of, and at the proper time be put back on the exact spindle from which they may have been taken. The first point of importance, when it comes to repairing an automobile, according to this method of reasoning, will be suitably cared for if the parts are "spotted" as they are removed, so that they may be identified with the position which they are supposed to occupy when the car is reassembled.

Unless some well understood system of spotting is contrived, it will be necessary for the man who may have made the identifying marks to do all the work of reassembling, for the reason that no other workman would be in a position to determine as to where the parts belonged. This condition means additional work, with much cost added also. The cost of assembling under such conditions would necessarily be high, but unfortunately what really does happen in nine cases out of ten is that the identifying marks are totally disregarded if in the assembling process the parts will go together, which, however, is excellent assurance of the fact that the car will not be assembled in a manner which will favorably compare with its condition when it left the works of the maker.

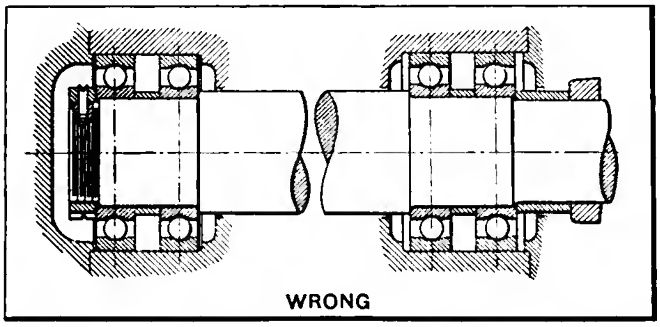


Fig. 1—Wrong nesting of ball bearings which support the two ends of a long shaft.

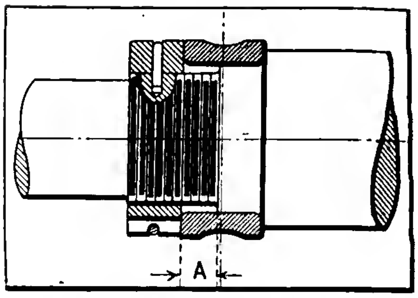


Fig. 2—Method of clamping inner raceway of an annular type ball bearing, showing threaded ring and locking device.

In some of the relatively old models of automobiles, the annular types of ball bearings were not fitted into place in full accord with present standards, and it is just these cars which are now likely to visit the repair shop. The earlier practice was to fit the inner raceway to its bearing on the spindle so tightly that by virtue of the pressure generated it would stay in place—a press fit. This character of fit served every end when the material of the spindle was of some excellent grade of alloy steel, properly heat-treated. In many cases, however, the steel was of a softer variety and the press fit failed to serve the end, so that the inner raceway of the bearing so fitted loosened up on the shaft and burrowed into it.

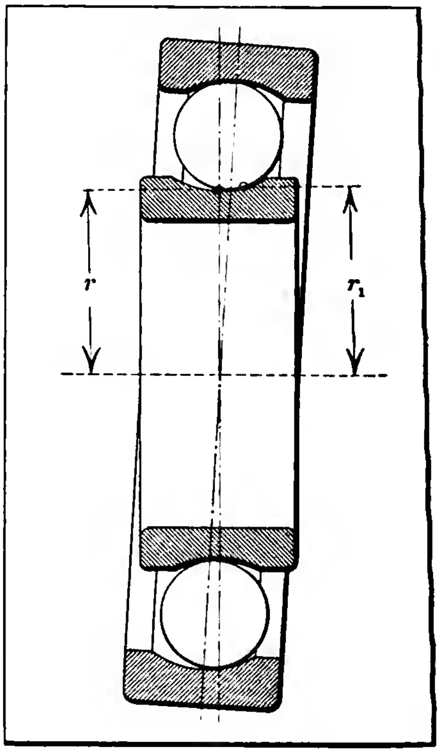


Fig. 3—Showing position which is assumed by a ball bearing if the outer raceway is pushed over to one side.

When this difficulty reached sufficient prominence to warrant giving it specific attention, the problem was taken up by Henry Hess of the Hess-Bright Ball Bearing Company, and this company thereafter issued specific instructions to the effect that the inner raceway should be a sucking fit on the shaft, and it should fetch up against the shoulder, using a threaded ring or other suitable nut for the purpose, and the nut in turn should be locked after it is screwed up tight. Fig. 2 shows just how this fit is made with the threaded ring and the wire lock. In this particular example, it would seem as if the distance (A) is excessive, but it accentuates another point very thoroughly, i. e., the thread should be cut back for a sufficient distance under the inner raceway so that the locking ring may be screwed up without interference, which latter condition is frequently present when the design is cramped, and a condition of give and take is not allowed for.

In making a repair, if account is taken of the conditions as above enumerated, the repair man will necessarily make an effort to have the inner raceway fit snug on the shaft in every case, and, when possible, employ some locking rings for the purpose of clamping the inner raceway so that it will not float on the shaft, and so tightly that it will not rotate, excepting with the shaft. It

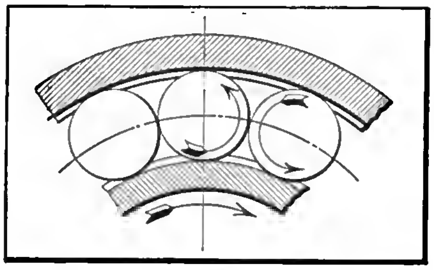


Fig. 4—Portion of an annular type ball bearing, showing directions of rotation of inner race and balls.

may be a little difficult in some of the older designs of automobiles to bring about this desirable condition, but it is well worth striving for, and it is the repair man who takes these nice details into account who will deliver the greatest measure of satisfaction, and number among his customers those who are willing to pay liberally if the results obtained are in keeping with the promises which have been made.

Annular types of ball bearings are capable of taking thrust as well as radial loads, but unless the thrust load is to be taken, it is important that the outer raceway be given a certain axlewise freedom, and the fit of the outer raceway in the bore of the housing should be barely "snug." If the bearing fetches up against the shoulder which will crowd the outer raceway when the inner raceway is clamped into its right position, the bearing will be crowded over as shown in Fig. 3 during a part of its rotation, which condition will be brought about by deflection of the housing or the spindle. If it is not crowded over diagonally as shown, it will at least be displaced so that the balls will press against the curvature of the races instead of rolling in the normal position as shown in Fig. 5. That the bearing will last as long under such conditions is scarcely to be expected, and that it will fail in service is assured, unless it is much too large from the point of view of normal service.

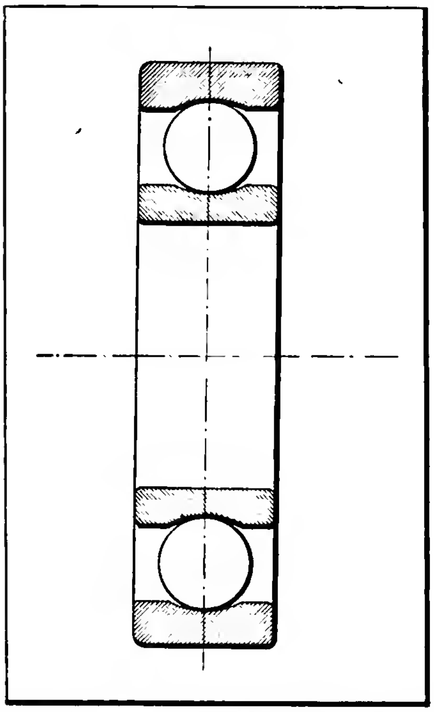


Fig. 5—Showing an annular type ball bearing and the correct position of the outer race when it is not interfered with.

In the types of bearings as illustrated in Fig. 6, when they are removed and cleaned it is desirable to inspect the spring separators and ascertain if they are in good condition. They should be sufficiently elastic to take up all lost motion, and if they are not, the best thing to do is to replace them by new spring separators, which can be made by a man of some deftness, or replacements may be had from the maker.

Figs. 1 and 7 are offered to show the difference between right and wrong when a plurality of bearings are correlated; that the shaft, if it is long, will deflect is a certainty, and in Fig. 1 it will be seen that the condition established is one which will cause the bearings to be pinched if the shaft does not deflect. Fig. 7 presents a design which is a corrective for this evil, due to the curvature of the housings for the bearings. Compensation is established, since the shaft deflection, instead of resulting in the cramping of the bearings, causes motion of the bearing housing against the surface of the shell.

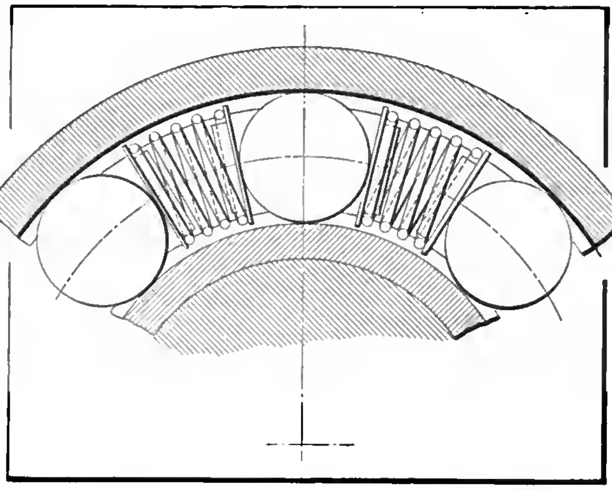


Fig. 6—Presents a portion of the silent type ball bearing, with spring spacers placed to maintain the proper distances of balls

The owner of a car who waits until he hears a squeak before he ascertains what an oil can is for is the customer whom the garage repair man relies upon for most of his income.

PROPER MAINTENANCE DEFERS NECESSARY REPAIRING

When annular types of ball bearings are used, if they are sufficiently large for the work they must do, and are provided with housings so designed that grease or other hard lubricant will be retained, the grease will have its tasks as follows:

(A) As a lubricant, it will have but little work to do.

(B) As a buffer between the balls it is worth considering, although the condition of rubbing, which is apparently indicated in Fig. 4, is scarcely worth taking into account, since the balls automatically space so that they do not actually contact after the speed reaches a certain point.

(C) The grease must serve as a preservative of the polished surfaces of the balls, and prevent rust from forming.

(D) The grease is also required in its capacity as a seal for the purpose of excluding foreign matter, as sand, fine dust, etc.

Any form of hard grease will have sufficient lubricating property (unctuousness) to satisfy the condition (A). The condition (B) is readily satisfied by any form of grease, or even oil, which will coat over the surfaces, especially of the balls, and serve as a cushion. The condition (C), however, is much more exacting. Any form of grease which holds in its composition such compounds as will attack and etch the polished surfaces is of the greatest detriment to the balls and the races.

It is frequently claimed that oil or grease which is the product of animal or vegetable matter is acid-producing under certain conditions, or may have free acid in its makeup. There is a certain amount of truth in this story, and in selecting lubricants which are made from animal or vegetable matter, it is necessary to exercise care, and it may even be desirable to consult the makers of reliable lubricants of this character, and procure from them the types of their products which are free from etching proclivities. This is not by any means a difficult task.

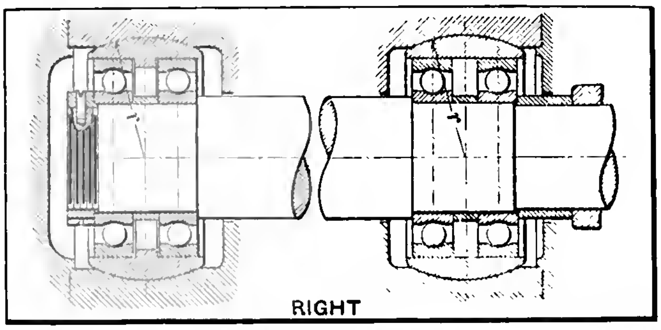
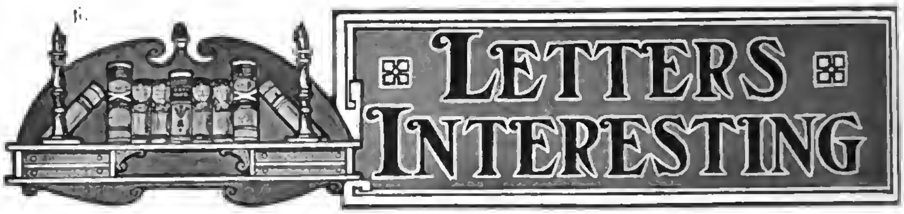


Fig. 7—Shows the right method of assembling dual ball bearings at the two ends of a long shaft.



A QUESTION OF LIABILITY

Editor THE AUTOMOBILE:

[2,160]—Kindly answer the following through the columns of your valued paper. If you can cite any legal authorities that cover this matter, do so. A is driving his car on a dark, rainy night, has top and windshield up, and is using second speed. The streets are poorly lighted and rain has covered the glass front so that it is impossible to see out. Driver is on the left hand side of the car track going south, and getting to a corner where he wishes to turn east. At or just before the corner he runs into a buggy. The first knowledge he has is the crash. When looking out he sees the buggy on one side and then on the other a horse breaking away. Car is stopped within three feet and levers show second speed. Man with buggy was looking for street car and claims he did not see machine until crash came, but saw it in time to throw horse off to east side of road to escape having it hit by the car. Light on front of car, left side, had been lighted, but was put out without knowledge of driver either before or after crash, or else at the time of the accident. Driver found man was thrown forward when horse broke away and hit his nose on dash of buggy, breaking bone, he claims. Query: What liability attaches to driver of car and what to driver of buggy? Automobile had lamps smashed and was otherwise injured. It was a pure case of accident, with no intentional injury. Driver of automobile rendered all possible assistance to people in buggy. Is he liable? If so, for what amount? And, in fact, would it be anything at all, or anything beyond actual repair to buggy and medical service. FRANK COOK.
Des Moines, Ia.

Although it is not anywhere so stated, we take it that the driver of the buggy was on the east side of the road, proceeding north, that is on his right side as he should be. The driver of the automobile, on the other hand, was on the wrong side of the road, simply as a matter of personal inclination or convenience, as the letter puts it, "he is getting to a corner where he *wishes* to turn out." In doing this he violates the rule of the road and drives on the wrong side. If in the course of such driving, as in the case cited above, he meets and damages a rig, whether another automobile, a horse-drawn vehicle, or any other, does not matter in the least. He (the automobilist on the wrong side) is liable not only for all repairs, but also for damages in the case of personal injuries, which the law usually considers as more than the cost of actual medical assistance. There is not a single thing that can be said in favor of the automobile driver's position in this case, the night in question being the very last one on which a sensible driver should try such a short cut. As the matter stands, the driver of the automobile was wrong from start to finish and should settle at the other man's terms. Apparently, no blame whatever attaches to the driver of the buggy.

PROPER GEARING FOR STEEP HILLS

Editor THE AUTOMOBILE:

[2,161]—I have an Oakland "20" 1909 car, which seems to lack power on hills, and particularly in deep sand, of which we have a lot in this part of the country. On ordinary roads the car runs fine, and I can find no fault, but some of the hills up this way are very steep and long. Then, too, there are lots of them, so that the car is in trouble often. It is a two-cylinder 4 1-2 by 5 engine, planetary transmission, shaft drive, and geared to a 4 to 1 ratio. Can you offer any suggestions whereby I could get more power out of my present equipment? Could the 4 to 1 gears be changed for a set of 5 to 1 gears without changing the bearings? Can you give me the address of the Warner Gear Company, who were the makers of the gears on my machine; at least I think so? MORE POWER.
Florence, Wis.

From the description which is given and the knowledge we have of the usual performance of these cars, we are forced to the conclusion that the trouble is with the gearing used and the surrounding country, rather than with the engine. Although it will depend entirely upon the dimensions of the differential gear housings, of which we do not have the figures, the change from 4 to 1 to 5 to 1 is otherwise feasible. If it should be found that this change is impossible, why not make a smaller change, such as to 4 1-4 or 4 1-2 to 1 in place of the present gearing? Even the slight change first suggested (4 1-4 to 1) changes the speed of the car, lowering it by 6 1-4 per cent, and raising the hill climbing and pulling ability by the same amount.

In making the change, it will be found that the lessened speed is not any too agreeable, so that it is wise to lower the gear ratio as little as is necessary to secure the hill-climbing ability required.

The Warner Gear Company, to whom you have reference, is located at Muncie, Ind., where they should be addressed.

HORIZONTAL AND VERTICAL ENGINES

Editor THE AUTOMOBILE:

[2,162]—I am very much interested in stationary engines of the four-cycle type, and would like to have you state a comparison between the vertical and horizontal types, giving the advantages and disadvantages of each. What are the proper angles on the crankshaft for the various places of beginning and ending the valve actions and firing operations? Will you please explain the low-tension ignition system as used with the Splitdorf single unit coil and magneto for four-cylinder work, as on the E-M-F car, for instance? L. GEE.
Whitehall, Mich.

In general, the comparison of the two types of stationary engines is based upon the matter of saving of space, both vertically and horizontally. It is considered that in the usual power plant there is sufficient height for any purpose, while the floor area is limited. If then two engines of equal power occupy respectively 8 square feet of floor space by 6 feet high, and 36 feet of floor space by 3 feet high, there is hardly any doubt as to which one will be chosen, height being cheap, while floor space costs money. As to other considerations, the only one worthy of devoting space to is the matter of valves and valve location. On the horizontal engine the valves are usually placed horizontally and bear on a vertical seat. Gravity acting upon the valve tends to make it wear the seat more on the lower side than the upper, thus leading to frequent regrindings, and trouble with leakages in between grindings. The vertical engine, on the other hand, has the valves vertically and the seats horizontally. The action of the weight of the valve and the strength of its spring are both acting all around the surface, no one part being worn more than another. This small difficulty is overcome by some makers of horizontal engines by setting the valves vertically, in which case the choice between the two types becomes a matter of available floor space and its value.

As to valve settings, opinions differ, but an average valve setting would be (all measured upon the crankshaft): Inlet opens at 10 degrees past center and closes at lower center or 10 to 20 degrees past. Compression from this point to upper center. Fire at small angle past, angle varying from 15 degrees for starting back to dead center for highest speed. Open exhaust valve beginning at 30 degrees before end of power stroke, holding it open up to the upper center and 5 degrees past. Interval of 5 degrees, then open inlet valve again and repeat.

If the magneto and ignition system is understood exactly as it is meant, the magneto generates a low-tension current which is sent through the coil, to be stepped up to a high-enough voltage to jump the spark plug gap. In place of using a single vibrator for each section of the coil, but one is used, and all coil parts wired through that one. It must then vibrate just four times as fast as any single vibrator in the ordinary system, in which four vibrators are used. Otherwise the whole system is the same as any other so-called high-tension ignition system.

CASTOR OIL AND RESIN CEMENT

Editor THE AUTOMOBILE:

[2,163]—Would castor oil and resin make a cement to fasten canvas inside tire shoes? Has it ever been tried? W. T. K.
Nichols, Conn.

The cementing qualities of this mixture are hard to determine, although, as a matter of fact, neither one of them has any cementive properties worth mentioning. Castor oil won't stick to anything (not even to the human stomach) and similarly resin is a poor binder. Answering your last question, we have never heard of its being used, either one of the constituents or the compound. In preference to this muss, why do you not use one of the many excellent cements now on the market for this purpose?

Answered and Discussed

A MULTIPLICITY OF BROAD QUESTIONS

Editor THE AUTOMOBILE:

[2,164]—Please answer some or all of the following questions in the columns of "The Automobile" and help an interested subscriber: 1. Why can you not have the greatest speed and greatest gasoline economy at one and the same time? 2. When was the Knight patent on a sliding sleeve engine issued? 3. Is the Ledru type of rotary sleeve engine patented; if so, when? 4. In a worm drive, using a driven worm of 5-inch diameter, and a small worm driving it, with teeth of a high pitch, what is the greatest reduction possible? 5. I have a good theoretical knowledge of automobiles and want to get a position at some factory in Detroit. What could I do and how should I proceed to get into touch with some of the factories there? C. W. S.
Albany, Ind.

Greatest gasoline economy is obtained by a very weak mixture, this reducing the amount of fuel used. Greatest speed on the other hand is obtained by a fairly rich mixture. So it is that the two may not be had simultaneously. If you refer to racing engines, these are usually constructed so as to obtain the maximum speed regardless of fuel consumption.

The Knight American patent has not yet issued, but is doubtless now in the Patent Office, which, however, is just as much protection to the inventor as if it had actually issued. The Ledru engine has not been patented on this side, but may possibly be patented in France.

Speed ratios or speed reductions as afforded by worm gearing vary with the number of teeth in the worm wheel and the threads of the worm. Then, if you fix the teeth in the driven wheel, the number of threads determines the speed reduction. Thus, if the single thread is used and gives a certain reduction, using a similar worm, but with a double thread, doubles the reduction. This may be carried on to the triple, quadruple and quintuple worms, the forms now in regular use. The pitch angle is usually fixed by considerations of economy, the proper angle resulting in an efficient power transmitter, while the wrong angle, either too large or too small, gives very inefficient driving, and consequent loss of power. The efficiency curve is flat topped, the efficiency with a 10-degree angle reaching about 80 per cent. Rising slightly above this in between, it comes down to the same point (80 per cent.) for a 78-degree angle. The actual maximum is reached at 45 degrees.

Nearly every factory in Detroit is at present seeking help in one department or another, so that a letter addressed to any one company will doubtless bring an immediate answer.

LEFT-HAND DRIVE AND WIDE TREAD

Editor THE AUTOMOBILE:

[2,165]—Will you furnish me with a list of all American cars which are now built with both left-hand drive and 60-inch tread for Southern roads? J. H. HODGES.
Gainesville, Fla.

Unfortunately for a direct answer to your question very few makers turn out a car with both features, although the number turning out each one of these separately is rather large. Thus the following make cars with 60-inch tread: A. B. C., Badger, Brush, Buggyaut, Cadillac, Cameron, Cartercar, Chalmers-Detroit, Cole, Cutting, E-M-F, Eureka, Flanders, Ford, Great Western, Hupmobile, Maxwell, McIntyre, Mitchell, Rambler and Reo. Of these only Brush, Ford and Reo have left-hand control, so that, as an exact answer to your question, the latter three are all that would be given.

Recent developments would seem to indicate that the left-hand drive is gaining in favor. The above list must not be taken as final for no attempt has been made to enumerate the cars which are driven from the left, but do not use wide tread. They are many.

CONE AND DISC CLUTCHES

Editor THE AUTOMOBILE:

[2,166]—Please discuss in your questions column the relative merits of the cone and multiple disc clutches. Which is the better clutch? Which is the better multiple disc clutch, the dry one or the one running in oil? J. M. I.
Cleveland, O.

Such questions remind one of the old friend, "How old is Ann?" Or, to put it otherwise, the return question might be asked, which is better, a silver dollar or a dollar bill? That about expresses the idea, it being impossible to state for a certainty that any one form is the absolute superior of all others. Each form of clutch has much to recommend it and, perhaps, a few faults. It noticing what the great majority of manufacturers are using as indicated by some such table of specifications as that to be found in the Chicago show issue of THE AUTOMOBILE, some idea may be had of popular demands. This, in reality, is what is turned out, without any idea of a "best." Actually, this is not so very far from an all-around best, for a majority of people would not want any one form if it did not have more commendable and less censurable features than the others.

So, too, with the second question, this is like asking which is better, a new silver dollar or an old one. The dry disc clutch has a number of advantages so weighty as to call for its adoption in the face of the reasoning that a clutch holds through friction, which means wear, the latter usually being reduced by the use of a lubricant. Up-to-date practice as expressed in percentages would tell an interesting story in this connection.

POINTERS ON PROPER TIRE INFLATION

Editor THE AUTOMOBILE:

[2,167]—All owners of automobiles as well as the trade will be interested in tests recently made at the factory of the Diamond Rubber company in Akron, with regard to the use of gas for inflating automobile tires as compared with the use of air.

The tests showed that gas in place of air will do for inflation of tires, if the user will but watch his tires and replace gas which escapes. But right here is the troublesome point. Not all owners watch their tires carefully enough, and even for those who do it is almost impossible to notice the constant leakage that goes on when gas is used. In one way or another gas will seep out of the tires by imperceptible degrees and more rapidly than air, as the Diamond Rubber Company's tests have shown the leakage of the best gas-filled tire was 43 per cent. greater than in any one of the air-filled tires.

The tests also served to emphasize the need of ample inflation of tires whether it be by gas or by air.

At the plant of the Diamond Rubber Company three tires were pumped by air to 100 pounds pressure each at 1:30 P. M. on October 14. At the same time three tires of the same size were inflated wtih carbonic gas to the same pressure. A week later, October 21, at 1:30 P. M., the three air-filled tires registered 92 pounds each, while the three-gas-filled tires stood 41, 50 and 51 pounds.

Should an owner pump his tires to 100 pounds with carbonic gas and not have a noticeable puncture he is likely to take for granted even a week later that he has been running with sufficient inflation. As a matter of fact, he really has only half enough, and during the intervening time considerable damage may have been done to the body of the tire.

The meat of these recent tests, previous tests and of many years of experience can be summed up in one terse sentence: Tires must be pumped up hard if they are to give maximum mileage. Speaking on this point Mr. Weigele, of the Diamond Rubber Company, said: "There is only one sure way of properly inflating tires so that they will give the most service of which they are capable, and that is to keep them pumped up so hard that they stand up full and round under a maximum load when in motion. If this is done there will be a decided increase in tire mileage.

The element of friction and heating is reduced by ample inflation, which also checks the movement within the tire and enables you to ride, as you should ride, on a cushion of air and not a cushion of rubber. And in this connection it is just as much the duty of the user to supply plenty of air as it is of the producer to supply good tires. Each expects the other to do his part, and the co-operation should be of mutual benefit. It will result in a reduced upkeep cost that must ultimately be of great benefit to the automobile industry.

Users should watch their tires, and when they do not stand up round under a full load, should immediately supply new air. The one safe rule is to do this at once, remembering that pressure gauges do not provide for the over-loaded tire, and four-fifths of all tires are frequently overloaded. The best available answer to the overloaded tire is the size of tire next larger than that usually applied. The only answer of any other kind is that of air, and still more air, and nowhere do the results show faster than in the service given by the tire overloaded as a regular thing.

Another thing that should be constantly kept in mind by the automobile owner is not to wait until all four tires are in need of air before using the pump. Don't let one tire get partially deflated and run your car in that condition. Not only is the effect very bad on the deflated tire, but the other tires are subjected to extra work that can only work injury to them.

Keep your tires pumped up hard—all of them—all the time.
Akron, O. JOSEPH W. CONNER.

Preheating the Mixture in Gasoline Motors

By Forrest R. Jones

PREHEATING the mixture of air and gasoline vapor just before it enters the cylinder or cylinders of gasoline engines and a full discussion of the good and bad effects of the practice will be the subject of this article. Only incidentally the preheating of the air before it reaches the carbureter, and the warming of the carbureter by means of a jacket or hot water or hot air around the vaporizing chamber is brought into the discussion.

In the monobloc type of multi-cylinder motor, with all cylinders cast in one piece, it is quite common practice to adopt a design in which the inlet ducts, or passages, for the ingoing charge, and those for the escaping exhaust gases, are all on one side of the cylinders and immediately adjacent to each other in the casting. A portion of the walls of the exhaust ducts are also a portion of the walls of the inlet ducts in some of these designs.

Some of the heat that is received from the exhaust gases by the metal forming these walls is therefore transferred to the ingoing charge of mixture just before it passes into the combustion chamber. The amount of heat that is thus transferred from the exhaust gases to the ingoing charge depends largely on the surface area of the metal wall that lies between the exhaust and inlet ducts. The heat is transferred more rapidly through a thin wall of metal than when it must pass a considerable distance through the metal. The compactness of the casting containing the ducts, which may be called the duct-box, also has to do with the rapidity of the transfer of heat from the exhaust gases to the ingoing charge. When the duct-box is very compact more heat is thus transferred than when it is of less compact form and the ducts are not so close together.

Lack of Preheating Causes Cooling, Even Frost—It is of course well known that when a carbureter without any hot-water or hot-air jacket is operated on air taken at atmospheric temperature, the carbureter becomes decidedly cool, especially just beyond the spray nozzle or other form of gasoline outlet into the air passage. In other words, the walls of the mixing chamber become very cool. The pipe connection from the carbureter to the motor also becomes cool at the end next the carbureter. In some cases the carbureter is cooled to such an extent by the vaporization of the gasoline that frost collects on the outside of it in damp weather, even at summer temperature.

In damp, cool weather it not infrequently happens that frost and ice collect in the mixing chamber so as to clog the passage and prevent the operation of the throttle valve. The cooling of the carbureter is more marked in connection with motors having several cylinders than in those having only one, since the vaporization is carried on more continuously when several cylinders are fed by one carbureter than when only one cylinder is fed.

Two methods of prevention came into use to keep the carbureter from freezing up. These have already been mentioned. Specifically, one method is to surround the mixing chamber, and sometimes also other parts of the carbureter, with a jacket of hot water, or hot air, from the motor; the other method is to heat the ingoing air before it reaches the carbureter, this preheating being accomplished by causing the air to come into contact with some warm, or hot, portion of the motor before reaching the carbureter.

It may also be noted that heating the carbureter, or preheating the air, or both together, affords a means of using what are commonly called inferior grades of liquid fuel, which are now so common; even ordinary kerosene can be used in this manner after the motor has become heated by running for some time.

After the liquid fuel has become vaporized and mingled with the air to form a combustible mixture, there is no probability that it will condense to a liquid during the operation of the motor. To condense it the mixture would have to be cooled below the temperature of the mixture when first formed, or it would have to be compressed without allowing it to become warmer on account of the heating action of compression. In the case of gasoline it would have to be compressed to a far higher compression pressure than is used in automobile motors, even if cooled by some means during compression so that its temperature would not rise above that at which the mixture left the carbureter.

All Fuel Vaporizes Close to Carbureter—The manner in which a motor operates is evidence that the gasoline, even if of low grade, vaporizes completely within a few inches of the spray nozzle of the carbureter. Even if the inlet pipe is long, so as not to have a considerable length not warmed appreciably by the heat of the motor, it is not cooled anywhere near as much at the part at some distance from the carbureter, as the latter and the portion of the pipe immediately next to the outlet of the carbureter are cooled.

If the vaporization were not completed near the carbureter it would be continued through the pipe, and the latter would be cooled very decidedly at the portion in which the vaporization continued. The fact that the inlet pipe does not become near as cold as an unjacketed carbureter when the air is not preheated is evidence that the vaporization is completed at or near the carbureter.

Naturally, the next question that arises is, does preheating a combustible mixture effect any economy of fuel or any increase of power? All of the know properties of gases and all of the known results of practice go to show that it does not.

First, as to the power developed in the cylinder of the motor. In a given motor the amount of power developed is at least approximately proportional to the weight of the charge of combustible mixture. The weight of the combustible mixture is proportional to the weight of the air in the mixture, assuming that the moisture in the air, or humidity, remains constant.

Volume Invariable, Temperature Changes—The volume of the charge taken into the cylinder is, of course, always the same for a given setting of the throttle and speed of the motor. This volume is approximately equal to the displacement of the piston per stroke. The piston is always at the same position when the inlet valve closes, at least in a motor with mechanically operated inlet valves, so that the same volume of charge is always enclosed in the cylinder at the instant the inlet valve closes. The pressure in the cylinder at this instant is always the same for the conditions just stated.

Every charge taken into the cylinder therefore has the same volume as measured in the cylinder, and the same pressure, both taken at the instant the inlet valve closes, as long as the speed of the motor and the setting of the throttle remain unchanged.

Weight of the charge varies with its temperature, since heating the mixture expands it if the pressure is kept constant. A pound of air at 62 degrees Fahrenheit and atmospheric pressure has a volume of about 13.14 cubic feet; when heated to 212 degrees, which is the temperature of boiling water in the open air, its volume is increased to about 16.9 cubic feet if the pressure is kept the same. It is therefore clear that a less weight of mixture is drawn into the motor cylinder per charge when the mixture is hot than when it is cool.

The smaller the weight of the charge, the less the amount of heat produced by its combustion. The amount of heat produced is proportional to the weight of the charge, when the proportions of air and fuel in the mixture remain constant, which is in accordance with the operation of the motor. A carbureter which operates correctly delivers a constant mixture.

Power Per Weight Proportional to Pressure Increase—The amount of power that a given weight of fuel will produce in a combustion motor when properly mixed with air and burned is approximately proportional to the increase of pressure that is caused by the heat of its burning. It has been clearly demonstrated experimentally in very recent years that the heat from a given amount of fuel will increase the pressure more when the temperature of the mixture at the instant of ignition is low than when it is high.

This is true even when the combustion is effected in a containing vessel such that the cooling effect of the walls is no greater at a high temperature than at a low temperature. This is contrary to the older theory of the action of combustion motors, and is apparently not yet fully understood by those dealing with such motors. The old theory is that the combustion of a given amount of fuel will always cause the same amount of increase of pressure whether the initial temperature is high or low, provided no heat is given up to the walls of the containing vessel. This theory has been conclusively proven to be untrue. The cooling action of the walls of the cylinder and combustion chamber is, of course, greater when the charge is hot than when it is cool. The motor does not therefore develop as much power in the cylinder, and the economy of fuel is less when the entering charge is hot than when it is cool.

Another disadvantage of heating the charge before it enters the motor cylinder is that it cannot be compressed to as high a pressure before ignition as a cooler charge can be. This is because it will ignite spontaneously at a lower compression pressure on account of its higher initial temperature. It has long been well known that efficiency of operation is increased by increasing the compression pressure within the limits of compression pressure that is practicable in automobile motors.

Advantages of light weight, fewer parts, lower cost of construction and possibly less power lost in the motor by driving its moving parts lie with the more simple motor which has a small and compact duct-box containing both inlet and exhaust ducts. These are strong points in favor of such construction. The best compromise seems to be this form of construction with water jackets enclosing the exhaust ducts as completely as possible.

The slower the speed of the engine during normal running conditions, the lesser the influence of preheating the mixture, whether this be favorable or otherwise. It is for this reason that little or nothing on this subject, so interesting to automobile owners and drivers, is to be heard among the motor-boat contingent. They talk little of it because its influence is so slight in their business or pleasure, as the case may be, as to be entirely negligible. The greater the speed of the engine, the more desirable is preheating, making it imperative for racing machines.

WESTINGHOUSE EQUIPMENT FOR ELECTRICS

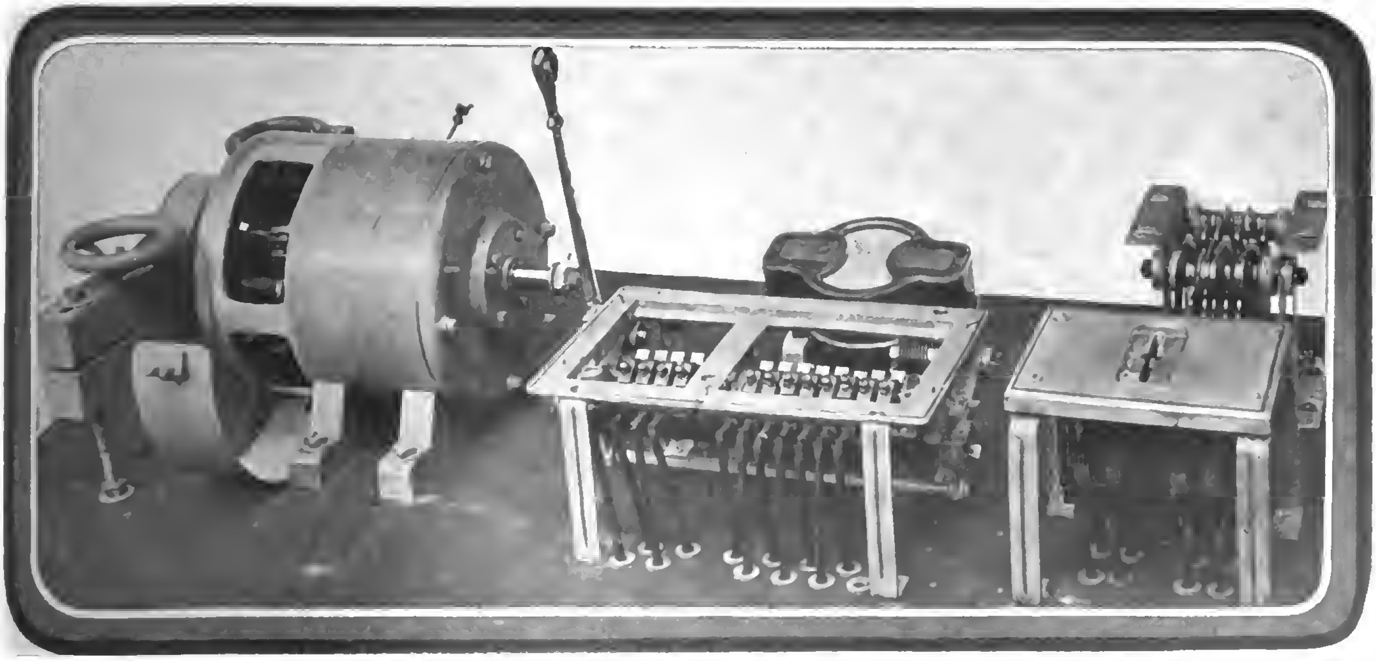
COMPLETE motive equipments for electric vehicles of all descriptions, as manufactured by the Westinghouse Electric & Mfg. Co., are illustrated by the exhibit which is making the rounds of the shows under that company's name. The illustration shows the table carrying the motor, controller and voltammeter.

The motor is of the regular vehicle type known as V-28, for 48 volts, and is very similar to the street car motors which the company has made for over a score of years. The controller, type 501-D, is equipped as in service with a grid-starting resistance, both forward and reverse notches of the quadrant being connected up. It is provided with an interlocking device, so that it is impossible to operate it incorrectly.

Current is supplied from a set of regular automobile type batteries, not shown in the photograph. The motor can be run in either direction, and loaded by means of a double prony brake, taking the place of the regular armature band brake for vehicle service. By turning one or the other hand wheel, the friction of the brake may be varied, and the current required and the voltage at which it is supplied are instantly shown on the meter.

The switch has three positions—off, running and charging—and is designed so that the key for operating it can only be inserted when in the off position, and cannot be removed until the switch has been returned to this position. This prevents any possibility of mistake either in charging or operating.

The standard vehicle voltammeter shown with the outfit permits the operator to read the voltage of the batteries at any time, determining thereby their condition and the approximate amount of charge. The current may be read when either running or charging.



Complete Westinghouse Electrical Equipment Designed for Use on Pleasure and Commercial Cars

CHARACTERISTIC CURVES OF INTERNAL COMBUSTION MOTOR

By B. D. GRAY

A COMBINATION of horsepower and torque curves with relation to angular velocity of crankshaft or piston speed, or, what is still better, total displacement per minute, will, I believe, give the most comprehensive measure of the performance of a motor and serve satisfactorily as a means of comparison.

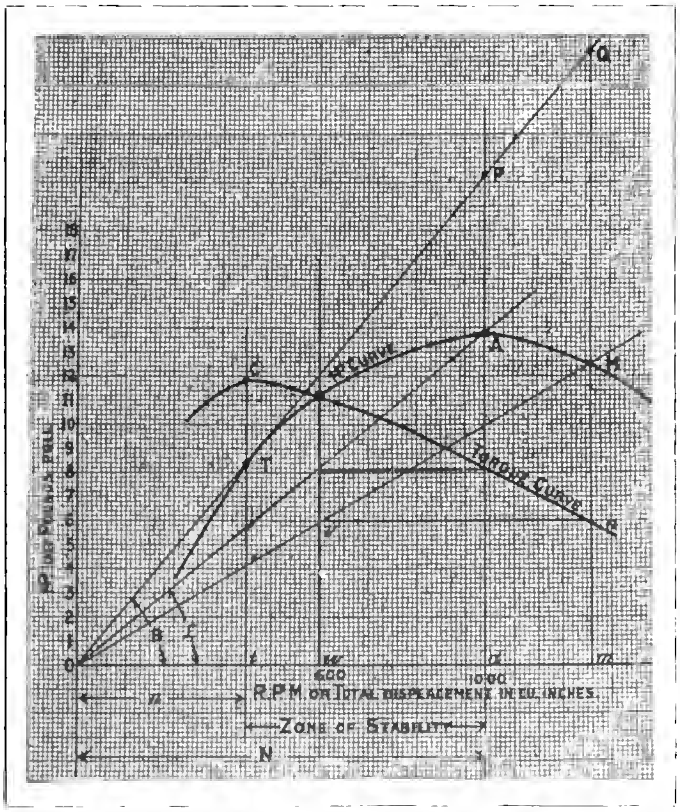
As is well understood, such considerations as type of motor, amount of compression and other details of design have no place in the discussion on this subject, although they are all important factors in the attainment of results, which it is proposed to illustrate by characteristic curves, and they enter, therefore, into the problem which confronts the designer of producing the most harmonious combination.

Mechanical efficiency has an important bearing, but I think it must also be relegated to the realm of the designer.

Thermal efficiency has, perhaps, a more intimate relationship with this subject, but it cannot properly, of itself, be made a prime factor in the determination of horsepower and torque curves.

Fuel consumption has a very decided bearing, and it may be argued that many purchasers give as much consideration to this feature as to flexibility, and that, therefore, provision should be made for a curve which would show the amount of fuel consumed, either per horsepower-hour or total, throughout the entire range of the motor. This would complicate matters, since, while it is perfectly feasible to add to the diagram given below, a third curve showing fuel consumption, it could be plotted for one condition only, viz.: Full load at varying speeds. It would be preferable, therefore, to consider separately the question of fuel consumption and efficiency.

Under present commercial conditions I believe that flexibility is the most important consideration, and desire, therefore, to direct the attention of the members to the accompanying diagram, which was published some months ago in "Omnia," in connection with a very interesting article on "Flexibility of Automobile Motors." In this diagram, both the curve of power and the curve of torque are plotted with a line representing flexibility.



Superimposed Curves of Power, Torque and Flexibility

"Graphic representation of flexibility of motor" $\frac{Pa}{Aa}$ represents flexibility of motor at normal speed N. $\frac{Qm}{Mm}$ represents flexibility at speed Om.

The H.P. and torque curves may be plotted geometrically one from the other without calculating each point. Joint point M on H.P. curve with O point. The triangle OMm gives tang. $\alpha = \frac{Mm}{Om}$.

Mm represents the H.P. at speed Om. Therefore, the quotient of the H.P. and R.P.M. equals the torque; that is, tang. α represents the torque, which is, therefore, measured on the diagram by uv. Carrying uv to the ordinates Mm the point n is obtained, representing the torque at speed Om. Note that maximum torque is obtained when α is maximum; that is, when the line Om is tangent to the H.P. curve, and the torque curve indicates that the maximum torque is at C (where the tangent is horizontal). The H.P. is maximum at A. Between n and N, corresponding to C and A, is the "zone of stability."

It is interesting to note in what way the information thus obtained regarding the performance of a motor may be utilized in determining the gear ratios of an automobile.

Gear reductions in transmission should be so designed that speed changes will keep the motor within the "stable zone," *i. e.*, as resistance increases and motor speeds decrease to n a change to the next lower gear will permit a motor speed of N without change of vehicle speed. Hence neither racing nor stalling of motor.

Flexibility of the motor is represented by $s = \frac{N}{n} \times \frac{w}{W}$.

N = the normal speed.
W = the maximum power.
n = R.P.M. which gives maximum torque.
w = power corresponding to speed giving maximum torque.

Theoretically gear reductions should be as follows:

v_1, $v_1 \times s$, $v_1 \times s \times s$, $v_1 \times s \times s \times s$, hence the reason for geometrical progression. On account of air resistance the high speeds must be less than gear reductions indicated.

Considering the H.P. curve and taking the tangent from the origin O, the right-angle triangles OPa and OTt give:

$$Pa = \text{tang } \beta$$
$$Aa = \text{tang } \alpha$$
or
$$\frac{Pa}{Aa} = \frac{\text{tang. } \beta}{\text{tang. } \alpha}$$

It is known that the tangents measure the torque and that the ratio of the torques considered represent the flexibility of the motor; hence $\frac{Pa}{Aa}$ represents the flexibility. The flexibility is always greater than unity, usually varying from 1.2 to 1.5. It should be possible to obtain a flexibility of 1.6. In actual practice the apparent flexibility is increased by racing the motor before shifting to a higher gear. This is represented on the curves by Om, representing a speed greater than N. If speed changes are made in this way s becomes $\frac{Qm}{Mm}$.

REMARKS RELATING TO GEAR AND PINION FAILURES*

By GEO. WM. SARGENT

IT IS not the purpose of this paper to go into the subject exhaustively, but merely to bring to your attention some of the points and facts which have come under my observation. If by so doing a discussion and investigation into the causes of gear and pinion failures can be started, more exhaustive developments are sure to follow, and this effort will have some merit.

Failures in general may be traced to one or more causes:

First—Improper design.

Second—Selection of material not suited to the purpose.

Third—Improperly manufactured material.

Fourth—Improper treatment of material.

Fifth—Conditions arising in service.

In this paper improper design only will be considered.

Actual faulty design is not a rarity. The matters of gear design and strength do not seem to rest upon the same safe mathematical basis as girders, beams, columns, etc., such as are used in bridge and structural engineering. Kent's Mechanical Engineer's Pocket Book refers to six elements and intimates of others entering into the construction of a formula from which the strength of the toothed wheel could be calculated. Again, according to Professor Harkness, the power transmitted by a given pair of gear wheels varied from 1 to 15, according to the various constants and formulas then extant (1886). This remark, however, refers more particularly to gear design. Having in mind efficiency for the transmission of power, but if the efficiency is lowered the power is consumed in the gear to the detriment of the latter.

Wilfred Lewis advises that in figuring the strength of a gear the tooth should be considered as a beam loaded at its extremity and supported at its base; and, furthermore, that one tooth carries the entire load distributed across its face. Right here I wish to emphasize this last. It is exceedingly important that the load be distributed across the face of the entire tooth and this is a condition which is very hard to obtain on some instances; for example, beveled pinions and gears. In these cases, even though the design of the pinion is correct, and the strength all that is necessary under correct alignment, the concentration of the entire load upon one portion of the face of the tooth of the gear, which would follow disalignment, would result in failure.

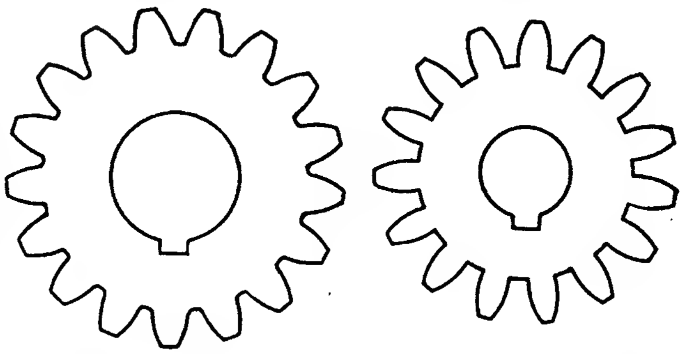
We find in "Elements of Machine Design," under the heading of "Influence of the Form of the Tooth on Its Strength," Professor Unwin remarks: "It will be seen presently that the teeth tend to break across at the root. The teeth are stronger the shorter they are, and the thicker they are at the root. They cannot to be shortened without reducing the arc of contact, and their length should be such as to ensure a sufficient, but not excessive, arc of contact. The thickness at the root depends on the form selected for the teeth. Involute teeth are generally stronger than cycloidal teeth, the teeth are stronger the smaller the diameter of the describing circle used for the flanks. In no case should the flanks be described with a rolling circle, the diameter of which is greater than half the diameter of the pitch line, inside which it is rolled."

I have already referred to Lewis' formula, in which the tooth is considered as a beam loaded at one end and supported at its base. The teeth, therefore, should not be longer than is necessary to give the desired form in order that any loss of power may be a minimum. Furthermore, with a full-sized tooth there is a strong tendency toward under-cutting, which weakens the tooth at its most critical part. Figs. 1 and 2 illustrate this point.

In automobiles, all transmission gears are subjected to a heat treatment and most spur gears are made of the hardened and tempered types of steel. In these latter the under-cut produces an effect similar to a groove or notch; for in the hardened and tempered piece it produces a temper line at the groove or notch and this temper line may develop into a plane of weakness. In pinions this under-cut condition is more likely to occur, for here the number of teeth are fewer, consequently the difficulty of forming the tooth without an under-cut is increased. A 13-toothed pinion will show more severe under-cutting than a 15 or 17-toothed pinion; and in designing pinions and gears this fact should be borne in mind, especially since the work which the pinion has to do is frequently the most severe of any part of the transmission. Again where the width of the tooth of the bevel pinion and gear at the addendum-circle is greater than at the root-circle, the effect of heat treatment is to make the overhanging end or ends harder and more brittle than the rest of the tooth; so that any extraordinary severe stress or shock is bound to cause a break at the overhanging part.

Generally speaking, all gears which are to be heat-treated should be so designed as to lend themselves to the conditions accompanying or resulting from such treatment; for instance, the sections of the various parts of the gear should be, in so far as it is possible, of uniform dimensions, so that in heating, no one part will heat faster than another, thus warping the gear. Likewise in quenching uniformity of dimensions prevents unequal cooling and hence warpage or distortion.

When it is recalled that at 700 degrees Centigrade a steel with 80,000 pounds tensile strength at the normal temperature possesses but 1,000 pounds and an elastic limit likely less than one-half this amount, it will be seen that 3 degrees difference in temperature is sufficient to produce a permanent change in the piece, and a design, therefore, which permits one part of the piece to heat or cool more rapidly than another is to be avoided as much as possible if distortion or warpage is to be reduced to a minimum. In the nature of things, this distortion of a heat-treated piece of steel cannot be eliminated, but it can be brought to the least possible amount, and should be, since warped gears are noisy and likely to break. When one recalls that hardened steel has little or no ability to flow when strained beyond its elastic limit, the necessity for a correctly proportioned gear is more appreciated.



Proper Form of Wide, Strong Gear Teeth and Improper Teeth

Furthermore, sharp corners or edges and sharp re-entrant angles should be avoided in any heat-treated piece of steel, since such design is not only naturally a weak one, but also prone to have developed, through the treatment, temper lines which may readily become planes of weakness.

Having now called attention to some of the points involved in gear design from a metallurgical point of view—and this should be noted for there is no pretension to pose as an expert in gear design—the consideration of the remaining causes of gear failures referred to in the first part of this paper will be made at a later time, for each in itself involves so many points that it would seem best not to attempt to cover them all.

*Paper read at the semi-annual meeting of the Society of Automobile Engineers, New York City, January 4 and 14, 1910.

RECENT CLUB ACTIVITIES

QUAKER CITY'S GOOD ROAD WORK

PHILADELPHIA, Jan. 31—That there are numerous avenues of usefulness open to the up-to-date motoring organization when roads are blocked with snow was made manifest last week when the Quaker City Motor Club began the distribution of a pamphlet. This contained the constitution and by-laws of the East Whiteland Township Improvement Association and a history of how it does its work of improving roads within its particular bailiwick.

The Quakers are especially interested in this small subdivision for the reason that a number of its most prominent members have summer homes in the immediate vicinity and because the much-traveled Lancaster Pike bisects the township from east to west. The Quakers argue that if the road supervisors of other townships can be similarly interested a vast chain of road-improvement projects will be launched which will benefit not only the automobilists, but the farmers and the property owners along the improved highways.

The rusticating Quakers had long deplored the poor condition of the Pike, and President Ross and Frank Hardart, whose properties abutted on it, determined to bring about a change. They interested the road supervisors—Messrs. Morris, Templeton, and Thomas—and later the project of organizing the East Whiteland Township I. A. was put through, whose object can be summarized under the following heads:

First. The improvement of the roads and the township.

Second. To encourage the improvement of the roads in neighboring townships and throughout the county.

Third. To promote and encourage local and neighborhood improvements, public and private.

Fourth. To discuss all matters pertaining to the public good and encourage all enterprises that would increase the value of property or improve in any manner the condition of our citizens.

Upwards of $20,000 has been spent on the township's roads, and there is a comfortable balance to open the roads in the event of snow blockades—which, by the way, came in handy during the Christmas blizzard—or other emergencies.

The Q. C. M. C. is of the opinion that similar results can be obtained in other communities, and is mailing the history, constitution and by-laws of the East Whiteland T. I. A. broadcast in the hope that the seed may fall upon fertile ground and similar benefits follow.

JUST BROKE MEMBERSHIP RECORD

SYRACUSE, N. Y., Jan. 31—The Automobile Club of Syracuse succeeded in its determination to have 400 members by the end of the year, and with 5 to boot, at that. The end was almost gained in a meeting held December 22, when 25 new members were voted in, but the figure still remained a trifle short of the mark which had been set. So the officers got busy, and on Thursday of this week held another meeting when 13 more were voted in. It was a lucky number, for it completed a quota of 405 members.

This is an increase of 168 since July 1, and it represents a lot of tall hustling on the part of the officers, particularly of President H. W. Smith and Secretary Forman Wilkinson. The assistant secretary, Miss Grace Tickner, has also hustled some toward this end. The officers now say that nothing short of 100 more before July 1 will satisfy them, and they are going after the "candidates" strong. Beginning January 1 the club will issue every month a club paper, to be known as the Spark Plug. It will be the official organ of the club and will contain information to members regarding such matters as speed traps in this section, road information for short tours out of Syracuse in all directions, reports of club meetings, banquets, etc.

The membership of the club has so increased within the last year that at a recent meeting it was decided that this publication should be initiated. One object will be to keep members well posted on automobile legislation as it is introduced from time to time and the progress that is made with it.

The club is continuing its campaign for better road directions in and out of Syracuse. This week signs were sent to Elbridge, Cazenovia and Oneida Castle, at the request of residents there. There is a danger point on the State road between Camillus and Marcellus, where large signs have been placed, warning autoists to drive with care. Several accidents have occurred there, and the club was asked to send signs. There is a tunnel 200 feet long, and the road enters and leaves at an angle.

NEW HAVEN'S NOVEL BANQUET SCHEME

NEW HAVEN, CONN., Feb. 7—Novelties are promised to those who attend the second annual banquet of the New Haven Automobile Club, to be held in Harmonic Hall, that city, February 9. The banquet will have for one of its novel features the fact that it will be a speechless affair. Among other odd effects the only illumination at the dinner will be furnished by powerful auto searchlights, while the music will be furnished on an orchestral electric phonograph. The decorations will consist entirely of automobile accessories and supplies. Invitations have been sent to over 500 club members and their friends, and among those who are expected to attend are Gov. Weeks, Secretary of State Rogers, and Attorney Joseph P. Tuttle, counsel for the State Automobile Association of Connecticut.

DENVER CLUB WILL HOLD SECOND SHOW

The Denver Motor Club will hold its Second Annual Automobile Show on February 2-3-4-5-6. The Board of Governors have appointed the following on the committee: C. P. Allen, chairman; Dr. Edw. F. Dean and Wm. D. Nash, the latter president of the Denver Motor Club. Communications should be addressed to C. L. Wands, manager.

EVEN SALAMANCA HAS A CLUB

In Salamanca, N. Y., about twenty-five local automobilists met recently and organized the Salamanca Automobile Club. The following officers were elected: President, Charles R. Gibson; vice-president, George L. Hammond; secretary, Albert M. Preuner; treasurer, William H. Hazard.

ROAD BUILDINC NEWS

INDIANA WILL NOW BUILD GOOD ROADS

INDIANAPOLIS, IND., Feb. 7.—Road work in Indiana, which has been stopped for more than two months, has been resumed, following a decision of the supreme court that the road laws are constitutional. In November the same court held that these same laws were unconstitutional, but, in response to a general demand, consented to reopen the case.

The laws affected are the ones providing for highway construction and the three-mile statute. Under the former, fifty or more residents of a township having a population of 30,000 or more may petition for an improvement, the question to be submitted to a vote in the township. Bonds are then issued by the county commissioners to defray the expense and later a

NEW YORK AUTO OWNERS' LICENSE ADVOCATED

ALBANY, Jan. 31—Those endeavoring to have the owners of motor vehicles examined and licensed like a professional chauffeur will have the aid of Governor Hughes, judging from his message to the Legislature on the subject, as he says therein:

There is obvious necessity for the improvement of the regulation of motor traffic. I believe that a substantial license tax should be imposed for the privilege of operating motor vehicles within the State, the proceeds to be devoted to highway repair. But the matter of first importance for your serious consideration is the provision of adequate safeguards to protect the lives of our citizens. The operation of motor vehicles should be prohibited save by those who upon proper examination and after tests specially adapted to their work are found to be duly qualified and are licensed accordingly under proper State authority administering a system of uniform application. These licenses should be subject to suspension and revocation, and in case of repeated infractions of the law the guilty person should not only forfeit his license, but be debarred from receiving another in the future. It should be made a crime in itself, with severe penalty, for any one to seek to escape after an accident to which his act has contributed.

Relative to good roads or highway improvement, all the Governor has to say to the Legislature in his annual message is this:

Important progress has been made in the construction and improvement of our highways. Of the 520 miles of roads under contract when the new State Highway Commission entered upon its work at the beginning of last year, 201 miles have been completed and accepted, and of the remaining 319 miles, 75 per cent. of the work has been done. In connection with these roads, supplemental agreements were made for construction of 112 miles of bituminous macadam, of which 88 miles have been completed.

During the past year there have been expended for the improvement of county roads $2,847,261, of which the State contributed $1,783,827 and the various counties $1,063,434. Special attention has been paid to repair and maintenance, and $941,000 were expended during the past year upon roads previously completed. Three hundred and seventy-five miles of road have been oiled with a heavy asphalt oil and covered with screenings or gravel.

The total amount available for town highway purposes during the past year, which was expended under the direction of the Commission, was $3,801,732, of which there was raised by highway tax on the towns outside of incorporated villages and cities the sum of $2,436,199, and the State contributed $1,365,533. There was also raised for bridge purposes $747,340.

MASSACHUSETTS LAW IS WORKING SATISFACTORILY

BOSTON, Jan. 31—In his inaugural address, presented to the Legislature recently, Governor Draper, of Massachusetts, says: "The automobile law which was passed by the last Legislature is working well. It is expected that it will produce a net revenue of $175,000 during the next year for use on the State highways; and, with the authority given the Highway Commission to check reckless driving of these vehicles, it is, in the opinion of the commissioners, the most effective automobile law of any State. The Highway Commissioners should be allowed to have sufficient money on hand to enable them to make advances to laborers and others for repair work. Where this work is done at present—there not being money on hand to deal directly with such men—the repairs are unnecessarily expensive. They should also be given authority to buy small sections of land in different parts of the Commonwealth, to be used for the storage of their machinery; and, when opportunity offers, should have the right to purchase land in various sections which furnishes good material for road building. All these purchases of land, either for the storage of machinery or the deposit of material for repairs on roads, should not be completed without the approval of the Governor and Council. I recommend that authority be given the Highway Commission in both these directions, because I feel certain that it will save money for the Commonwealth and permit the commission to render better service."

THE LAW AND THE AUTOMOBILE

TO ILLUME TAXICAB DIALS AT NIGHT

BOSTON, Jan. 31—Managers of the taxicab companies operating in this city are much disturbed by a new rule put out by the State Commissioner of Weights and Measures. Under a law passed last year this official was given power to examine taximeters and see that they were accurate. His first order was that they must be connected with the front and not with the back wheels; then he required that every meter be subjected to a State test as to its accuracy in recording distance and time. These were perfectly satisfactory to the taxicab managers. The latest rule, however, requiring that the dials of the meters be illuminated at night, so that the passenger can more readily tell the charge, is opposed. The managers say that they cannot afford to equip their cabs with dial-illuminating devices and continue to operate them under the taxicab rates. They say that to comply with the rule it will be necessary for them to wire the cabs, install the lights and batteries and also maintain charging stations and a large number of extra batteries. Furthermore, they believe such a rule unnecessary. Two of the smaller taxicab companies have already removed the meters from their cabs, and the larger ones are considering such a step. In case they do, taxicab travel in Boston will be much more expensive than at present, for the other schedule of charges will make the rates much higher for the same distance. The larger taxicab companies equip their drivers with pocket searchlights and require them to illuminate the dial at the end of a trip for the benefit of the passenger. They even keep inspectors on the streets at night to see that this rule is complied with. The manager of one of the large companies states that it will cost from $3,000 to $5,000 a year to comply with the lighting rule, and his company cannot afford to do it under the existing taxicab rates. The taxicab companies probably will take steps to ascertain their exact rights before the law and will combat the enforcement of the rule if they have a fair chance, rather than remove the taximeters from the cabs.

In the end this may work out to an increased rate of fare, since the taxicab company does not exist, which would not welcome the excuse that would allow of doing this very thing. So it is that legislation does not always work out in just the manner expected when it is planned. In so far as the public would really pay for all of the benefits here, it is questionable if it is worth while to make the change as proposed.

ROAD BUILDING NEWS

general tax is levied on the township to reimburse the county.

Under the three-mile law, an election is not necessary. Fifty or more property owners may petition for a road not to exceed three miles in length which will connect an improved road traveled by a rural mail route, at either end. A bond issue and subsequent tax is also provided under this law.

The laws were questioned in a suit brought by Samuel H. Smith against the Hamilton County Commissioners. The general law apparently reads that the township in which the work is to be done must "include" an incorporated city or town of 30,000 or less inhabitants. The court holds that the work may be done in any township in the State, and also in any city or incorporated town of less than 30,000 inhabitants.

Universal demountable rim has many friends among the garage men. Scene in one garage.

GARAGES

The Hokanson Automobile Co., of Madison, Wis., general western Wisconsin representatives for the Buick, Oldsmobile, White steam and gasoline and Oakland cars, on January 26 formally opened its handsome new garage and salesroom building at 14 to 20 East Doty street. The garage is three stories high, with about 30,000 square feet of floor space. The Hokanson company was reorganized several months ago and capitalized at $70,000. Charles F. Spooner is president; Emil Hokanson, vice-president; George P. Miller, treasurer, and Rudolf Hokanson, secretary and manager.

The Baker Motor Vehicle Co. is erecting in Cleveland one of the most modern and completely equipped garages in the United States. The building is 200 by 162 feet, located on Euclid avenue, and built 50 feet back from the street. It will be occupied by the Baker Motor Vehicle Co., Cleveland salesrooms and the Standard Automobile Co., Cleveland distributors of the Packard. The Euclid avenue section will be devoted entirely to show rooms and offices, which will be finished in oak with panelled walls. Two garages, one for gasoline and one for electrics (with repair shops for each), battery department, painting and upholstering shops will be operated in connection. The garages will have a storage capacity of at least 80 electrics and 30 gasoline cars, and will have many new features.

The Taylor Motor Distributing Company, of Philadelphia, has been formed to handle the Warren-Detroit "30" in that city and vicinity. The company includes William P. Taylor, president; Frank B. Cook, vice-president, and Philip M. Price, secretary.

The Bergdoll Motor Car Company, of Philadelphia, has secured the large garage and storage plant formerly occupied by the local. electric bus company, which will be immediately equipped as a factory for building the Bergdoll "30" and Bergdoll taxicabs.

The garage and salesrooms of A. Vernon Hart, Rochester, N. Y., were badly damaged by fire last Friday, and several cars were scorched and otherwise injured. The estimated loss is $10,000. Mr. Hart handles the Thomas Flyer, Oakland and Columbus Electric.

The Garage Equipment Manufacturing Company, of Milwaukee, Wis., manufacturers of motor car accessories, has been incorporated with a capital stock of $100,000. The incorporators are: George F. Discher, D. H. Discher and Theodore Kerner.

W. T. Toops, Harry Ennis and C. H. Smith, of Bowling Green, Ky., have organized the Bowling Green Automobile Company, and will do a garage and supply business as well as handling a line of automobiles.

The Gordon Motor Company, Inc., Richmond, Va., has, on account of increasing business, purchased a large lot on which it will erect a modern garage and salesroom at an estimated cost of $50,000 for the building alone, equipment extra.

The Prothers-McGinnis Auto Company, of Barboo, Wis., has arranged for the erection of a large building during the coming Spring, which will contain its garage as well as a large equipped machine shop.

The Ames Auto Garage Company, of Orrville, Ohio, has been purchased by the Champion Thresher Company. The garage will be enlarged, and R. C. Taylor has been appointed manager

B. H. Smith, of Caro, Mich., is about to erect a one-story building to be used as a garage and repair shop, in which will be handled supplies, sundries and automobile accessories.

In Cleveland, Ohio, Harry S. Moore, agent for the Stoddard-Dayton, will open a garage and salesroom on Euclid avenue, continuing his place of business on Crawford road.

William E. Kennard, in Seneca, Kan., has taken over the automobile garage formerly conducted by Thomas Bennett & Son, and will conduct the business in the future.

The Willis Motor Car Company in Syracuse, N. Y., has taken the Rapid Truck agency for Central New York. James B. Fiedler will manage the truck department.

At Denver, Col., the Studebaker Automobile Company has just moved into the new garage at 1515 Cleveland place. This is a modern two-story building, 50 by 125 feet.

STERN WHEEL TAX ORDINANCE KILLED

The Milwaukee common council committee on judiciary has effectively killed the Stern wheel tax ordinance pending for some time, by recommending indefinite postponement, which has been agreed to by the council. The measure provided for a special tax on all vehicles, including horse-drawn and self-propelled, to raise money for street improvement. The Milwaukee Automobile Club took a decided stand against the measure, and its efforts were successful. The argument of Counsel James T. Drought, of the M. A. C., was that the motor car owners are paying a fair share of taxes in their registration fee and personal property assessments; that the special tax would be double taxation, and that the measure would mean discrimination. This, it was contended was wrong and aside from the original purpose of the bill.

R. C. Hupp, president Hupp Motor Car Company.

AGENCIES

W. H. Wilcox, of Binghamton, N. Y., is handling the well-known Marmon car in the State, excepting for the three or four counties around New York City and some four or five counties in the extreme western end of the State. In addition to the Binghamton district, the Wilcox agency crosses the line into Pennsylvania, taking in two or three counties adjoining. The Wilcox agency reports a brisk demand for this well-known make of automobile, and in the rather rough going in some of the hilly country of New York State, it is claimed that the extremely powerful motors of this make in a chassis which is designed for a low center of gravity and good clearance, users are extremely well pleased and satisfied customers spread the good news everywhere.

The O. G. Roberts Co., Columbus, Ohio, which opened a sales agency and garage at 953 East Gay street a year ago, is planning the erection of a large addition to the plant as soon as the weather will permit. The concern is now the agent for Central Ohio for the Courier, made at Dayton, in addition to the Overland, the Stearns, Jackson, Marion and Stoddard-Dayton.

Rainier motor cars will be represented in Maryland by L. H. Shaab, 116 W. Mount Royal avenue, Baltimore, Md. R. M. Robinson, Albany, has closed the agency for the Rainier in that city and district. Mr. Robinson also represents the Reo and has taken on the Rainier to supply the demand for a high-class car in Central New York.

The Racine Manufacturing Company, of Racine, Wis., is now turning out a large percentage of bodies as before the fire in December. Temporary dry kilns have been erected on the site of the old plant. Every available building in Racine is being used by the company, and new machinery is arriving daily.

The Bejier & Finch Motor Car Co. has been formed at Stevens Point, Wis., to handle the Ford in Portage, Wood and Waupaca counties, Wis. H. J. Finch, of Stevens Point, and Arthur H. Bejier, of Phillips, are the proprietors.

C. A. Woodruff, purchasing agent Chalmers Motor Company.

Among the new branches established along Broadway was noted that of the Gilbert Manufacturing Co., at 2002, next to the corner of Sixty-eighth street, which store will be shared with the Seamless Rubber Co. The Gilbert line of accessories, as well as the Bowers carbureter, will be carried in stock, at all times, the tire accessories being featured.

Tom Botterill Automobile Company, Salt Lake City, Utah, Pierce-Arrow State Agents.

The Sterling car, manufactured in Elkhart, Ind., will be represented in Cleveland by the Sterling Motor Sales Company, a new company, with a capital stock of $30,000, of which J. C. Koepke is manager.

The Hollis-Rand Co., agents for the Speedwell and Pullman cars in Rochester, have opened up temporary quarters in the Triangle Building, that city, which they will occupy until April or May.

The Chalmers-Hipple Co., of Philadelphia, agents for the Chalmers and Hudson, have outgrown their present quarters, and will shortly move to a larger building at 206 North Broad street.

The Obenberger Drop Forge Company has been incorporated at Milwaukee, Wis., with a capital stock of $30,000. John Obenberger, H. W. Ladish and H. C. Fueleuer are the incorporators.

C. M. Logan, formerly with the Cleveland branch of the Olds Motor Works, has secured the agency for Pope-Hartford cars. Mr. Logan's territory includes all of Ohio except Cincinnati.

The Cole "30," according to arrangements just closed, will be handled in Chicago by the Standard Automobile Company. F. C. Bailey is the manager of the local concern.

The Kilpatrick-French Motor Car Company, of Lebanon, Ohio, has been incorporated by J. A. Kilpatrick, A. N. French, Albert French, Howard Ivins and C. Wilbur Ivins.

Ole G. Kinney, of Colfax, Wis., has been appointed agent for the Ford and Brush in the country districts in the vicinity of Colfax and Eau Claire, Wis.

The Ross Motor Company, of Superior, Wis., has secured the local agency for Overland automobiles, in addition to a number of other lines already handled.

The Way-Mitchell-Rigden Company, Cleveland, Ohio, agents for Republic tires and Stromberg carbureters, has secured the agency for Harris oils.

The Pullman Motor Car Company, of Cleveland, Ohio, was incorporated recently with a capital stock of $25,000 by F. C. Thornton and others.

W. L. Hurdle has been appointed agent in Cleveland for the Keystone "6," and will establish headquarters on Euclid avenue, near Sixty-fifth street.

The Ross Motor Co., of Superior, Wis., has been appointed district agent for the Overland, in addition to several other well-known lines.

The Welch car will be distributed in Philadelphia and adjacent territory by Manager Daniels of the Buick branch in that city, according to a recently completed arrangement.

Realm of the Makers

First Abbott-Detroit automobile, designed by John C. Utz. John G. Phillips plays an important part, and A. T. O'Connor is making the sales. The large new plant is producing many cars.

The Cole Motor Car Company entered a "30" at the late Indiana meet, and the after results seems to have proven very conclusively the futility of accepting advanced information in relation to the car ahead or the time taken by any given car. In this case, as it would seem, Endicott, who drove the Cole "30," was told that his time was 19 min. 47 sec. for 20 miles. This record was confirmed, unofficially, the night of the race, and the Henderson Motor Sales Company, which distributes Cole automobiles, wired its branches throughout the country, stating the facts as it believed.

Charles P. Henderson, of the company, having discovered by reading THE AUTOMOBILE that the unofficial time as reported to him was not in accord with the official time, said: "We were amazed when we saw the time published in your journal as 21 min. 22 sec. for 20 miles. We immediately took the matter up with Mr. Warner, who wired us that the time published by your journal was the correct official time for the Cole "30."

Mr. Henderson shows that he believed the first report to be true, and the prompt action which he took, after he read THE AUTOMOBILE and found what was the true time, would seem to make his position perfectly clear.

Hugh N. Harding, the racing driver, who will be remembered as a headliner in drivers of the events of the past six years, has been retained by the Alco, and under the tutorage of B. D. Gray, chief engineer of the company, will undertake important technical investigation for the company. Those who are in a position to know fully appreciate the high technical skill of Mr. Harding—driving with him is a pastime.

Not long ago the Pierce-Arrow Motor Car Company, of Buffalo, began a systematic inquiry with a view to ascertaining the ultimate destiny of all the cars which are made. One result was the bringing out of the remarkable fact that in so far as Pierce-Arrow cars are concerned, substantially 47.5 per cent. of the cars are absorbed by Pierce-Arrow owners. The experts who undertook this investigation expressed the further belief that a man almost always buys a low-priced car at first, and as he gains experience buys one of a higher grade. The tabulation which was made showed that 16.9 per cent. represented the class of people who purchased a car for the first time.

The Royal Tourist is out with a torpedo body which, in addition to being of excellent appearance, has been designed most carefully, according to the reports which emanate from the Tourist engineering office, and H. H. Adams, sales manager from the factory, is kept on the go because of the interest which is taken in this type of car by real buyers. The Chicago office of the Royal Tourist Car Company is 1253 Michigan avenue, where the overflow of the Tourist's friends aggregate when the Tourist booth will hold no more.

The new Torpedo Runabout which is offered in the 1910 Winton product, is attracting considerable favorable comment, which, together with the Winton torpedo type of touring car, completes the advance list, excepting that the really latest idea from this well-known Cleveland plant is embodied in a limousine.

"Report of service by owners of Franklin 1910 automobiles" is a brochure of nice proportions and clean print which is being sent out by the Franklin company, and it tells its own story. It is free for the asking. A little reminder appears on the title page which is very suggestive, i. e., "The man who can best judge the merit of an article is the man who daily uses it."

A Stoddard-Dayton delivery wagon which was built for Fleishman, the florist, Chicago, is attracting notice because of the fanciful art appearance of the body, and the fact that it is giving good service.

The Mitchell Motor Car Company, Racine, Wis., is declining to accept deposits for future deliveries from its agents. James W. Gilson, sales manager of the company, is stout in his defense of this policy, and he points out that if the Mitchell Company was to accept the customary deposit on its output of 6,000 cars the Company would have the use of $300,000 for upwards of a year, for which it would give no adequate return. The Mitchell car, by the way, was one of the sights of the Brussels Show. The consignment to this show comprised a polished chassis, a five-passenger touring car, fully equipped; a seven-passenger machine, and a roadster.

At the big plant of the Nordyke & Marmon Company, Indianapolis, Ind., work is progressing favorably, despite the fact that the deliveries are still well behind orders. In the meantime the company is preparing for its 1910 aggressive racing policy, claiming that racing has had a marked influence on the quality of Marmon cars.

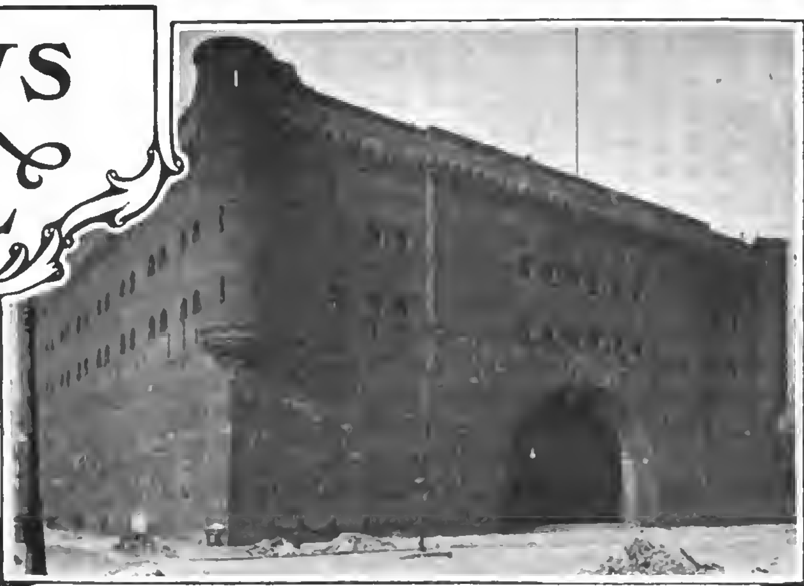
. The Inter-State Automobile Company put out a booklet during the holding of the New York Show entitled, "Why We Named the Inter-State the Bull Dog." It was a neat undertaking, and the demand for the first edition far exceeded the supply. The company has issued a second edition, which is being handed out at Chicago. It is worth sending for, and autoists who are not in a position to visit the show have but to make a direct request to the company at Muncie, Ind., to get a copy.

In the Moon plant at St. Louis, much valuable time is saved through the use of a two-track shipping platform from which two freight cars can be loaded simultaneously. The tracks are so arranged that a big end-door automobile car can be switched close to the platform while a side-door car is already in position on another track.

The Dixie Motor Car Company, of Frederick, Okla., which was recently incorporated for $250,000, is designing an automobile, the price of which will probably be fixed even as low as $1,050. It is the expectation of this company that it will furnish 500 automobiles this year.

Benjamin Briscoe, president and general manager of the Maxwell-Briscoe Motor Company.

News in General



Seventh Regiment Armory, Michigan avenue, where the overflow from the Chicago Show is housed. Connection is through a covered passageway at the back, and along an alleyway eight feet wide.

Chas. Y. Knight has completed a visit to certain of the automobile plants in this country, and left for his English home at "Broadwater," Kenilworth Road, Coventry, Tuesday, February 8, where he will remain for a time sufficient to enable him to complete some motor designs which are projected, after which the Knight motor situation, in connection with the Panhard & Levassor Company, will command his attention. Mr. Knight relates some very interesting phases of the motor situation abroad, and silences the story which has been going the rounds as a side light, to the effect that the Mercedes Company, at Unterturckheim, was running ahead of the original idea and taking out patents which will afford an advantage. It seems that under the terms of the license which is given force between the Knight syndicate and the respective companies, they will not have the right to export automobiles from one to the other country without giving the builders in the relating country full right to adopt and use any special devices which may be found on Knight motors as by them applied.

The Hess-Bright Mfg. Company (H.B.-D.W.F. ball bearings) cordially invites visitors to the Chicago automobile show to call at its recently opened store at 1800 Michigan avenue, where the full line of ball-bearing products of this company are artistically displayed. An accurate and convenient slide rule will be given to each engineer who leaves his name.

In Columbus Director of Safety McCune has issued orders for all violators of the State law to be arrested after February 10, the date set for enforcing the licensing of horse-drawn vehicles.

Herr Hulmle, head of the German ignition firm, U. & H., makers of the U. & H. magneto.

A recent test given the Morgan & Wright Nobby Tread non-skid tire, in Detroit, proved its excellence in the most pronounced way. The test was held on a sharp rise, one studiously avoided by motorists on slippery days. On this occasion the hill was covered with a glare of ice covered with light snow. A Buick car, equipped with these tires, was driven to the foot of the hill, brought to a dead stop, and then started, making the incline without the slightest halt or slip, even under these most unfavorable conditions.

At the second quarterly conference of the branch managers of the Franklin Automobile Co., held in Syracuse, the following representatives were present: W. S. Jewell, New York; A. B. Henley, Boston; George Ostendorf, Buffalo; F. L. Thomas, Chicago; C. H. Rockwell, Cleveland; W. F. Reynolds, Pittsburg; F. H. Sanders, Rochester; J. F. McLean, San Francisco; W. E. Brearley, St. Louis; N. S. Lee, Albany, and George E. Messer, Syracuse. T. R. Lippard and G. D. Babcock, of the Franklin Manufacturing Co., made the opening addresses.

Charles W. Oathout, of New York City, who is Eastern sales manager of the Jackson Automobile Company, is authority for the statement that as far back as 1907 it was proven by a close inspection of the records that $70,000,000 was spent yearly in the upkeep of 49,000 automobiles, which he states were then in operation in the State of New York alone. According to the same authority, this repair account mounted up to nearly $90,000,000 in 1908, and $7,000,000 more must be added to cover the increase for 1909.

The National Sales Corporation has issued for the trade a combination electrotype sheet of their automobile accessories. This pamphlet is so arranged that the descriptions may be cut out and pasted into the dummy of any catalogue.

Strict orders have been issued to the police departments of Dayton and Cincinnati to enforce the State automobile law after February 1. It is reported that many owners are operating cars without the 1910 number plates, and after the first of the month all will be arrested and prosecuted.

The B. F. Goodrich Company, of Akron, Ohio, at its annual stockholders' meeting, approved plans for extensive additions and betterments to the plant. While no direct statement was made, it was intimated that about $1,000,000 will be spent during the coming year. The meeting marked the retirement of Walter A. Folger, treasurer of the corporation. He was succeeded by W. A. Means, who has been assistant treasurer. Secretary C. B. Raymond was elected to the additional office of assistant treasurer. The other officers are: B. G. Work, president; F. H. Mason, first vice-president; H. E. Raymond, second vice-president, and E. C. Shaw, general manager.

The Mitchell-Lewis Motor Co., of Racine, Wis., the new $10,000,000 corporation at Racine, Wis., has established a large dining-room in the new general office building, where employes may obtain meals at cost.

At this early date Pennsylvania registrations have reached the 10,000 mark for the year 1910. The majority of cars registered are above twenty horse power. It is expected that the total for the year will aggregate between 35,000 and 40,000 registrations.

CHANGE OF NAME—YORK MOTOR CAR CO.

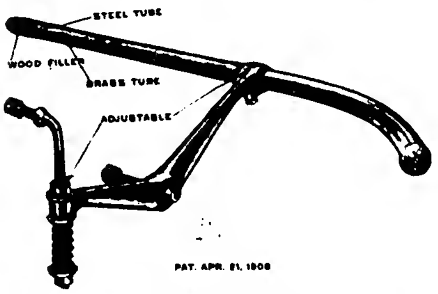
In accordance with its progressive policy, and also due to the fact that the company has outgrown its local name, the York Motor Car Company, of York, Pa., recently applied to the courts for a change of name, which has been granted, and, commencing Feb. 1, 1910, the company will be known as the Pullman Motor Car Company, Inc.

The demand for Pullman automobiles has grown so rapidly that the company is very much behind in its orders, but with the completion of an additional plant at Evansville, Ind., in the early summer, the output will be greatly increased, and the company will be prepared for this demand.

The officers and personnel of the new company remain unchanged. The change, as previously stated, is made so as to harmonize more with the character of its output, and to avoid the confusion which would necessarily result after the establishment of the plant at Evansville, Ind.

Prominent Accessories

The Sager Bumper—The construction of a bumper capable of protecting the lamps and radiator of a heavy automobile running at high speed is not such an easy matter as one might casually suppose. The bumper in question, although it is not claimed that it will protect the car from damage in the event of its running into a stone wall at sixty miles an hour, is nevertheless substantial enough to afford a very material protection to those delicate parts



Sager's new bumper construction, showing adjustment at front end.

of the automobile which of necessity, it seems, must always be placed at its front end.

The cross bar, which receives most of the hard knocks in service, is a triple construction of an unusual and meritorious sort. The body of the bar is a stout steel tube; this is reinforced by a round bar of wood driven solidly into place. The whole is then, for appearance sake, driven into a second tube of brass. The cross bar thus formed has remarkable strength, and at the same time keeps its appearance well, not being easily bent or dented.

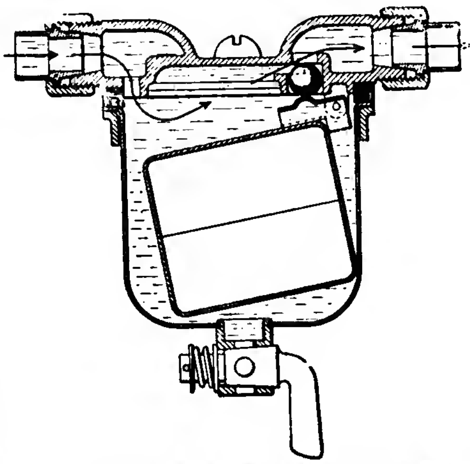
Considerable stress is laid on the construction of this bar, because it is quite important for the popularity of the device that it should retain its good looks. Accidents in which the bumper is involved are by no means necessarily the fault of the owner of the car, and he naturally does not like to have it look battered and worn.

The bar is supported on two brackets cast of manganese bronze, of I-section. These are provided with steel pivot bolts, and at their rear ends are cushioned by steel coil springs. The springs are of steel rods which pass through eyes in the ends of the brackets, being held between the brackets and nuts on the ends of the rods, so that they are in compression whenever the bumper bar is forced back. Stop-nuts are provided above the brackets, by means of which the position of the bumper bar can be regulated. The firm of J. H. Sager & Co., of Rochester, N. Y., which also makes the Sager spring shock absorbers, is marketing this improved bumper.

H. W. Nuckols, General Manager Columbia Motor Car Company.

"No-Shammy" Gasoline Strainer—Gasoline strainers usually will not separate any more water than they can hold, which at best is but two or three teaspoonsful; when water still continues to come to the trap it passes through as easily as the gasoline, and enters the carbureter. The feature of the "No-Shammy" strainer is that it automatically closes when water beyond its capacity reaches it, and so prevents any water getting into the pipe between the strainer and the carbureter.

The strainer contains a float, which is so adjusted as to sink in gasoline, but float in water. As long as nothing but gasoline passes through, the float is inoperative; but when the strainer pocket gets full of water the float rises and cuts off the feed of gasoline. This, of course, stops the motor, and so calls the driver's attention. After the water has been let out at the petcock, the float valve opens



No-Shammy strainer has a float like a carbureter, and convenient drain cock.

and admits pure gasoline to the carbureter. The motor will then start on the first turn of the crank.

The "No-Shammy" strainer is made to fit all sizes of piping, from 3-16 to 1-2 inches* outside diameter. It has been adopted as regular on six 1910 cars.

Hart Gas Lamp Ignitor—This device is unique among similar ones in that it makes use of the regular high-tension ignition system of the car to effect the lighting of the headlights, instead of providing a coil of its own. It is connected with one of the coil units or with one terminal of the magneto, according to conditions. The use of the ignitor thus sidetracks the current from one cylinder momentarily; turning the switch to light the lamps causes one or two misses of the cylinder which should have received the "juice," but as a single spark does the work on the headlight the skip is hardly perceptible.

The ignitor can be applied to any car in a few minutes. One cable leads to each light, the return being grounded. A three-pole switch is provided for the dash by which it is operated. The sparking points which are applied to the acetylene jet are exactly the same in principle as a spark plug. As they spark in the open air, instead of under compression, when their switch is on and the high-tension current is given its choice of the spark-plug route or the ignitor, it takes the ignitor every time. As the device needs no batteries or other source of current distinct from that of the regular ignition system, and likewise needs no separate coil, the maker, H. T. Hart, of Hartford, Conn., is enabled to sell it at a low price.

The Wohlfeld Tire Trunk—To redeem the space within the spare tires usually carried on a tour it has become quite general to provide a circular trunk to fit inside of them. With the large tires which are coming into general use, the space available for such trunks has increased, until now a considerable amount of luggage can safely be carried in that way. The only objection urged against these trunks has been that all were not as strictly waterproof as might be desired.

With the view of making such a trunk which would be waterproof in the most severe storm, S. Wohlfeld & Company, of Philadelphia, got out an entirely new idea in the way of providing the necessary opening. The outer end of this trunk is, as usual, divided horizontally across the middle; but instead of being hinged on this dividing line, the upper and lower parts are joined by a single central pivot. This allows the upper half to slide down over the lower half to open the trunk. The waterproof feature is accomplished by having the upper half overlap the lower considerably when in the closed position, and at the same time the cylindrical body of the trunk has a lip which overlaps the edge of the upper section. Substantial locks are provided, and it is claimed that the trunk is absolutely water and dust-proof.

Wohlfeld waterproof tire trunk shown closed, with solid and reliable locks.

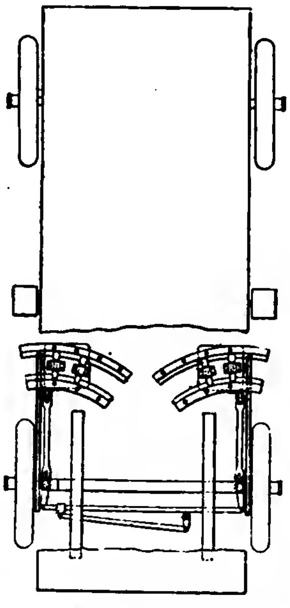
PATENTS AND PROCESSES

INVENTIONS and inventors have always had a peculiar fascination for American people, whether due to a natural inventive genius inherent in all of us, or to a receptive attitude towards things new, better and different, is hard to say. Nevertheless, tbis feeling exists, and in no small degree, either. To care for this, in part at least, THE AUTOMOBILE proposes to set aside one page each week for matter relative to both inventions and inventors. It will be the idea to bave a competent authority deal with these subjects, so that the matter may present something of worth and the space not be wasted.

For the present week the portrait of Thomas A. Edison is presented. Mr. Edison is without a doubt one of America's foremost inventors, in which chosen field he has shown a touch of rare versatility, his inventions being of many kinds, touching as they have things electrical, mechanical, chemical, electrochemical, and pertaining to other branches of science.

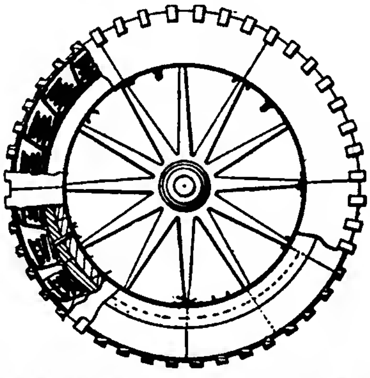
While not the purpose to expand upon any one man's inventions, and thus exploit him, as it were, it will serve as complete proof of the man's ability as an inventor to mention his work in storage batteries, his phonograph, his magnetic low-grade iron ore separator, his more recent work in connection with photography, and in particular with moving pictures, to say nothing of his work in cement, including as it does an attempt to construct a complete house at a price within the means of every working man, which house will have all of the many advantages of concrete construction.

From the latest information, it would appear as if he has now turned to automobile construction, probably drawn thereto by his work in this connection on storage batteries. As shown by the latest patent office gazette, namely, the issue of February 1, a patent has been granted him on what appears to be a development of the forecarriage idea. This is to drive the front wheels, utilizing tbem for steering as well. In this way tbe whole power and transmission unit becomes one unit, which is readily removable as a whole. In the present invention, illustrated elsewhere on this page, no mention is made of the motive power, the claim speaking broadly of a motor. The latter is mounted upon a forward truck, in such a manner as to turn with it. A further proviso is made of radial ways or tracks upon which the weight of the motor may be supported during the turning process. Although worked out in somewhat different form, this same construction was used abroad in the Italian forecarriage, Cantano, and has been very successful. This, by way of passing mention, was electrically driven from storage batteries.



Edison's fore-carriage system, using the front wheels for driving and steering.

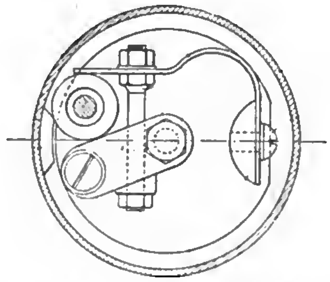
Like the non-refillable bottle, the spring wheel is a sort of hardy perennial, a new inventor with a brand-new solution of the tire problem, worked out as a spring wheel, cropping up every little while. This is not said in a sense of disparagement, but rather as comment upon the number and variety of the spring wheel inventions. In the latest gazette a patent is described whicb has just been granted to Rudolph J. Lackner, of New York City, the exact official designation being a spring tire. In this tire Mr. Lackner utilizes the usual felloe, upon which a series of small coil springs are mounted. At their outer ends these springs carry rubber caps, while tongues are interposed between the springs and connected at the inner ends to the felloe, have their outer ends angularly disposed, and so arranged as to press inwardly against the ends of the rubber caps. This forms a combination of wheel and tire which has, among many other virtues, that of the rubber caps being readily removed for inspection, adjustment or repair.



Spring wheel patented by Rudolph Lackner, using a multiplicity of coil springs.

Probably no one distinct part of the automobile has excited more attention at the hands of inventors in the past two years than the ignition system and its many details. As exemplifying one of the well-worked-out smaller details, the third patent reproduced this week is that of a German magneto man, Hermann Ruthardt, of Stuttgart. This gentleman is the inventor and manufacturer of the Ruthardt magneto, to which the Herz (American) magneto bears some resemblance. Herr Ruthardt's invention, as described in the gazette, is a rotary current-breaker. This breaker is equipped with a spring on unusual and noticeable shape, this being comparable to a combination of two letter U's, one inverted and the other flattened out. On this flat part is carried the platinum point, which is of unusual size. The outer end of the flattened part is the portion upon which the circular but eccentric cam operates to cause the break. The housing forms a sort of circular box, which is rotated bodily to advance or retard the time of the spark.

At least one prominent automobile company is represented in the gazette as assignee, that one being the American Locomotive Company, to which Budd D. Gray assigns his patent on the rear axle construction now used on the Alco cars. The specifications call for a central annular body adapted for the reception of driving mechanism, tubular supporting members continuous with and oppositely projecting from said central body, a spacer fixed in the central body, and tubular liners fixed in the tubular supporting members and abutting at their inner ends against the spacer.



Circuit-breaker for magneto use, embodying a number of refinements of merit.

Further claims cover the method of securing the tubular liners, intended to carry the wheel bearings of the full floating axle. in the projecting supports on the central body. One method is to shrink a band over the end of the supporting tube, thereby clamping it against the tubular liner.

Still another claim is for a construction in which the spacer and the axle tubes are assembled first, and then covered by a central body made of pressed steel in two halves, the halves being then welded together, uniting this body with the tubes.

This axle construction seems one of the neatest at present in use. It was originated for the Alco taxicab and light town car, but its success was such that this year it is to be used exclusively on all the models of this company, including the four-cylinder 40-horsepower and the six-cylinder 60-horsepower, which formerly had chain drive.

Thomas Alva Edison, who has turned to automobile improvements recently.

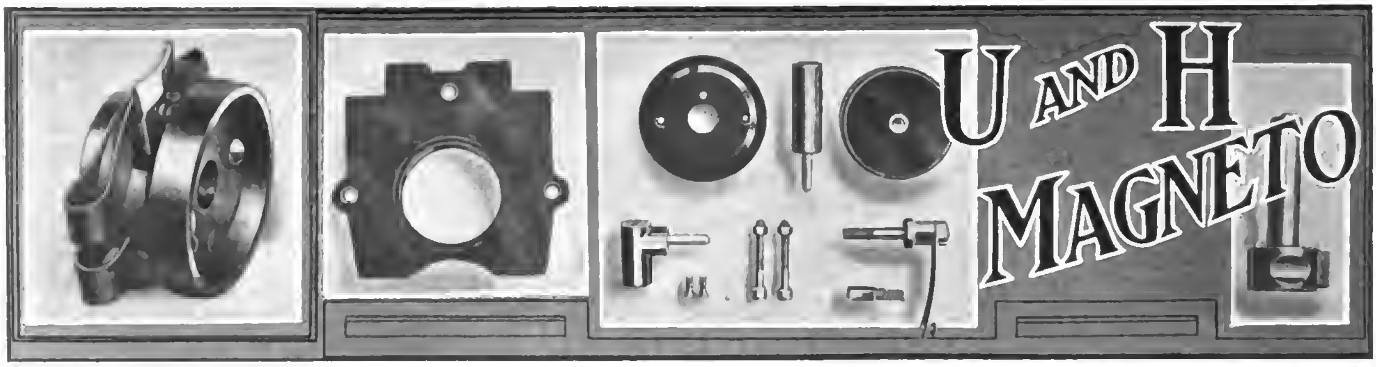


Fig. 1—Parts of magnetos, which are made to standard, in order that the rapid supply of repairs will be facilitated

THIS magneto has a double winding on its armature and is of the true high-tension type. It is made in the several styles as required in ignition work, has been before the automobile public for several years, and has earned a reputation for uniform stability. The product is made by Unterberg & Helmle, Durlach, Germany, and is distributed in the United States by J. S. Bretz Company, New York City.

Of the several types of U & H magnetos which are made, reference will be here made to two; they being enough to support the points which it is the desire to make. Fig. 1 (the title illustration) shows something of the work of standardization; parts are kept in stock at all branches of the maker, in quantity sufficient to satisfy every emergency. The part on the left, in Fig. 1, is the interrupter, which is common to all the types of this company, and, considering the great importance of this particular part in a magneto, it is well to examine it closely with a view to noting its ability.

The interrupter comprises a bronze barrel to one end of which is riveted a steel centering disc. This disc is recessed, and fits over a corresponding projection on the condenser casing, thereby locating the interrupter in true concentric relation when it is mounted into position; skill is not necessary in the process. In assembling, the flexible phosphor bronze member is interposed, and the success of the interrupter is due to this shape.

PROPER SPEED OF ROTATION OF U & H MAGNETOS

The speed of rotation of a magneto of this character bears a definite relation to the speed of rotation of the crankshaft of the motor, and to the number of cylinders of the motor, assuming that there is one spark plug in each cylinder of the motor—referring, of course, to four-cycle types of motors. For the several motors the speeds should be as follows:

Considering 4-Cycle Work

(A) 3-cylinder motors—the magneto armature must be run at 3-4 of crankshaft speed.

(B) 4-cylinder motors—the magneto armature must run at the crankshaft speed.

(C) 6-cylinder motors—the magneto armature must run at 1 1-2 times the crankshaft speed.

(D) 8-cylinder motors—the magneto armature must run at double the crankshaft speed.

Considering 2-Cycle Motors

(E) 2-cylinder motors—the magneto must run at the speed of the crankshaft.

(F) 3-cylinder motors—the magneto must run at 1 1-2 times the crankshaft speed.

(G) 4-cylinder motors—the magento must run at double the crankshaft speed.

The direction of rotation of the magneto armature is fixed when the magnetos are assembled in the shop of the maker. A small arrow printed in the metal at the driving spindle end, shows the intended direction of rotation, but by altering the relative position of the interrupter the direction of rotation will be reversed, considering the proper working of the magneto—no mechanical damage will follow if the magneto armature is rotated in either direction; the only point to be remembered is that the spark will not be properly timed unless the connections are properly made for the right direction of rotation.

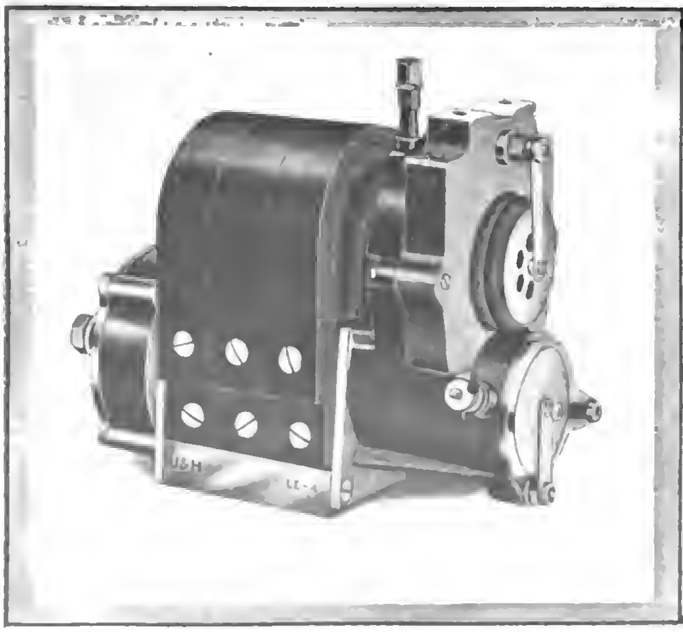


Fig. 2—Type L E 4 magneto, which is made for motors up to eight cylinders, and with a device for starting from the seat

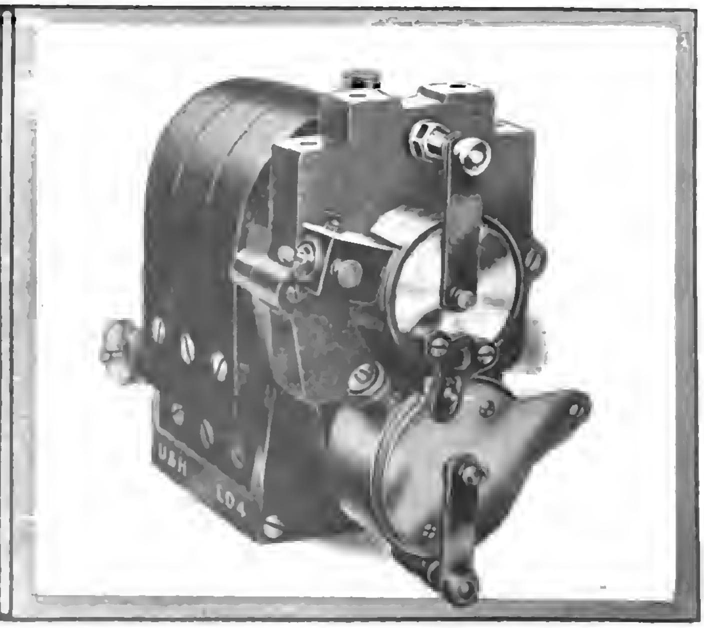
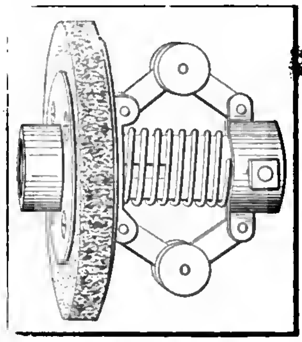
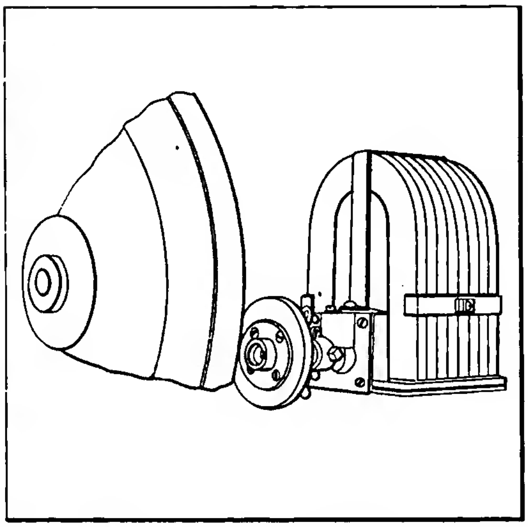


Fig. 3—Type L D 4 magneto, as made for any number of cylinders up to eight, is also intended for dual work

THE HOLTZER-CABOT IGNITION SYSTEM





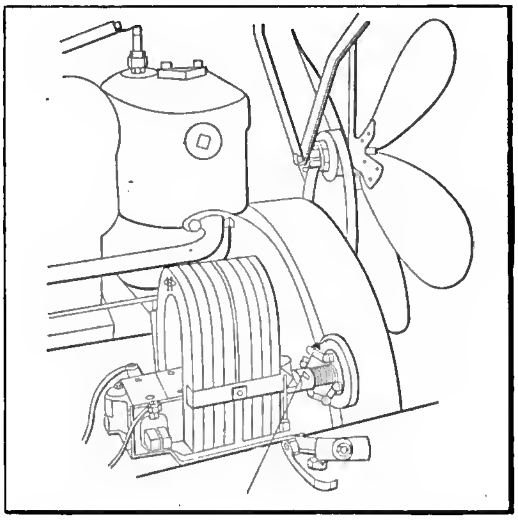


Fig. 1—Presenting details of end friction governor. Fig. 2—Showing method of applying end friction governor. Fig. 3—Type J. S. magneto, as attached to a Stevens-Duryea car.

IGNITION devices, as made by this company, are so contrived that, by means of a pulley drive, the magneto, in any given application, may be quickly and cheaply made to fit any existing automobile, thus doing away with the battery, or reducing it to a position of secondary importance. Many autoists, having failed to keep the battery system up to an efficient state, or, preferring to make a greater initial investment in the interest of diminished attention later on, employ this system. From the point of view of the makers of automobiles, it is equally available, and, in view of its ease of application coupled with a certain reliability, it is being taken up and used to an extent which is particularly noticeable.

With a view to presenting the system in its most simple form, advantage is taken of illustrations, in which Fig. 1 is of the J. S. type of magneto, as it was applied to a Stevens-Duryea car; Fig. 2 is an application of the magneto using a friction governor, and Fig. 3 shows the details of a governor, of which the maker has several designs, each one of which has a place in this class of work. Fig. 4 depicts the method of wiring which will afford the desired result considering a 4-cylinder, 4-cycle motor, and Fig. 5 presents the method of wiring when a jack-knife switch is interposed for the purpose of changing the polarity of the current, which is advantageous.

It is the claim of the maker that cork is the best material to use as the friction member in the pulley system, and this material is adapted as the standard. Fig. 2, which is the end-friction governor, is designed to keep the speed of the armature constant so that the voltage of the armature is substantially constant, although the speed of the crankshaft of the motor may change, as it does in service, over broad ranges. Besides this end-friction governor, there is a bevel type, and what is known as the "standard" type as well. The standard type of friction governor is provided with a flat-faced pulley, and contacts with the face of the flywheel of the motor. The proportion, that is to say, the diameter of the friction pulley as it relates to the diameter of the flywheel, must be considered in making an application, and, if the motor speed is a variable, as it is in automobile work, this fact must be taken into account. In ordering, if the purchaser will give the desired data, the maker will fix all the dimensions, and when the magneto is then placed, it will work without further adjustment.

FACTS IN RELATION TO THE DESIGN OF THE MAGNETO

The permanent magnets are of circular section, made of a special grade of magnet steel in which retentivity is realized to a maximum, and the strength of the magnetic field is high enough to assure the desired result. The armature is of the slotted type; windings are imbedded, and insulation is adequate for every emergency—the insulation is thoroughly protected by the slots. The armature spindle is of relatively great rigidity; it is 1-2-inch in diameter, and the bearings, which are of phosphor bronze, are allowed a sufficient projected area to last for a sufficiently long period of time to eliminate trouble from this quarter to a noticeable degree.

Lubrication is by means of a grease cup, involving the application of a steel ball which rides on the shaft and pinches off the supply of lubricant by resting on the seat of the cup. A dual system of brushes, which represent an unusual feature in magneto work, assures that at least one set of brushes will be in good electrical contact, unless it transpires that the care given the magneto takes on a characteristic which may better go by the name of positive and long-continued neglect.

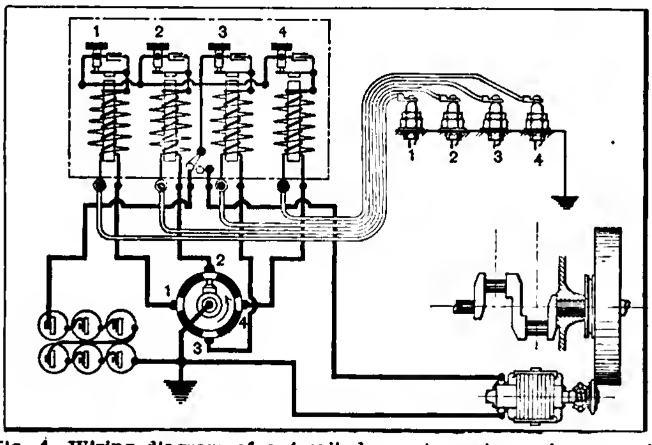


Fig. 4—Wiring diagram of a 4-cylinder motor using a jump-spark system

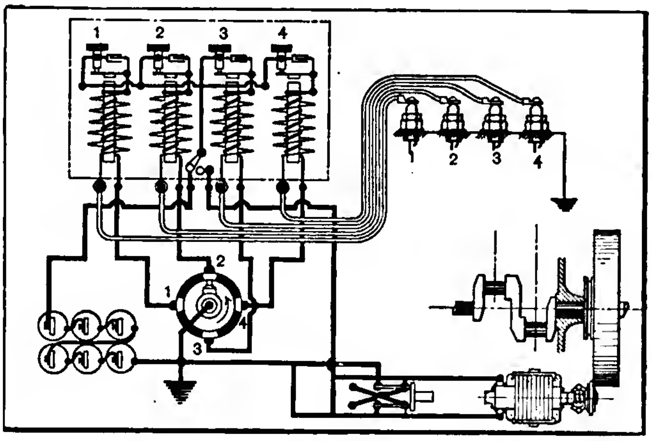
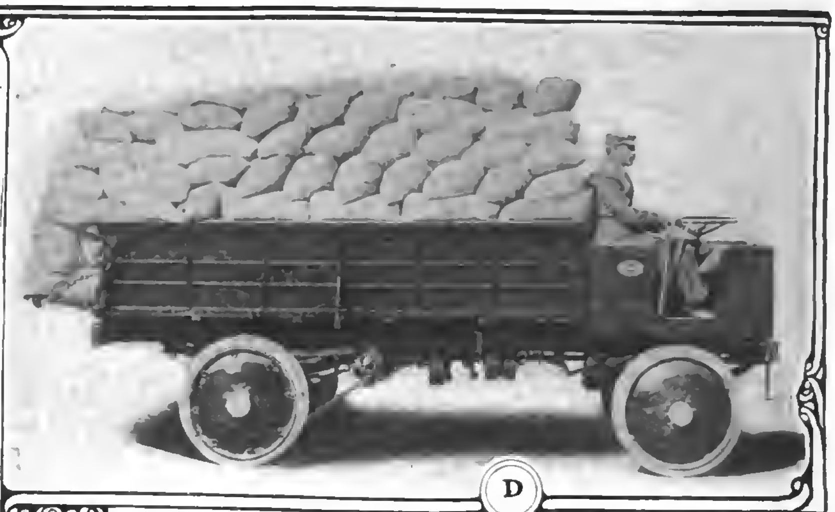


Fig. 5—Four-cylinder wiring diagram, with a polarity-changing switch

1910 COMMERCIAL

A



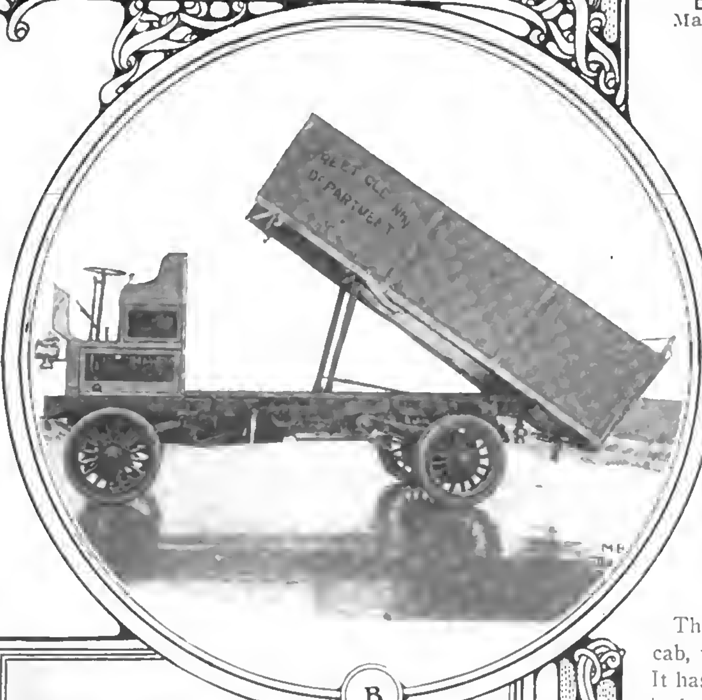
D

A—Hewitt Motor Company's 2-ton delivery wagon, used by Colgate & Company in the delivery of soap.

B—A Manhattan truck fitted out with a tilting body of steel, for use in the Street Cleaning Department. The body is shown tilted to the dumping position.

C—Franklin delivery wagon as used in Newburgh, N. Y., by John Schoonmaker & Son.

D—A big truck made by R. L. Morgan Company, of Worcester, Mass., with a load of cement in bags.



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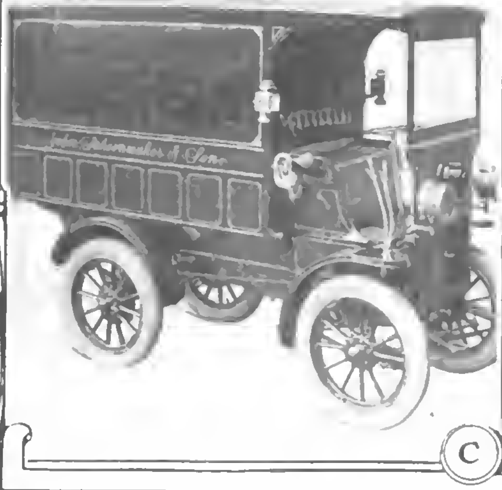


C

COMMERCIALS, as they are exhibited at Chicago, include eight forms of strictly business wagons and one taxicab, the latter being a Thomas. The commercial situation is better represented in the tables as published in THE AUTOMOBILE, issue of February 3, which includes 45 makes, including taxicabs. This branch of the automobile industry is rapidly assuming the importance it is entitled to, and it is predicted by those who have followed the commercial situation closely that it is now but a matter of little further experience on the part of users when they will be convinced of the desirability of utilizing commercial vehicles to the entire exclusion of animal-drawn wagons.' A few of the types of cars which are now in common use in commercial pursuits are here illustrated, they having been taken at random with the expectation of showing to what extent the commercial situation is spreading out, rather than to confine them to just the types of power wagons which are on parade at the show.

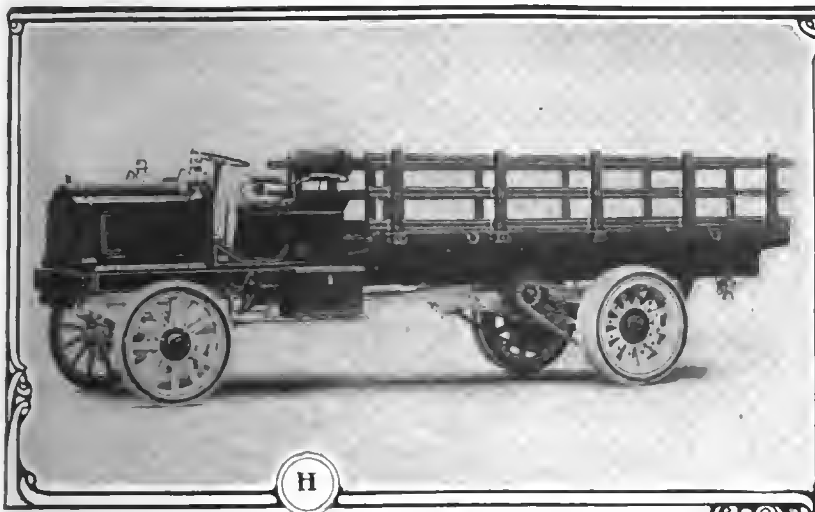
AMERICAN LOCOMOTIVE CO. PRESENTS THE ALCO

The Alco, in a commercial sense, is available as a model 16 taxicab, with a 24.8-horsepower motor, taking the A. L. A. M. rating. It has four cylinders, 100 by 120 millimeters bore and stroke, respectively, with a cellular type radiator, centrifugal water pump, Bosch magneto without auxiliaries, four-feed lubricating system, multiple disc clutch and three-speed selective transmission gear with reverse. The wheel base is 104 inches, with a 55 1-8-inch tread. Bearings are anti-frietion, excepting in crankshaft, and the tires are all 32 by 4.

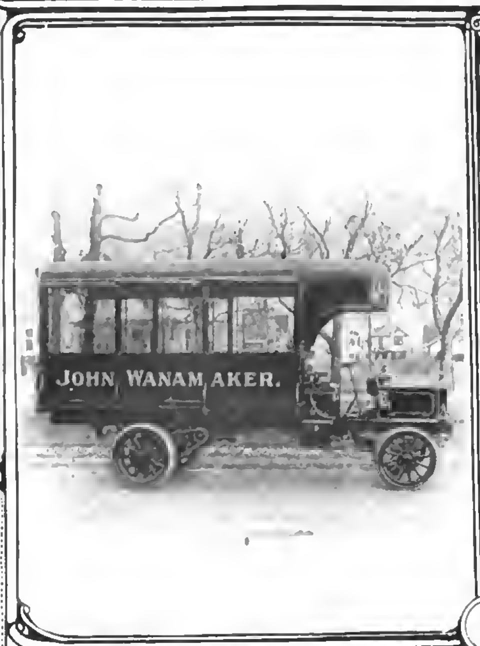
The Alco truck, which sells at $3,500, has the same size motor as in the taxicab, and the same motor details obtain throughout. The wheelbase is 110 inches, and it has a side-chain drive, whereas the taxicab has a shaft drive. The tires on the truck are 36 by 5 inches in front and dual 36 by 3 1-2 inches in the rear.

FRANKLIN OFFERS THREE TYPES OF COMMERCIALS THIS YEAR

This line includes Models L-1, L-2 and J-3. Each of these models is provided with the same size motor, which is four-cylinder, air-cooled, with a bore of 3 3-8 inches, and a stroke of 4 inches. The ignition is by Bosch magneto without auxiliary. The mechanical lubricator has four feeds; the multiple dise clutch works in conjunction with a three-speed transmission system, and the wheelbase is 83 inches for Models L-1 and L-2 and 100 inches for Model J-3. These cars weigh 1,750 pounds for Model L-1, 1,850 pounds for



H



E

E—Packard truck with a furniture body in the service of John Wanamaker.

F—Alco 3-ton truck with a 4-cylinder 24-horsepower motor, with a large and commodious platform.

G—Grabowsky truck with a double-opposed motor unit design, located in front, used for delivery by the New York "World" on hilly Staten Island.

H—Packard 3-ton truck with standard body, presenting a long platform, and ample room.

F

G

Model L-2 and 2,550 pounds for Model J-3. In view of the power supplied and the load carried, the weight is low.

GRABOWSKY HAS DEMOUNTABLE POWER PLANT

Grabowsky offers four models, but the motor is identical in three of them, namely: 101-A, 313-A and 505-A. This motor is a double-opposed type with a bore of 5 1-2 inches and a stroke of 5 inches. In the Model 507-A the bore is increased to 6 inches, but the stroke remains at 5 inches. The motor is mounted in front on a subframe, and is so contrived with its accessories in a self-contained relation that when the motor is unbolted the entire power plant may be shifted out to the front without disturbing the radiator, which latter equipment is located above and to the rear of the power plant. The radiators used are of the tubular type, but they differ from other radiators in that a steam compartment is introduced above the water level.

KNOX OFFERS A CAR FOR EVERY COMMERCIAL PURPOSE

The Knox line comprises seven distinct models, ranging in price from $1,400 to $4,300; the lightest model has a single-cylinder, 10-horsepower motor and the largest is provided with a four-cylinder motor with a rating of 48.4-horsepower A. L. A. M. This particular motor has a bore and stroke of 5 1-2 inches. Cylinders are individual; a cellular radiator in conjunction with a centrifugal pump provides for cooling, and a Bosch magneto in conjunction with a coil and storage battery is used in the ignition system. The lightest truck weighs 1,800 pounds, and the several sizes range in weight to the largest one which tips the beam at 5,600.

PACKARD IS PROVIDING LIBERALLY FOR TRUCK WORK

The best indication of Packard progress in the commercial line is that as represented by the large new plant, which is completed and being fitted out exclusively for the building of trucks. These trucks were especially designed, entirely disregarding Packard pleasure vehicles, and are intended to undertake the most severe service, on a basis of economy of maintenance, rather than to attempt to fix a low purchase price.

The Rapid line has four models, ranging from 20 to 48-horsepower A. L. A. M. rating; two of the models employ a double-opposed motor, and the two heavier trucks have four-cylinder motors, all being water-cooled. Tubular radiators and centrifugal pumps obtain, and ignition is by coil and storage battery.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—FOREIGN GASOLINE PLEASURE CARS

MAKE AND MODEL		BODY			MOTOR				COOLING		IGNITION				TRANSMISSION							BEARINGS				TIRES	
	Price	H.P.	Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Transmission	Axle	Weight	Front	Rear
Benz 18-22	$3500	15.9	Extra		4	80	120	Pairs	H'comb.	Gear	Eisem'n.	None	4 mech.	Cone	Sel.	3	Frame	Shaft 1	110	52	P. steel	3 plain	Ball	Ball	1,680	815x105	815x105
Benz 40-45	6250	35.8	Extra		4	120	145	Pairs	H'comb.	Centrif'l.	Bosch	Storage	8 mech.	Cone	Sel.	4	Frame	Shaft 1	129	56½	P. steel	3 plain	Ball	Ball	2,460	920x120	935x135
Benz 40-45	6250	35.8	Extra		4	120	145	Pairs	H'comb.	Centrif'l.	Bosch	Storage	8 mech.	Cone	Sel.	4	Frame	2-chain	124	56½	P. steel	3 plain	Ball	Ball	2,460	920x120	935x135
Benz 60-65	8500	45.2	Extra		4	135	150	Pairs	H'comb.	Centrif'l.	Bosch, 2	Storage	8 mech.	Cone	Sel.	4	Frame	2-chain	129	56½	P. steel	3 plain	Ball	Ball	3,020	920x120	935x135
Benz 60 Special	8500	32.8	Extra		4	115	175	Pairs	H'comb.	Centrif'l.	Bosch, 2	Storage	8 mech.	Cone	Sel.	4	Frame	Shaft 1	129	56½	P. steel	3 plain	Ball	Ball		920x120	935x135
C. G. V. 12-14	2500	15.9	Extra		4	80	120	Block	Tubular	None	Bosch	None	Pump	Cone	Prog.	3	Frame	Shaft 1	100	51	P. steel	3 plain	Ball	Ball	1,800	810x90	810x90
C. G. V. 16-20	3250	22.4	Extra		4	95	130	Block	Tubular	None	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 1	116	51	P. steel	3 plain	Ball	Ball	1,900	875x105	875x105
C. G. V. 18-24	4000	23.8	Extra		6	80	120	Pairs	Tubular	None	Bosch	Storage	Pump	Cone	Sel.	4	Frame	Shaft 1	116	51	P. steel	4 plain	Ball	Ball	2,000	875x105	875x105
Clement-Bayard	2500	15.9	Extra		4	80	120		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Prog.	3	Frame	Shaft	110		P. steel					810x90	815x105
Clement-Bayard	3000	20.1	Extra		4	90	120		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	4	Frame	Shaft	120		P. steel					870x90	875x105
Clement-Bayard	3500	24.8	Extra		4	100	120		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	4	Frame	Shaft	120		P. steel					870x90	875x105
Clement-Bayard	3750	23.8	Extra		6	80	120		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	4	Frame	Shaft	125		P. steel						
Clement-Bayard	4250	30.1	Extra		6	90	120		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	4	Frame	Shaft	135		P. steel						
Clement-Bayard	4250	35.8	Extra		4	120	140		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	4	Frame	2-chain	125		P. steel					915x105	920x120
Clement-Bayard	4750	37.2	Extra		6	100	120		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	4	Frame	Shaft	135		P. steel						
Clement-Bayard	4750	48.6	Extra		4	140	140		H'comb.	Centrif'l.	Bosch	Storage	Mech.	Disc.	Sel.	4	Frame	2-chain	130		P. steel					915x105	920x120
Darracq 25-35	4000	35.8	Tour'g.	5	4	120	120	Pairs	Tubular	Gear	Bosch	Storage	4 mech.	Cone	Sel.	4	Frame	Shaft 2	120	54	P. steel	4 plain	Ball	Ball	2,800	880x120	880x120
De Dion-Bouton	1600	6.2	Extra		1	100	130	Single	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	103½	50½	P. steel	2 plain	Ball	Ball		760x90	760x90
De Dion-Bouton	1800	11.0	Extra		4	66	100	Block	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	107	50½	P. steel		Ball	Ball		760x90	760x90
De Dion-Bouton	2200	6.2	R'bout.	2	1	100	160	Single	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	92	48	P. steel	2 plain	Ball	Ball		760x90	760x90
De Dion-Bouton	2250	14.0	Extra		4	75	120	Pairs	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	110½	50½	P. steel	3 plain	Ball	Ball		810x90	810x90
De Dion-Bouton	3500	24.8	Extra		4	100	130	Pairs	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	122½	55	P. steel	3 plain	Ball	Ball		880x120	880x120
De Dion-Bouton	4500	35.8	Extra		4	120	130	Single	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	130½	58	P. steel	5 plain	Ball	Ball		935x135	935x135
De Dion-Bouton	5500	40.2	Extra		8	90	125	Pairs	Tubular	Centrif'l.	Bosch	None	Pump	3-plate	Sel.	3	Frame	2-shaft	130½	58	P. steel	3 plain	Ball	Ball		935x135	935x135
Delaunay-Belleville	2800	17.9	Extra		4	85	120	Block	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	3	Frame	Shaft 1	118		P. steel					815x105	815x105
Delaunay-Belleville	3250	19.3	Extra		6	72	85	Threes	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	Shaft 1	123		P. steel					815x105	815x105
Delaunay-Belleville	3500	23.8	Extra		4	98	122	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	Shaft 1	123		P. steel					880x120	880x120
Delaunay-Belleville	4000	19.3	Extra		6	72	105	Threes	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	Shaft 1	128		P. steel					920x120	920x120
Delaunay-Belleville	5000	30.1	Extra		4	110	130	Single	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	2-chain	128		P. steel					880x120	880x120
Delaunay-Belleville	5100	35.7	Extra		6	98	122	Pairs	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	Shaft 1	138		P. steel					920x120	920x120
Delaunay-Belleville	6100	44.5	Extra		4	134	140	Single	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	2-chain	130		P. steel					935x135	935x135
Delaunay-Belleville	7000	49.2	Extra		6	115	130	Single	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	2-chain	144		P. steel					935x135	935x135
Delaunay-Belleville	10000	66.8	Extra		6	134	140	Single	H'comb.	Centrif'l.	Bosch	Storage	Pump	Cone	Prog.	4	Frame	2-chain	157		P. steel					935x135	1000x150
Fiat 12	2750	15.9	Extra		4	80	100	Block	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	Shaft 1	107	54	P. steel	3 plain	Ball	Ball	1,500	810x90	810x90
Fiat 18	3500	20.1	Extra		4	90	120	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	Shaft 1	120	54	P. steel	3 plain	Ball	Ball	1,900	810x90	810x90
Fiat 25	4500	30.0	Extra		4	110	130	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	Shaft 1	120	56	P. steel	3 plain	Ball	Ball	2,350	820x120	820x120
Fiat 45	5000	41.9	Extra		4	130	140	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	2-chain	126	56	P. steel	3 plain	Ball	Ball	2,500	920x120	920x120
Fiat 45	5250	41.9	Extra		4	130	140	Pairs	H'comp.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	Shaft 1	125	56	P. steel	3 plain	Ball	Ball	2,550	920x120	920x120
Fiat 45	6000	45.0	Extra		6	110	130	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	2-chain	130	56	P. steel	4 plain	Ball	Ball	2,650	920x120	920x120
Fiat 90	7500	41.9	Extra		4	130	190	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	2-chain	114	56	P. steel	4 plain	Ball	Ball	2,425	880x120	880x120
Hotchkiss Z	2850	15.9	Extra		4	80	110	Block	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	3	Frame	Shaft 2	109½	53	P. steel	3 plain	Ball	Ball	2,200	810x90	810x90
Hotchkiss T	3650	22.4	Extra		4	95	110	Block	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	4	Frame	Shaft 2	119	53	P. steel	3 plain	Ball	Ball	2,500	975x105	875x105
Hotchkiss X	4500	30.0	Extra		4	110	130	Pairs	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	4	Frame	Shaft 2	126	55	P. steel	3 plain	Ball	Ball	3,000	880x120	880x120
Hotchkiss V	6500	53.6	Extra		6	120	140	Pairs	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	4	Frame	Shaft 2	143½	55	P. steel	4 plain	Ball	Ball	3,500	920x120	920x120
Isotta-Fraschini	2750	10.5	R'bout.	2	4	65	100	Block	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Disc.	Sel.	4	Frame	Shaft 1	82½	49½	P. steel	2pl., 1bl.	Ball	Ball	1,450	810x90	810x90
Isotta-Fraschini	3500	20.1	Extra		4	90	120	Pairs	H'comb.	Centrif'l.	Bosch	None	3 mech.	Disc.	Sel.	4	Frame	Shaft 1	118	55½	P. steel	2pl., 1bl.	Ball	Ball	1,850	875x105	875x105
Isotta-Fraschini	4500	30.0	Extra		4	110	130	Pairs	H'comb.	Centrif'l.	Bosch	None	4 mech.	Disc.	Sel.	4	Frame	Shaft 1	120	55½	P. steel	2pl., 1bl.	Ball	Ball	2,150	870x90	880x120
Isotta-Fraschini	5600	41.9	Extra		4	130	150	Pairs	H'comb.	Centrif'l.	Bosch	None	4 mech.	Disc.	Sel.	4	Frame	Shaft 1	124	55½	P. steel	2pl., 1bl.	Ball	Ball	2,450	875x105	935x135
Isotta-Fraschini	5600	41.9	Extra		4	130	150	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	2-chain	124	55½	P. steel	2pl., 1bl.	Ball	Ball	2,400	875x105	935x135
Isotta-Fraschini	6500	41.9	R'bout.	2	4	130	150	Pairs	H'comb.	Centrif'l.	Bosch	None	4 mech.	Disc.	Sel.	4	Frame	2-chain	110	55½	P. steel	2pl., 1bl.	Ball	Ball	2,400	875x105	935x135
Isotta-Fraschini	7500	55.8	Extra		4	150	150	Pairs	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame	2-chain	128	55½	P. steel	2pl., 1bl.	Ball	Ball	2,700	875x105	935x135
Isotta-Fraschini	8500	52.2	R'bout.	2	4	145	120	Pairs	H'comb.	Centrif'l.	Eisem'n.	None	4 mech.	Disc.	Sel.	4	Frame	2-chain	118	55½	P. steel	2pl., 1bl.	Ball	Ball	2,500	870x90	880x120
Lancia 12-18	3000	20.1	Extra		4	90	100	Pairs	H'comb.	Centrif'l.	Bosch	None	Pump	Disc.	Sel.	4	Frame	Shaft 1	110	54	P. steel	3 plain	Ball	Ball	1,800	810x100	820x120
Lancia 20	3300	22.4	Extra		4	95	110	Block	H'comb.	Centrif'l.	Bosch	None	Pump	Disc.	Sel.	4	Frame	Shaft 1	115	54	P. steel	3 plain	Ball	Ball	1,800	810x100	820x120
Lancia 20 Special	3500	22.4	R'bout.	2	4	95	110	Block	H'comb.	Centrif'l.	Bosch	None	Pump	Disc.	Sel.	4	Frame	Shaft 1	105	54	P. steel	3 plain	Ball	Ball	1,800	810x100	820x120
Panhard-Levassor	5500	20.1	Limous.	7	4	90	130	Single	H'comb.	Centrif'l.	Eisem'n.	Storage	Pump	Disc.	Prog.	4	Frame	Shaft 1	115	56	P. steel	5 plain	Ball	Ball	2,900	875x105	875x105
Panhard-Levassor	6500	33.6	B. tonn.	5	6	95	130	Single	H'comb.	Centrif'l.	Eisem'n.	Storage	Pump	Disc.	Prog.	4	Frame	Shaft 1	115	56	P. steel	7 plain	Ball	Ball	2,700	880x120	880x120

NOTE—These tables are a continuation and conclusion of those published in the issue of February 3.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—FOREIGN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
Renault 10-12	$3500	12.2	Land't..	5	4	70	115	Block	Tubular	None....	Bosch	None....	5 mech..	Cone ...	Prog.	4	Frame..	Shaft 2.	99	53	P. steel..	2 plain..	Ball...	Ball...	1,800	810x90	810x90
Renault 20-30	5500	24.8	Tour'g.	5	4	100	140	Pairs..	Tubular	None....	Bosch	None....	5 mech..	Cone ...	Prog.	4	Frame..	Shaft 2.	120	55	P. steel..	3 plain..	Ball...	Ball...	2,800	915x105	920x120
Renault 18-24	5750	23.8	Land't..	5	6	80	120	Threes	Tubular	None....	Bosch	None....	7 mech..	Cone ...	Prog.	4	Frame..	Shaft 2.	120	55	P. steel..	3 plain..	Ball...	Ball...	3,500	875x105	880x120
Renault 25-35	5800	32.8	Tour'g.	7	4	115	160	Pairs..	Tubular	None....	Bosch	None....	5 mech..	Cone ...	Prog.	4	Frame..	Shaft 2.	128	55	P. steel..	3 plain..	Ball...	Ball...	3,500	915x105	920x120
Zust 20-30	3900	32.8	Extra..	..	4	115	120	Pairs..	H'comb..	Centrif'l.	Bosch	None....	5 mech..	Disc. ...	Sel...	4	Frame..	Shaft...	120	....	P. steel..	5 plain..	Ball...	Ball...	2,000	910x90	920x120
Zust 35-45	4750	41.9	Extra	..	4	130	140	Pairs..	H'comb..	Centrif'l.	M & B	None....	5 mech..	Disc. ...	Sel...	4	Frame..	Shaft...	128	....	P. steel..	5 plain..	Ball...	Ball...	.....	910x90	920x120

STEAM PLEASURE AND COMMERCIAL CARS

MAKE AND MODEL	Price	Body	Seats	ENGINE No. Cylinder	ENGINE Type	ENGINE Action	ENGINE Bore	ENGINE Stroke	ENGINE Valves	ENGINE Position	Boiler	Condenser	TRANSMISSION Change-gear	TRANSMISSION Speeds	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Engine	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
Lane "19"	$1250	Roadster...	3	2	Compound.	Double..	3½ & 5½	3½	Slide....	Middle...	F tube...	Yes...	None....	...	1-chain..	99	56	Channel.	Roller.	Roller.	Roller.	2,200	32x4	32x4
Lane "20"	1500	Touring....	5	2	Compound.	Double..	3½ & 5½	3½	Slide....	Middle...	F-tube...	Yes...	None....	...	1-chain..	103	56	Channel.	Roller.	Roller.	Roller.	2,400	32x4	32x4
Lane "21"	2400	Baby tonn.	4	2	Compound.	Double..	3⅞ & 6½	4	Slide....	Middle...	F-tube...	Yea...	None....	...	1-chain..	119	56	Channel.	Roller.	Roller.	Roller.	3,100	36x4	36x4
Lane "22"	2500	Touring....	7	2	Compound.	Double..	3⅞ & 6½	4	Slide....	Middle...	F-tube...	Yes...	None....	...	1-chain..	125	56	Channel.	Roller.	Roller.	Roller.	3,500	36x4	36x4½
Michigan D	4000	Truck, 3 t'n	...	8	Quadruple.	....	....	3	Slide....	Middle...	F-tube...	Yes...	Yes.....	1	2-chain..	140	66	Channel.	Plain.	Roller.	Roller.	4,500	4½	Dual.
Stanley "60"	850	Runabout..	2	2	Simple.....	Double..	3¼	4½	Slide....	Axle....	F-tube...	None..	None....	...	Gears....	104	56	Wood...	Ball...	Ball...	Ball...	1,500	34x3	34x3
Stanley R	1400	Roadster...	4	2	Simple.....	Double..	4	5	Slide....	Axle....	F-tube...	None..	None....	...	Gears....	114	56	Wood...	Ball...	Ball...	Ball...	2,000	36x3½	36x3½
Stanley U	1500	Touring....	5	2	Simple.....	Double..	4	5	Slide....	Axle....	F-tube...	None..	None....	...	Gears....	114	56	Wood...	Ball...	Ball...	Ball...	2,100	36x4	36x4
White O-O	2000	Touring....	5	2	Compound.	Double..	2½ & 4½	3	Joy.....	Front...	Flash....	Yes...	Sliding..	2	Shaft 2..	110	56	P. steel..	Ball...	Ball...	Ball...	2,300	32x4	32x4
White M-M	4000	Touring....	7	2	Compound.	Double..	3 & 5	4½	Joy.....	Front...	Flash....	Yes...	Sliding..	2	Shaft 2..	122	56	P. steel..	Ball...	Ball...	Ball...	3,600	36x4	36x5

ELECTRIC COMMERCIAL CARS

MAKE AND MODEL	Price	BODY Type	BODY Tons	MOTOR Number	MOTOR H.P.	MOTOR Location	BATTERIES Type	BATTERIES No. Cells	BATTERIES Location	SPEEDS Forward	SPEEDS Reverse	First Reduction	Drive	Wheelbase	Tread	Frame	BEARINGS Motor	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES (Solid) Front	TIRES (Solid) Rear
Buffalo T	......	Ambulance...	...	Two	....	Rear...	Option, 11-plate	42	Middle...	4	4	Gears.......	Double chain.	....	....	Channel...	......	......	......	.....	34x2½	34x2½
Buffalo O	......	Express.....	1	Two	....	Rear...	Option, 13-plate	42	Middle...	4	4	Gears.......	Double chain.	....	....	Channel...	......	......	......	.....	36x3½	36x3½
Buffalo F	......	14-passenger.	...	Two	....	Rear...	Option, 13-plate	42	Middle...	4	4	Gears.......	Double chain.	....	....	Channel...	......	......	......	.....	36x3½	36x4
Buffalo S	......	Truck.......	5	Two	....	Rear...	Option, 19-plate	42	Middle...	3	3	Gears.......	Double chain.	....	....	Channel...		......	......	.....	36x5	36x6
Lansden 356	$1950	Rack H......	2	One.	3.4	Rear...	Edison A-4.....	45	Middle...	3	2	Chain.......	Double chain.	120	52	Armored...	Plain...	Plain...	Plain...	2,750	18x6	24x6
Lansden 76	2550	Panel E......	½	One.	3.4	Rear...	Edison A-4.....	60	Middle...	4	2	Chain.......	Double chain.	88	56	Armored...	Plain...	Plain...	Plain...	2,700	32x2½	32x2½
Lansden 186	2650	Panel E......	¾	One.	3.4	Rear...	Edison A-4.....	60	Middle...	3	2	Chain.......	Double chain.	88	56	Armored...	Plain...	Plain...	Plain...	3,000	32x3	32x3
Lansden 86	3150	Express A....	1½	One.	4.5	Rear...	Edison A-6.....	60	Middle...	3	2	Chain.......	Double chain.	100	66	Armored...	Plain...	Plain...	Plain...	3,850	32x3½	32x3½
Studebaker 251	1825	Panel.......	½	One.	2	Rear...	Exide 11 MV...	26	Middle...	4	4	Gears.......	Double chain.	74	58	Angle.....	Plain...	Ball....	Ball....	2,775	36x2½	42x2½
Studebaker 20	2300	Panel.......	...	Two	1½	Rear...	Exide 9 MV...	44	Middle...	4	4	Gears.......	Double chain.	91	56	Angle.....	Plain...	Plain...	Plain...	3,800	36x3	42x3
Studebaker 27	2800	Express.....	...	Two	3½	Rear...	Exide 13 MV...	44	Middle...	4	4	Gears.......	Double chain.	104	58½	Angle.....	Plain...	Plain...	Plain...	5,500	36x4	42x4
Studebaker 2024	3250	Stake.......	...	Two	3½	Rear...	Exide 15 MV...	44	Middle...	4	4	Gears.......	Double chain.	117	64½	Angle.....	Plain...	Plain...	Plain...	7,070	36x5	36x3½d
Studebaker 28.1	3850	Stake.......	...	Two	3¾	Rear...	Exide 17 MV...	44	Middle...	4	4	Gears.......	Double chain.	127	75	Angle.....	Plain...	Plain...	Plain...	8,900	36x5	42x4d
Studebaker 24	4500	Stake.......	5	Two	3¾	Rear...	Exide 19 MV...	44	Middle...	4	4	Gears.......	Double chain.	132	69¾	Angle.....	Plain...	Plain...	Plain...	10800	36x7	42x4d

LATEST KNIGHT DEVELOPMENTS

SILENCE commends itself, at least in automobile construction, and the combination of silence with increased efficiency is one that every automobile designer in the country is striving to obtain. The attainment of this combination, to a very considerable degree, is the claim of the Knight motor, and that the claim is justified, a year's service of stock models in the hands of ordinary purchasers has amply proved.

The first public appearance of the Knight slide valve was at the Chicago show of 1906, where a car was exhibited by Knight & Kilbourne. This car was illustrated and described in THE AUTOMOBILE, February 15, 1906. Quite a little comment was excited, by no means all of it favorable, and it is not believed that the actual sales were sufficient to increase noticeably the manufacturer's bank account. Like many another novelty, interesting for the moment, the Knight motor had almost been forgotten when in the early part of 1908 announcement was made that it had been adopted by the Daimler Motor Company, of Coventry, England, one of the oldest and supposed to be one of the most conservative of British manufacturers.

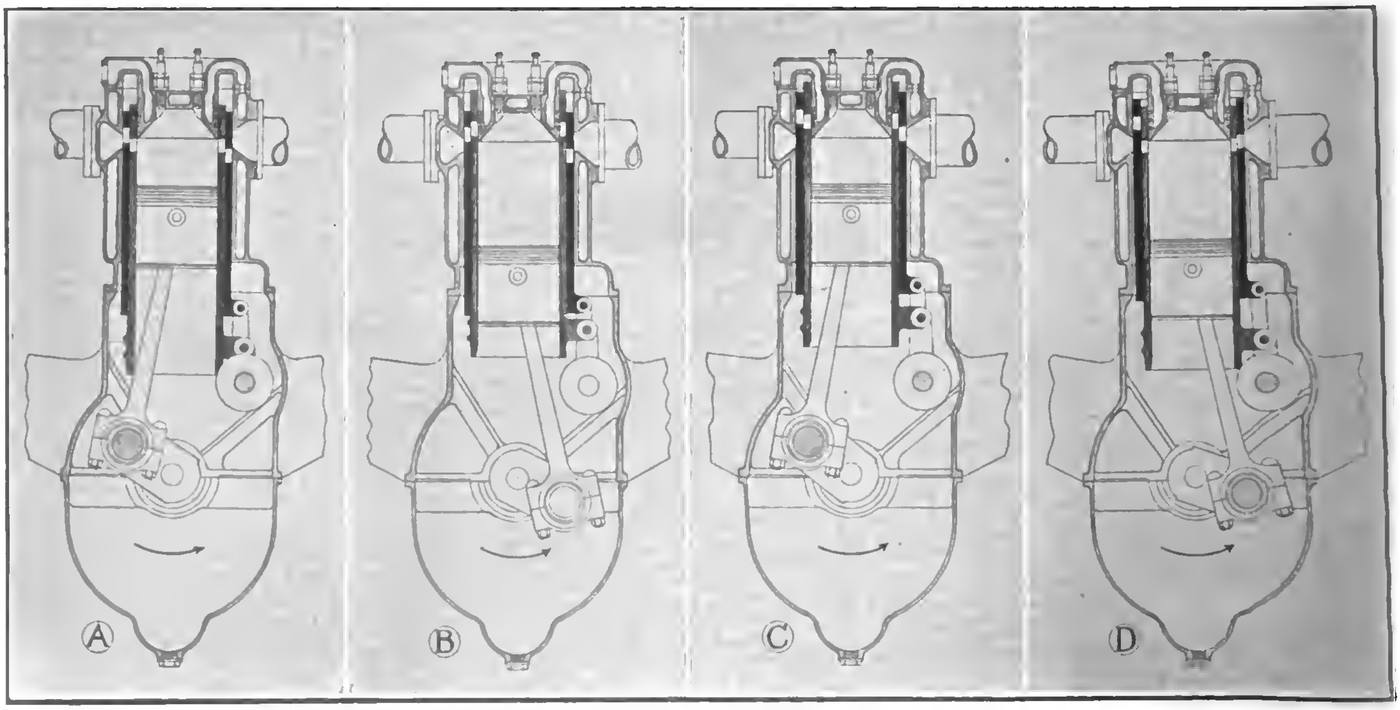
True to its word, the Daimler Company used the Knight valve system on all of its 1909 product, and these cars are in use with great success, both in England and on the Continent. Further, the Minerva Motor Company, of Antwerp, Belgium; Panhard & Levassor, of Paris, France; the Daimler Motoren Gesellschaft, of Untertuerckheim, Germany, which makes the Mercedes, and the Deluca Daimler Company, of Naples, Italy, have all received from Mr. Knight permission to use his valve system, and it is a matter of positive knowledge that four prominent American makers are experimenting with it, one having six cars so equipped actually on the road.

Most people interested in automobile design know that the Knight valve system consists of two concentric sleeves or liners in each cylinder, which move up and down and thereby open or close ports in the cylinder walls which act as inlet and exhaust valves. The exact operation of these sleeves, however, has been more or less a mystery. This is not unnatural, for the movements are much more complex than those of an ordinary poppet valve system. With this in view, the Daimler Company has had made and sells at one shilling sixpence an ingenious cardboard working model of the Daimler-Knignt motor. Drawings from this model in four typical positions are shown herewith.

The inlet and exhaust ports in the cylinder wall are diametrically opposite. Each sleeve has in it two slots, one for the inlet and one for the exhaust. It is obvious that to secure the valve opening the slots in the two sleeves must simultaneously register with each other and with the port in the cylinder wall. The inlet and exhaust slots in the inner sleeve are on the same level; on the outer sleeve the inlet slot is considerably above the exhaust slot. The sleeves are moved up and down by eccentrics on a shaft corresponding to the camshaft of an ordinary motor.

The crucial point is the timing of these eccentrics, and the corresponding movements imparted to the sleeves with respect to each other and to the cylinder. The inner sleeve reaches its highest point at the beginning of the expansion stroke, and its lowest point consequently at the end of the exhaust stroke and the beginning of the inlet stroke. The outer sleeve, on the other hand, is about half a revolution away from the inner one; it reaches its highest point at the end of the expansion stroke and its lowest at the end of the suction stroke. At the highest point in the travel of the outer sleeve its exhaust slot is approximately in registry with the exhaust port of the cylinder, and at its lowest point registers with the inlet port. The inner sleeve, on the contrary, has both of its slots in registry with their ports when it is at the bottom of its stroke.

It is now possible intelligently to follow the motor througb an entire cycle. Beginning with the inlet stroke, the inner sleeve has its port in line, and the opening is affected by the downward movement of the outer sleeve, bringing its slot into line. Then both sleeves move upward together at the end of this stroke. This upward movement leaves the exhaust slot of the outer sleeve in line with the exhaust port. During the expansion stroke the inner sleeve is moving downward, and the exhaust opening is effected when its slot comes into registry with the other two. Then, while the inner sleeve stands still, the outer sleeve begins a downward movement which results in the



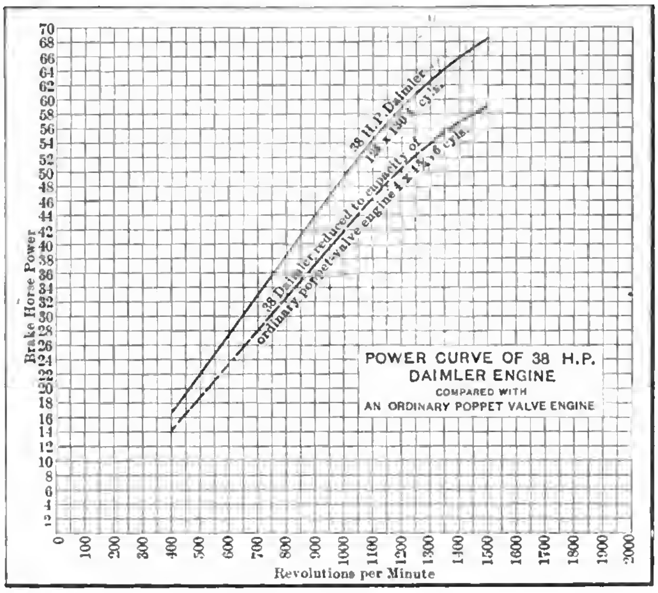
Section Through Knight Motor, Showing at A Inlet, at B Compression, at C Firing, and at D Exhaust

closing of the exhaust port and the opening of the inlet.

The most enthusiastic advocates of the Knight system do not claim that it is simpler than the poppet valve mechanism. To the two poppet valves in each cylinder correspond the two sleeves; these must be ground with the utmost accuracy on both the inner and outer walls. The camshaft is replaced by the eccentric shaft, and the valve tappets by the connecting rods between the eccentrics and the sleeves which they actuate. Springs, however, are dispensed with. In addition, the Knight motor cylinder must have a removable head fitted with three additional packing rings, to keep tight the joint between the head and the inner sleeve.

First of the objections offered against this construction is the difficulty of lubricating the sliding sleeves. This difficulty on the face of it seems considerable; yet the best evidence possible to quote in proof that it has been overcome is the successful use of stock cars for a year and more. Although it is not known just what provision the Daimler Company has made in this respect, at least one of the American concerns at present experimenting with the motor has worked out a scheme whereby the cylinder lubricating oil is forced to pass between the sleeves on its way to the piston. It should be remembered that the speed of the sleeves is only about one-fifth that of the piston, and that no thrust is exerted on them by the explosion save that resulting from the angularity of the connecting rod. This is one of the principal differences between the Knight system and other kinds of slide valves and rotary valves, in which any pressure in the cylinder means an equal lateral pressure of the valve against its seat.

In the size of its valve openings the Knight motor is superior to those using poppets. It is customary to speak of a poppet valve as being so many inches in diameter, and to an untechnical mind a poppet valve two inches in diameter has little to distinguished it from an open hole of the same diameter. Actually a poppet valve offers but a narrow slit or opening, and when the valve is in a pocket this slit is effective only on the side nearest the cylinder bore. On the Knight motor the slit is of double or triple the width, and directly in the cylinder wall.



Power Curve of 38-Horsepower Knight Engine

Indicator curves taken from Knight motors show a very perfect expansion line; the increase of pressure following ignition is not sudden or excessive, and the pressure falls off with more regularity and uniformity than in poppet-valve motors. The mean effective pressure is claimed to be in the neighborhood of 100 pounds to the square inch, as against say 70 pounds for the ordinary motor. Although it is difficult to assign a wordy reason, the fact remains. Further, the Knight motors show a far more uniform relation of power and speed than usual. Their power curves are practically straight lines, and it has often been found impossible to reach the peak of the curve in tests, without serious danger of injury to the mechanical components of the motor. No better demonstration could be asked of the efficiency of the valves, considered as a method of transferring gases.

FOREIGN CARS STILL HOLD THEIR AMERICAN MARKET

ALTHOUGH the foreign cars sold in this country no longer maintain their former position of haughty superiority, American designers cannot suppose that there is nothing to be learned from the invaders. In details of construction which reveal thought and experience, as well as in more prominent features, the foreign cars which have been exhibited at the various shows have much that is of interest.

In the domain of light town cars Fiat is building a chassis of 12 horsepower, nominal, which for this purpose could hardly be surpassed. The motor has four cylinders 80 by 100 millimeters (3.15 by 3.94 inches), cast in a block, with all valves on the left side. The hood is very short, so that with a wheelbase of 107 inches there is ample room for an extension coupé body with wide doors; at the same time the radiator does not project over the front axle. There are no levers on top of the steering wheel, the spark being fixed and the throttle controlled solely by a foot button.

The smallest four-cylinder motor on the market in this country is the Isotta, used in their runabout built under the French voiturette rules. Its bore and stroke are 65 and 100 millimeters (2.56 and 3.94 inches) respectively. Isotta, like Fiat, has not quite decided the chain versus shaft drive question to its own satisfaction, and has some of each.

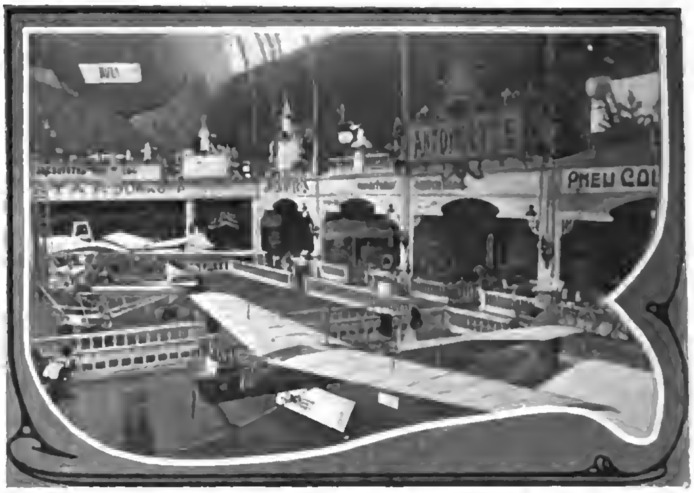
De Dion-Bouton is a prominent exponent of the single-cylinder motor for light runabouts, and has two models of this type. One of these is a standard design with bore and stroke of 100 and 130 millimeters (3.94 and 5.12 inches) respectively; in the other, built under voiturette rules, the stroke is 160 millimeters (6.30 inches). The latter is a remarkably fast car, and can take the measure of many four-cylinders of greater rated power.

Going to the opposite extreme, De Dion is building an eight-cylinder car of remarkably heavy and solid construction, with axles and frame which recall commercial practice. All De Dion models have two distinctive features, the three-plate clutch and the double shaft drive. In the latter, the gear-box and differential are exactly the same as for a car with double chain drive, but are located so that the jackshaft is just over the rear axle. The shafts which should carry the sprockets on their outer ends, are instead provided with two universal joints each and project directly into the hubs of the wheels, as in the regular full-floating rear axle. The axle itself is a solid I-beam.

Two models are featured by Panhard for American service, a four-cylinder town car and a six-cylinder touring model. The touring car has its cylinders cast separately but bolted together into a semblance of a block construction; the idea is exactly the same as that embodied on two well-known American cars.

Six-cylinder motors with the cylinders cast in threes are much favored in foreign practice, although the only American maker who tried this construction dropped it after one year. Those using the triplet cylinders are Delaunay-Belleville, on two models, and Renault on one. All of these are very small motors, the Delaunays being 72 by 85 millimeters (2.84 by 3.35 inches) and 72 by 105 millimeters (2.84 by 4.14 inches), respectively, and the Renault 80 by 120 millimeters (3.15 by 4.73 inches).

FROM THE EUROPEAN MAIL



Antoinette Exhibited Its Graceful Monoplane at Brussels

FRENCH AUTO SALON ASSURED FOR 1910

PARIS, Feb. 2—It is now practically certain that there will be an automobile show in Paris this year, for the constructors who eighteen months ago voted against the annual exhibition have just voted in private for the renewal of the interrupted annual event. When they voted against the show the constructors formed part of an association under the auspices of the Automobile Club of France, in which they had as companions accessory manufacturers and dealers, tire manufacturers, body makers and a host of others who figured largely on the voting list, although being comparatively unimportant financially. It was only by forming a solid body, and refusing to exhibit despite the vote that the automobile manufacturers had their way.

No date has yet been fixed for the show, nor have any regulations been drawn up. It is probable, however, that the event will be held late in November or early in December. It is impossible to hold it earlier, for the aeronautical manufacturers, who are also holding a show under their direct management, without the aid of outside club or association, have secured the Grand Palais in the Champs-Elysées from October 15 to November 2.

Dirigible "Belgica," a Feature of the Brussels Salon

MANY FRENCH FACTORIES INUNDATED

PARIS, Feb. 2—More than any other industry has the automobile suffered by the floods in the Seine valley. At least three-quarters of the automobile factories of France are clustered on the low-lying banks of the Seine in the northwestern suburbs of Paris. When the river overflowed its banks and worked into the basements of all the factories, extinguishing the fires, nothing remained to be done but to close the doors. In several cases, indeed, the doors have been barricaded by water, making it impossible to enter the factory except by boat. Practically the only large firm not having suffered, and not likely to suffer, by the flood is Panhard & Levassor, whose factory is on high ground.

Renault was one of the first to close the doors of its factory, thus throwing 2,500 men out of employment. Voisin, the aeroplane constructor, being separated from the river by the width of the roadway only, was an early sufferer. Esnault-Pelterie, although further inland, soon had to abandon work. At Puteaux the Darracq, Unic, Saurer, Vinot-Deguingand, De Dion-Bouton, Mercedes, and Charron shops have all had to be closed. Among the body makers who are adversely affected are Védrine and Kellner. On the opposite bank of the river the Clément-Bayard works have only been kept open by the use of three powerful pumps and a brick wall hastily built to keep out the water. Santos-Dumont's private workshop is surrounded by a sheet of water and has had to be abandoned. The Antoinette aeroplane works have had to be closed owing to the impossibility of reaching them through the surrounding water.

IMPERIAL PATRONAGE FOR RUSSIAN SHOW

PARIS, Feb. 2—Russia will hold an automobile show for the third time in the Michel Riding Hall, St. Petersburg, from May 28 to June 9. The first event took place in 1907, the second in the following year, and the third is to be held after an interval of 24 months. The automobile outlook is promising in the land of the Czars, as there is a very large section of the wealthy population eager to take to the new mode of locomotion. The authorities are well disposed toward the automobile industry, and the main highways are being rapidly improved, primarily for military purposes, but at the same time for the benefit of the new industry. As a proof of the favor with which the automobile is regarded in high quarters, the Automobile Club of Russia has been given the right to incorporate the word "Imperial" in its title.

Maurice Clement on a Santos Made in the Clement Factory

Leblanc in Flight at the Aviation School at Pau, France

FRANCE MAKES TROUBLE OVER AERO DATES

PARIS, Feb. 2—Because an aeronautical meeting in England appeared to clash with French interests, the Commission Aerienne Mixte, the governing body in France, called a meeting, revised the calendar drawn up by the International Federation, and set it up to the superior body with the threat that it must be accepted in place of the list of events drawn up a week before.

The new calendar had struck out the English meeting, originally announced for July 11 to 16, and so modified the French dates that there was practically a continuous aviation meeting, under different managements, from June 19 to August 21. Although the second English meeting was allowed to retain its date from August 6 to 13, a French meeting organized by an enterprising Parisian newspaper was allowed to have exactly the same date. As no French aviator can take part in the first boycotted English meet, and is not likely to want to take part in the second one, in view of the greater attractions in his own country, the position allotted to England is not a very important one.

Naturally John Bull is furious, declaring that July 11 to 16 having been granted him, he will not release it without a struggle. If the International Federation decides for England, France will withdraw; if, on the other hand, it decides for France England will find herself in the impossibility of holding any meeting of more tban local importance. Whatever the justice of the case, victory appears to lie with France, for as she possesses practically a monopoly of aviators she can either enforce her wishes or defy the international body.

Tbe trouble arises from the fact that the Rheims authorities, the Automobile Club of France, and the Brussels aeronauts wish to work together with a series of meetings following one another without a break. As soon as the Rheims program has been pulled off, there will be a cross-country flight through the champagne country, over the northeast of France, and the Belgian frontier, to Brussels, the event being under the control of the Automobile Club of France.

The revised program comprises 11 international events, each having an assured prize list of not less than $40,000, and 16 national events offering smaller amounts in prizes. The total amount offered in prizes at these public meetings is $675,000.

M. BALSAN REMODELS HIS BLERIOT

PARIS, Feb. 2—Léon Delagrange's untimely death, as the result of flying a Blériot with a Gnome motor, has not prevented other aviators from employing the same combination. One of the most interesting of tbese has been brought forth by Jacques Balsan, who has replaced his 25-horsepower Anzani with a 50-horsepower revolving Gnome, and as a consequence increased his speed about 20 per cent. Unlike the Delagrange outfit, however, the Balsan aeroplane has been specially designed for the greater strain under which it will work. The four longitudinal frame members forming the main body of the aeroplane are united by two steel girder work crosses, one at the forward extremity and the other a little further to the rear. The motor is carried between these two, the external ball bearings of the crankshaft being in the center of the metallic cross. The propeller is mounted directly on the end of the projecting shaft.

A circular sheet-metal screen surrounds the radiating cylinders, at the same time concentrating the current of air on the motor and preventing the splashing of oil in the face of the pilot. Up to the present this has been one of the minor disadvantages of the Blériot aeroplanes, the pilots often being obliged to descend owing to the blinding spray of oil. The attachment of the wings to the body has been considerably strengthened and the wing-warping cables made more powerful.

Jacques Balsan and His Rebuilt Bleriot with Gnome Motor

ROCHESTER-SYRACUSE RUN MEETS SUCCESS

ROCHESTER, N. Y., Feb. 4—Of the twenty cars that left here on Wednesday morning as participants in the second winter endurance run of the Automobile Club of Rochester to Syracuse and return fifteen checked back last night with absolutely perfect scores. Still more remarkable—of the five penalties imposed not one was due to mechanical trouble unless cracked spark plugs be so called. Entry No. 5, a Model T Ford, with Claud Darling driving, was penalized for a broken porcelain and the consequent time consumed in making a change. The other four, Cadillac "30," No. 2, Ray Bettys driving; Selden, No. 6, William T. Barry, Jr., driving; Gaeth, No. 8, D. C. Anderson driving, and Maxwell Model "A", No. 24, Harry Veltz driving, were each penalized because of stalled motors.

The penalty inflicted upon the Selden was certainly one that

Chalmers "40" Held Up by Pace-Maker Amid Snow-Drifts

might well be termed hard luck. The car was perfect in every respect and had driven up to within 20 feet of the checking-out line and was standing idle with the motor running. In answer to the checker's signal to come ahead the clutch was slipped in, and at almost the same instant, the front wheels sank into deep snow with just enough jar to stall the motor. The little Maxwell also belongs in the same class, for the penalty imposed in this case was due to another contestant backing into the little car and thus causing Veltz to stall the motor.

The pacemaker was a Palmer-Singer 6-60, driven by Bert Van Tuyle, secretary of the Rochester club. The press car, entered at the last moment, was an Oldsmobile 4-cylinder, owned and driven by Thomas J. Northway, one of the prominent dealers of Rochester. This car was also of considerable value in assisting the pacemakers in opening the terrible roads. With representatives of THE AUTOMOBILE and MOTOR AGE in this car, were also, Walter A. Stewart, of the Rochester *Times*, and E. R. Partridge of the Rochester *Herald*.

In point of miles the run was short, being but a little over 200, going and coming from Syracuse, but there is no doubt in the minds of any of the participants but that the mileage covered offered more severity than three or four times the distance under ordinary conditions.

Starting Wednesday morning the run to Clyde was easy, as the roads were well cleared, but from Clyde through to Syracuse that afternoon, mere words seem but weak expression of conditions encountered. In two different places it was necessary to tear down farm fences, fill deep ditches with fence rails after digging out many feet of snow, and take to the farmers' fields for over a mile. Then, in the middle of one field, another deep ditch was encountered, and it required an hour for about thirty men with shovels and picks to clear out the ditch and fill it with solid rails.

On the return from Syracuse Thursday over the southern roads via Auburn and Geneva, the most terrible weather conditions were the rule. Early in the morning it started to rain; within the hour it was snow, and within two hours the thermometer had dropped to below twenty. Add to this a driving gale, bearing down from the northwest, squarely into the faces of the drivers, and some idea may be gleaned of the hardship of that second day's trip. Goggles were unavailable because of the snow, and after some of the boys had cut their faces to the point of bleeding, veils were bought and wrapped around the heads of the drivers.

Those cars with perfect scores will have to participate in another run, according to the rules of the contest.

ENTRANTS OF ROCHESTER-SYRACUSE ENDURANCE RUN

Order of Starting	Makes of Automobiles	Driver	Score
1	Chalmers 40	J. W. Ellis	1000
3	Cadillac 30	Edw. Martin	1000
4	Ford T	Fred Rockleman	1000
7	Selden	Jack Harrigan	1000
9	E-M-F	F. W. Peck	1000
10	Franklin	John Burns	1000
14	Cunningham	W. Kelman	1000
15	Cunningham	H. Holton	1000
16	Maxwell K	George Bower	1000
17	Pullman	Ray Hollis	1000
18	Speedwell	W. Holtzmiller	1000
19	Chalmers 30	Jack Ward	1000
20	Oakland	Dick Geyer	1000
21	Chalmers 30	H. A. Strickland	1000
22	Selden	Hector Carmella	1000
2	Cadillac 30	Ray Bettys	999
6	Selden	W. T. Barry Jr	999
8	Gaeth	D. C. Anderson	999
24	Maxwell A	Harry Veltz	999
5	Ford T	Claud Darling	990

Palmer-Singer Pace-Maker Arriving at the Clyde Control

Cadillac Number 2 Checking Out, with Others Ready

NEW MOTOR OF MERIT IN ACCESSORY FIELD

SO GREAT has been the demand for accessories, and in particular what might be called the major accessories, exceeding by far the supply, that the entry of any well-equipped firm into this line will be welcomed by all makers of automobiles not building every part in their own shops—and their number is legion. So it is, that the entry of the Chester Engineering and Machine Company, of Chester, Pa., into the accessory field with a pair of very neat block engines, will be singularly welcome. This firm, located at Front and Penn streets, in Chester, has a large and well-equipped shop, the whole extent of which is now being turned over to the construction of automobile and marine engines, whereas previously, a number of other parts were built. This previous experience is of value, in that the firm is not to be classed with the untried and untested.

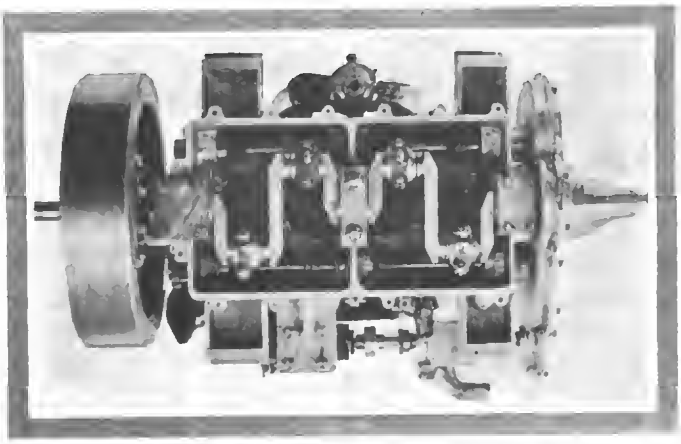
Two models of engines will be built, these varying mainly in size, the design being common to both. This motor is known as the Penn, and is of the four-cylinder, block type, with tee heads. The smaller engine is illustrated herewith, the size of this being 3 9-16 in. bore by 4 3-4 in. stroke. In adopting the block construction and the very long stroke, the firm has shown a commendable knowledge of the latest in motor design, both at home and abroad. This bore and stroke give a ratio of 1 to 1.33, which is above the average of long strokes, and very close to the highest ratio now in use in this country. This very long stroke should result in the development of power at very low speeds. Since this is easy on bearings and other wearing parts, the result to the user should be long life, and small upkeep expense, as well as fuel economy.

Despite the compactness of the block construction, the crankshaft has three bearings, the middle one being fairly liberal considering the circumstances. The end bearings, on the other hand, are very long, so that the total length or area of bearing surface is very large in relation to the size and power of the engine. Although of the block type of casting, the space between the lower parts or barrels of the cylinders is not solid metal, but is cored out, thus securing lightness and superior cooling ability.

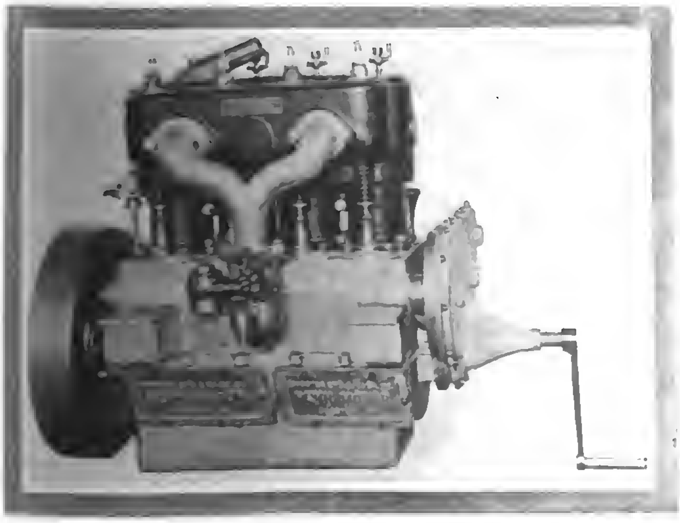
Power rating is according to the usual formula, so that the engine is called a 19.6 horsepower unit. As a matter of fact, however, the engine develops over 20 at 1,100 and has developed as high as 26.8 horsepower at 1,200 revs. This extreme power output is rendered possible by large valves, the size of the clear valve opening for this small engine being 2 in., which is far in excess of that usually considered as a maximum, namely, half of the cylinder diameter. The latter figure in this case would be but 1 3-4 in., so it is seen that the valve size is very unusual. Large valves give a low lift for the same volumetric area of opening, which, in turn, makes for extreme quietness. This is one of the factors which have made this motor very silent in its action.

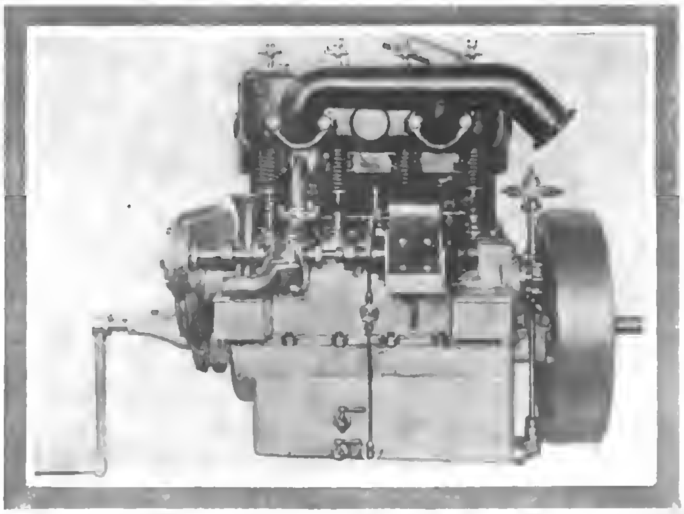
Cooling is by centrifugal pump, although the proportioning of the water pipes was done with the idea in view of utilizing thermo-siphon cooling when so desired. The pump is located on the right-hand side, together with the magneto. The latter is supplied as regular equipment. Lubrication is by the constant level splash system, the level being adjustable by means of a handy screw. This allows the driver of the car to regulate the amount of oil used, a feature not present in other engines.

One feature not observable in the pictures shown, is the starting crank arrangement. This is such that the cranking handle is always held in one position, at the left. When desired to crank the engine over, it is simply pushed into engagement. When the cranking is concluded, the crank may be allowed to swing, as it will automatically check itself, and catch at the left in the usual position. This is a far superior arrangement to a strap, which necessitates loosening and removal for use, and loosening and replacement after use.


Magneto Is Conveniently Located on the Exhaust Side

A larger motor is also built along very similar lines, in fact, to the same design. The size of this prime mover, rated at 30 horsepower, is 4 1-4 in. bore by 4 3-4 in. stroke. This is comparatively shorter than the small engine, but still long enough to bring it into the long stroke class. This motor, too, is of the block type, with tee-head cylinders and 3 crankshaft bearings.


Inlet Side of Penn Motor, Showing Carbureter and Pipe


View from Beneath, Lower Half of Crankcase Removed

ANOTHER CHAPTER OF GOSSIP FROM DETROIT

DETROIT, Feb. 7—Further evidence of the prosperity being enjoyed by automobile interests is furnished by the increase in capital stock from $1,800,000 to $2,500,000 just announced by Morgan & Wright Company, manufacturers of tires and rubber goods. The firm established its plant in Detroit in 1906, and J. C. Butler, president, declares the demand for automobile tires, principally in Detroit, is responsible for the increase in capitalization, all of which has been paid in cash.

In this connection figures compiled by the official statistician of the Detroit Board of Commerce furnish a striking object lesson in the growth of the automobile business locally, and what it means to the hub of the industry. During the year just closed there was an increase in capital in the various corporations, including new ones to enter the field, from $5,700,000 to $15,200,000. During the same period there was an increase of employees from 8,430 to 14,900. During the year 45,500 cars were built in local plants, with a valuation of $54,300,000, compared with a total valuation of $23,600,000 in 1908.

The Dominion Motors Company, Ltd., has been organized, and will establish a plant in Windsor, just across the border on the Canadian side. Detroit and Canadian capital is financing the enterprise, and experienced automobile men from this city will be in charge of affairs. Operations will be commenced at once, and it is hoped to build 250 cars the first year, the machine being known as the Royal Windsor. Canada has long been looked upon by American manufacturers as an inviting field. A duty of 35 per cent is imposed on all automobiles taken into the Dominion from the United States.

Van Dyke Motor Car Company, Frank G. Van Dyke, president, is out with a delivery wagon with a capacity rating of 1,000 pounds. The plant, which will be located at Detroit, is to be a large one. The area is to be 130,320 square feet and the main building will be 704 feet long. A delivery wagon, the first one out of this make, created quite a lot of healthy excitement at the Detroit show, and reports have it that the demand for this wagon is pronounced. The motor is double-opposed, 4 3-8-inch bore and 4-inch stroke; magneto ignition, and the control will include a friction drive. Geo. P. Davis, consulting engineer of the company, is the designer. In the handling of the company business a service station system will be maintained—service will be guaranteed.

The Lozier Motor Company of Michigan, is now in control of the holdings of the Lozier Motor Company of New York, this action having been taken at Plattsburg, N. Y., last week. The transfer was made on the basis of $493,710 in cash or $822,850 in fully paid non-assessable captial stock at par in the Michigan corporation, in addition to which Henry A. Lozier and Edwin R. Lozier are to get $160,000 in cash or $200,000 in the non-assessable capital stock at par, the duly authorized officers of the Lozier Motor Company, of New York, also to receive $106,290 in cash or $177,150 in stock. It is announced that work on the Detroit plant will be begun as soon as possible.

The Chalmers-Detroit car has now passed into the realm of history. Henceforth that popular car is to be known as plain "Chalmers." This step is officially announced by the Chalmers Motor Company, the reason being assigned that it is desirable in order to avoid confusion with the great number of new cars which have incorporated "Detroit" into their names.

There is another class of scouts of whom little is heard, but who are a recognized part of almost every factory force. These are the men on the lookout for skilled mechanics, for whom there is the keenest demand. They keep in touch with the avenues through which machinists, toolmakers, in fact all kinds of skilled labor, find their way to Detroit, and offer inducements to have the men enter their plant.

The newly organized Owen Motor Car Company has purchased a three-story brick factory building on North Grand Boulevard, adjoining the Packard plant, together with six acres of land. The company is capitalized at $500,000, with $250,000 paid in. It is proposed to build 500 cars the first year, and in the spring work will be begun on a reinforced concrete factory that will increase the capacity to 1,000 cars per year.

Local auto makers are rejoicing over the action of transcontinental lines in rescinding the recent raise in rates on automobiles for Pacific Coast points from $3 to $4 per 100 pounds. On every car sent to the coast this meant the imposition of a tidy sum which either had to be met by the manufacturer or tacked on the selling price by the dealer.

The United States Auto Top Company has been incorporated, with a capital stock of $20,000. The incorporators are W. A. Paul, F. A. Hood and L. S. Anderson.

Grant Brothers' Foundry Company is another new industry, the promoters of which are Charles A., George D. and W. W. Grant, of the Grant Brothers' Auto Company, and Vital Ouellette.

F. H. Trego, secretary of the Chicago Motor Club, and a well-known automobile expert, has joined the ranks of the Hudson Motor Car Company and will be associated with Vice-President and Chief Engineer Howard E. Coffin.

MINNEAPOLIS SHOW WILL OPEN FEBRUARY 19

MINNEAPOLIS, MINN., Feb. 7—Indications are that the third annual automobile show to be given under the auspices of the Minneapolis Auto Show Association, February 19 to 26, inclusive, will be the biggest event ever held west of Chicago.

Notwithstanding there are close on to 25,000 square feet of space available in the National Guard Armory, where the show is to be held, those interested in these annual motor exhibitions are afraid that there will be a shortage of room, and plans are already being discussed looking to the securing of larger quarters for the show in 1911. Already the list of exhibitors for this show exceeds that of 1909 by at least 80 per cent. The space on the main floor of the big armory has all been taken up and on this floor alone upward of 70 bonafide automobile dealers will show. It is estimated that one hundred makes will be exhibited.

There is besides this floor, a spacious basement, which will be used for the exhibition of the heavier class of motor vehicles, such as motor trucks, delivery cars, etc. The space here, too, is being taken up rapidly, and a complete assemblage is promised.

When it is known that there are upward of 50,000 cars now running within the territory of which Minneapolis is the gateway it can be realized how important this show will be to the motor industry of the Northwest. Dealers, buyers and everybody interested in motor cars in the States of Minnesota, North and South Dakota, Montana, Western Canada, Iowa and parts of Wisconsin will be at this show. About 45,000 persons saw the show in 1909, but the present indication is that twice that number will pass through the gates during the week of the show

Following so closely as it does the Chicago show a large number of automobile dealers who will have exhibits at the Windy City event will ship their exhibits direct to Minneapolis.

The officers of the Minneapolis Auto Show Association, who have the affair in charge, are: H. E. Pence, of the Pence Auto Company, president; H. E. Wilcox, of the Wilcox Motor Company, vice-president; F. E. Murphy, of the Minneapolis *Tribune*, secretary, and Walter R. Wilmot, manager.

MITCHELL HEAD REPORTS PROSPERITY ABROAD

BACK from an automobiling trip in Europe that was productive of much valuable information as well as brimful of pleasant experiences, Captain William Mitchell Lewis, president and general manager of the Mitchell Motor Car Company of Racine, Wis., and G. Vernon Rogers, its secretary, traversed a little more than 2,000 miles of diversified roads ranging from the broad highways of England to the mountain roads of the Pyrenees and the mediocre roads of Spain in the Mitchell six-cylinder machine at the wheel of which sat René Petard, European representative of the Mitchell company.

"We toured from London to Folkestone," said Captain Lewis, "thence from Calais to Paris, and over the Pyrenees to Barcelona, Spain, and back to the French capital, with no motor or mechanical troubles, considerable comfort, and much enlightenment. The American-made cars are enjoying a wonderful amount of popularity in continental Europe and in the British Isles. I am pleased to state, also, that the Mitchell car, one of the pioneers in tthe American invasion, not only is having a big share of this but is in the lead of all others.

"While in London we closed a contract with Lavey Brothers, 20 Conduit street, for a period of five years, the British concern agreeing to take $500,000 worth of our cars. While in London we visited the Olympia show, the largest and best automobile exposition ever held. The success of this show has taught the continental makers, especially the French and German manufacturers, their great mistake is not holding the usual big annual expositions that have served to direct the attention of the world to their wares. As a result of the lesson given to them, the French makers are even now planning for a huge Paris salon in November or December, 1910, to offset the depressing effect of the failure to hold the Salon this year. Germany also is figuring on a great show revival, while the French makers who now realize the lack of wisdom in abolishing great track and road-race classics, are planning a race revival upon one of their big schemes.

"I was impressed by economic problems presented by the European situation. The continent has not the motor purchasing public that the United States has, although in France the national records show that the wealth per capita is more evenly distributed than in any other country abroad. In England there are many poor and also many rich. But the great class that might be depended upon to absorb motor cars is that element which the Britons refer to as 'in trade.' The tradesmen are perfectly able to purchase cars, but they refrain from doing so rather than have it appear they are aping the royalty and aristocracy. The contrast in America is rather marked to the traveler—imagine the business man of the United States going without an automobile if he wished one—and he has the money to buy the car.

"You are struck abroad and especially in London by the number of taxicabs and commercial vehicles. The field is a great one. Before I left there Gamage Limited of London were just negotiating a contract for putting 3,000 more taxicabs on the streets of Greater London, which has 3,000,000 more population than Greater New York and not nearly as many motor cars—and so important has the taxicab problem become that they are starting schools for the education of cabmen's children for the avocation of the chauffeur. The horse-drawn vehicle is rapidly becoming a thing of the past in London.

"While in Spain we closed with Rossello y Mas, 20 Plaza de Tetua, for 25 Mitchell cars. The Spanish automobile agent has a beautiful country estate near Barcelona to which we motored. Near it is a church built in 625 A. D. containing the sarcophagus of a daughter of a former king of Spain."

AUTOMOBILES IN ENGLAND ON INCREASE

From a statement recently issued, based upon official statistics, the following table, showing the number of motor vehicles of all kinds, including public service and motor cycles, in use in the United Kingdom on September 30, 1908 and 1909, has been prepared:

	Total of all kinds.	
In use in	1908.	1909.
England and Wales	137,323	163,181
Scotland	10,907	13,093
Ireland	6,186	7,499
Total	154,416	183,773

	Private motors.	Trade motors.
In use in	1909.	1909.
England and Wales	74,748	13,961
Scotland	6,157	1,056
Ireland	3,933	164
Total	84,840	15,181

The foregoing shows an increase of 29,358 in the total number of vehicles during the last year, which was largely due to the more extended sales in England and Wales. The increase in private cars was 18.8 per cent. According to the statistics, the number of public service cars increased 48.8 per cent. and motor cycles 15.3 per cent., the number of the latter being given as 75,000. These results indicate an increasing demand for motor vehicles, and especially for cabs for public service and cars used for commercial purposes. It is confidently predicted by many that in a few years the number of business vehicles will exceed those used for pleasure.

As to private cars, there was an increase of about 13,435 during the year. Present indications are that cars of small and medium power will predominate during the coming season. Modern improvements in motor cycles, to prevent vibration and noise, will assist this branch of the trade, and it is believed that the coming year will witness an increase of 25,000.

OWNERS' GASOLINE STORAGE PROBLEM

Automobile owners have been handicapped in many ways, but it is doubtful if they have ever been confronted with a more perplexing problem than the safe storing of gasoline. This phase of the automobile business has caused many people sleepless nights of worry. They were continually harassed by the fear that the city fire regulations were not being lived up to. Explosions were feared and dreaded, and an innovation which would sweep all this away was hailed with delight.

Such an innovation received its inception in Pittsburg, where the city officials, constantly on the lookout for infringements of its strict fire regulations, endorsed the project as the best that has been put on the market. That the air-tight steel gasoline tank is not liable to an explosion was demonstrated after the careful inspection made by the city experts.

No city can boast of more strict fire regulations than Pittsburg. The peculiar formation of the downtown section, so closely built up, caused these severe restrictions, and it was with careful regard for these laws that the air-tight tank was finally picked as the safest. Three departments were supplied with them, the Departments of Public Safety, Public Works and Health.

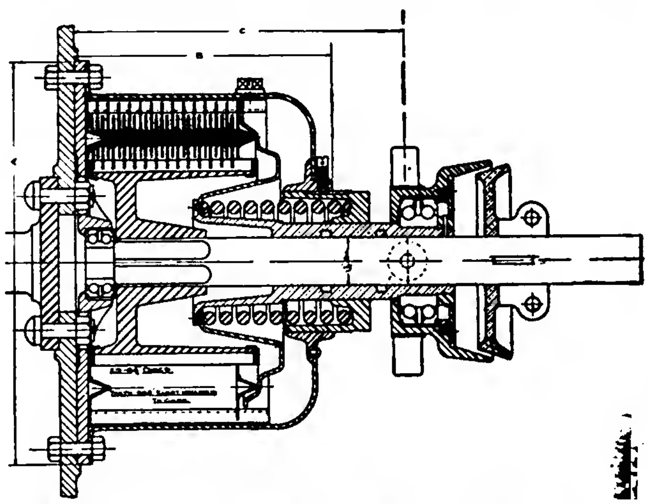
It is recognized among automobile owners and other users of gasoline that this necessary adjunct to the operation of the machine is highly explosive. Its storage was the problem with which auto owners grappled for so long. But with the coming of the air-tight tank, the problem has become no problem at all.

Pittsburg's strict fire regulations were taken into consideration when the air-tight tank was first broached as a possible purchase by the city departments. Its merits were thoroughly looked into before the city ventured to put the seal of approval on them hy purchasing them. It was deemed safe to put two of the tanks within the fire limits, while the third was placed at the Department of Health stables in Frankstown avenue, East End.

HELE-SHAW CLUTCH HAS NOVEL M. D. FEATURES

MULTIPLE disc clutches are now so thoroughly well known for their varied and excellent qualities in connection with automobiles, that the improvements which are being made from time to time are interesting in the extreme. The Hele-Shaw clutch, of which a cross section is here given, represents one of the types in the multiple disc family, which has sustained its reputation, and is being taken up by car builders of exacting ideas. As the section clearly indicates, the discs are considerable in number, they being utilized in proportion to the power which must be transmitted, and the outer discs are the driving members, they being fitted to inwardly projecting driving faces, which are integral with the housing, which, in turn, is flanged to the flywheel. The driven discs are on a drum with outwardly projecting driving faces, and the spider of the drum ends in a suitable hub, which is broached with a square hole, which in turn engages the squared end of the driven shaft. The driven shaft is surrounded by a sliding sleeve, and the clutch spring is concentric with the sleeve. A drag brake is shown to the rear of the clutch proper, and when its conical faces are engaged, the slight amount of inertia which might be felt when the clutch is relieved, is overcome by the drag of this supplementary clutch. This is a detail which is well worth looking after.

The Merchant & Evans Company, with headquarters in Philadelphia, Pa., in addition to meeting with good success in the exploitation of the Hele-Shaw clutch, is handling a line of front and rear axles, transmissions, and other specialties, all of which



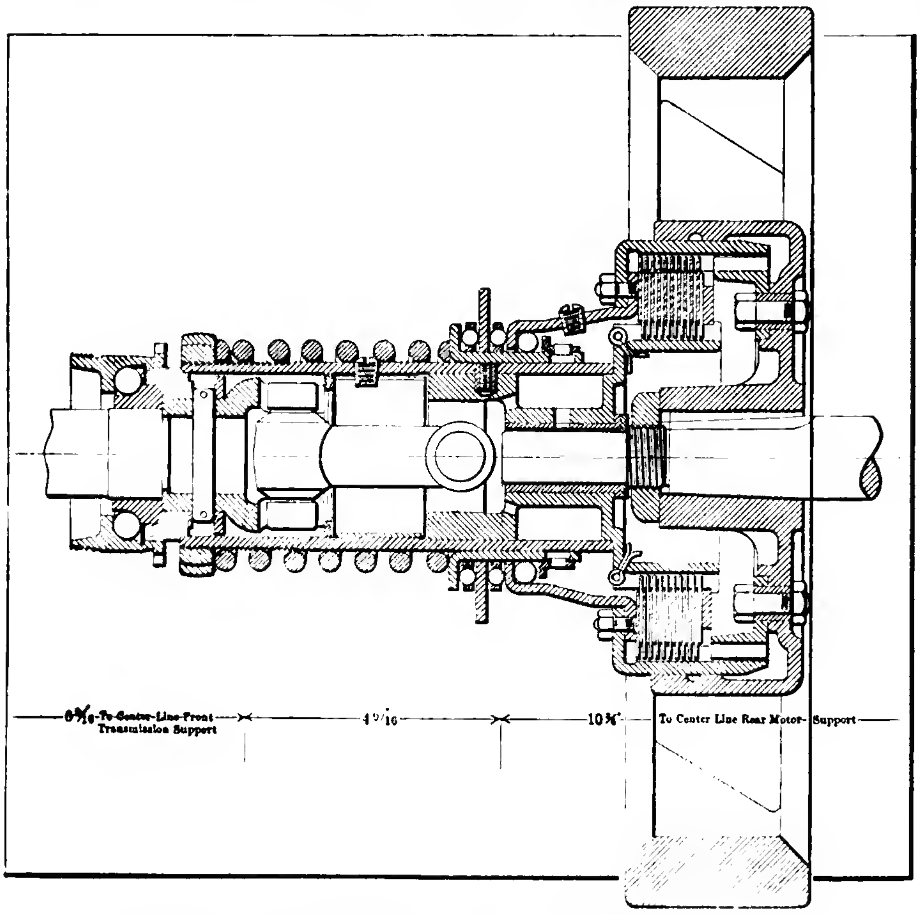
Section Through Hele-Shaw Disc Clutch Showing Discs

are now much in vogue and well known to builders of automobiles of the class which provides a residence for quality.

REO MULTIPLE DISC CLUTCH AND JOINTS

DESCRIBING a whole automobile offers the disadvantage of saying so much that memory fails to grasp the situation from the point of view of details. In the long run it is the detail which will be found at the seat of trouble, and for the best result it is more profitable to discuss details one at a time to bring out the gist of the story. The subject here taken is the clutch and universal joint in the Reo 4-cylinder automobile for 1910, and attention is called to the presence of the universal joint inside of the shell around which the spring is placed. The shell connects with the crankshaft through the discs, but the transfer of power is through the universal joint, which, instead of being placed back of the clutch unit, as it is in many makes of automobiles, is housed in, away from accumulations of foreign matter, and lubrication is easy of accomplishment.

Among the other features which will be found in this unit are: The large size of the spring used to apply clutch pressure; ball thrust bearings to take the reaction of the large spring; pipe plugs which may be unscrewed if it is desired to add to the supply of grease within the housing, and such other features as will add to the good qualities of the unit. The flywheel is placed on the crankshaft by being fetched up on a taper, and a key is there to resist the torsional effort. In assembling, the pin back of the universal joint is readily removed, and the bolts which hold the clutch housing to the flywheel will also facilitate the operation. In divers other respects the assembly as here depicted has novelty in its makeup, and stability besides.



Construction of Reo Multiple Disc Clutch as Revealed in Cross Section

VOL. XXII NEW YORK—THURSDAY, FEBRUARY 17, 1910—CHICAGO No. 7

THE AUTOMOBILE

METERING out the accumulated knowledge gained within a year is the process which is now being projected in the form of shows, following the two more pretentious efforts in New York, a very successful exhibition at Detroit, and the Ninth Annual National Show, which terminated at Chicago with great success on February 12. The further activity will be in the form of equally im-

EXTERIOR OF HARTFORD ARMORY AND A CORNER OF THE SHOW WITHIN

portant shows, beginning with Buffalo and including Hartford, St. Louis and Rochester, February 14-19. The remaining seven shows will include Washington, February 15 to 19, inclusive; Grand Rapids, February 17 to 19, inclusive; Minneapolis, Newark, Los Angeles, Salt Lake City and Cleveland, with dates from February 19 to 26 inclusive. Cleveland, however, will have two separate shows, one of which will be held at the Central Armory and the second will be held under the auspices of the Cleveland Automobile Club.

The large exhibitions are of the greatest possible value in an effort to indicate the enormousness of the automobile industry, but they offer the disadvantage of congestion, and the patrons of the industry are prevented from examining the products in detail with a view to judging as to their qualities, discriminating as between the methods of the respective

MAIN AISLE OF HARTFORD SHOW, VIEWED FROM OPPOSITE ENDS—THOMAS APPEARS PROMINENTLY

schools of design, and tabulating the relative facts in the mind for convenient use at the propitious moment.

Among the strong reasons why the lesser shows present positive advantages are those which are reflected by an examination of the situation as it obtained at Chicago, in which 78 different makes of automobiles were lined up, with from two to five models of each make there to be examined. The total of the cars was 211, which is equal to saying that an interested spectator would have to examine 35 automobiles per day to cover the ground, and he would only be permitted to take substantially 15 minutes in the examination of each automobile. This schedule would leave no time whatever to devote to the examination of the major accessories, of which the automobiles of this year are so largely constituted, and as for the minor accessories, or accessories of convenience, it would not be feasible to devote to them a single thought.

In going into the shows which offer a wider opportunity for an inspection of the automobiles exhibited, it will not be without profit to have in mind just a few of the statistical characteristics of the automobile industry as a whole. It has been conservatively estimated that the product of the year will be approximately 280,000 automobiles, and the money exchange of the year foots up to the enormous sum which is just under $500,000,000. The automobiles which are being made would string out in a row to the close approach of 650 miles, and the passenger carrying capacity, taking them as a whole, would not be far from 1,200,000 adults. Thirty million dollars have been expended in factory buildings, and they cover 2,500 acres of ground, one of which plants, for illustration, reaches over an area of 101 acres.

It is fortunate for labor that upward of 120,000 skilled artisans are engaged, they having been recruited from congested industries, notable among which should be listed the machine tool zone of activity. These men will receive for their direct share the near approach of $100,000,000, which as a tax on the whole people might be stated in a homely way as equal to the purchase price of a dozen loaves of bread per inhabitant. The value of the industry to the country as against this relatively insignificant tax upon the individual resources, putting it in the same homely terms, reaches a figure which is scarcely within the realm of comprehension, it having been figured as equal to the value of 1,000,000,000 loaves of bread.

Under ordinary conditions men who do things as the men who command the rank and file which is engaged in producing automobiles, are prone to forget the foundation, and in allowing themselves to be lauded for their activity depreciate the value of the stable structure on which the whole rests—the patrons of the industry.

That users have been loyal to their ideals, despite the many disappointments, is the prime reason for the greatness of the automobile industry as it stands to-day, nor could the cars which are in fettle for a close inspection be placed on parade, were it not for the peculiar characteristic of men who buy; each one of them, almost without exception, has maintained that the automobile he invested in was the most suitable for him, even granting (which he is rarely willing to do) that some other make of automobile is superior in certain respects, which, however, is beside the question as he sees it.

It is this loyalty on the part of users which makes it possible for investors to build millions of dollars worth of automobiles even before there is any attempt made to ascertain if there is a buyer for each one of them, although absolute ruin would follow were purchasers to balk.

It is this certainty of success from the selling point of view that brought the quality of automobiles up to the present standard, and which assures that the standard will be advanced by easy stages, year after year. The few who have waited for a condition of ideal perfection before making a purchase were mostly of the class who would have to deprive their children of reasonable comforts had they done otherwise, and the very condition which induced them to hold back has proved to be a blessing in disguise.

The automobile industry, taking it as a whole, is in the hands of men who fully appreciate the value of a reputation; they know very well that a "run," while it is closely associated with banking, has a synonym; that lack of confidence will lead to a slump, and that it is necessary to maintain a high standard in order to be successful. Fortunately, the very worth of the automobile, the divers uses to which it may be profitably put, adds stability to its manufacture, and this condition is enough to induce money to come to the rescue of the maker who knows the worth of quality, and who employs the brains and the brawn which is capable of doing the work.

That time is practically at hand when the automobile will be a standard product, ordered without the necessity of seeing the finished article; the automobile dealer will call for a consignment of cars, specifying merely the seating capacity and power, confident that when received they will answer his requirements. Although shows may in this way lose some of their importance, they will continue to do valuable missionary work. Their spectacular features form a most valuable attraction.

LOCAL SHOWS FLOURISH THE COUNTRY OVER

FOLLOWING the great National exhibitions in New York and Chicago, the present week finds a number scattered over the country. In the East, Hartford, Conn., is having its exposition, under the management of the local dealers' association; New York State has two, at Buffalo and Rochester. In the West, St. Louis dealers are having their annual inning. The Grand Rapids, Mich., Automobile Club will open its show in midweek on Thursday. To next week belong, in reality, those opening on Saturday, February 19, namely, Minneapolis, Minn.; Newark, N. J.; Los Angeles, Cal.; Salt Lake City, Utah, and Cleveland. In Hartford, Conn., the third annual automobile show of the Hartford Automobile Dealers' Association opened at Foot Guard Hall, Monday evening, and continues for a week. The home of the famous crack military command presented an animated appearance. This notable hall has housed many attractions in its day, but none of more importance to the City of Hartford, from a commercial standpoint at least. The Hartford Automobile Dealers' Association proved conclusively on two former occasions that, notwithstanding the proximity of this city to New York or Boston, a local automobile show could be conducted as a successful venture if it was only done in the right way. The association discovered the right way three years ago and has made good on three successive occasions.

Within the past few years the automobile trade has increased by leaps and bounds and Hartford has become the mart for the smaller towns for miles around, so that although the city has a population of but 100,000 it serves in reality as the center for twice that number. The cars on exhibition range in price from $500 to $5,000, and the aggregate value of the cars shown is estimated at $100,000, although in a comparatively small building. The main floor is given up to car display, together with the stage, the two rooms off the main floor, and a portion of the basement. The balconies are devoted to the display of accessories.

The committee tried to serve up something a little different in decorations this season, and succeeded. The effect is colonial, and even the uniformed attendants are dressed in the costumes of the time of Washington, with powdered wigs and all that sort of thing. Above the stage proper is a balcony which is made to represent the balcony of one of those colonial mansions which all are familiar with. The effect is well carried out. The sign posts of the various booths are of the same style.

To make the show the more entertaining the Foot Guard orchestra holds forth in the elevated balcony, and then, too, there are other attractions a bit out of the ordinary. The Tempo male quartet, which is one of the best of the sort in this section of the country, is also in evidence.

But as to the show itself. On the right of the main entrance is the Jackson stand, with two snappy models shown by Kilby & Bassett. On the opposite side is the Mitchell, followed by the Maxwell, in six different models. The Baker electric is exhibited by the Electric Auto Station; this is the first appearance of this vehicle in Hartford. Next to the Jackson exhibit is that of the Miner Garage, where are shown two models of the Pierce-Arrow and two Buick pleasure cars and a delivery wagon, this latter being much in favor. The Pierce has grown to be regarded locally as one of the most reliable cars and the representation has increased materially since the show a year ago.

Next to the space of the Maxwell is that of the Palace Automobile Station, agent for the Thomas, Studebaker-Garford, E-M-F, Flanders and Waverley electric. Here are shown a Thomas town car with a brougham body, a Thomas Flyer touring car, a Studebaker-Garford touring car, a Flanders roadster, runabout and chassis and an E-M-F chassis. The little Flanders was a matter of much interest to the crowd, who lingered about this booth in goodly numbers. Opposite the Thomas exhibit is that of Brown, Thomson & Company, who show the Cadillac touring car and a chassis in which the parts are exposed and in operation. One of the snappiest appearing cars in the show is the Briarcliff model Lozier, on this stand; the little six Lozier is also popular. The Stevens-Duryea is shown by the same firm in models X and AA.

Upon the stage, where it has now reposed on three different occasions, is the Ford line shown by the Elmer Automobile Company, including a touring car, runabout, coupe and town car. The Ford shares the stage with the Reo, which comes back after an absence of a year. The Knox is shown in one touring model on the same stand. Off the main floor, in the south

COLONIAL DAYS RECALLED BY THE NOVEL DECORATIVE SCHEME OF THE HARTFORD DEALERS' SHOW room, appears the Elmore in three models, not the least interesting being the new model "46" with the differential or two-diameter pistons. This car attracted much attention and the two-cycle advocates were numerous. On the north side of the hall in the room off the main floor the Rambler is shown by Foster & Company, of this city, who took the agency for this car a few months ago.

Down in the basement are shown several cars that have proved to be attractions. The little Hupmobile was one of the most interesting cars on exhibition. It is shown by C. K. Hansen, a local garage man who has built up a good business in the past two years. The Empire "20" is another newcomer and is shown by Kaeser & Wilbur, of West Hartford, who recently entered the field with very bright prospects. Several sales have already been made. The Franklin is shown by S. M. Hutchins and is as popular as ever. The air-cooled proposition has many followers in this city, and the Franklin is, by the way, the only air-cooled vehicle in the show. The Everitt "30" is shown by the J. T. Curtiss Company, and so is the Velie—both newcomers.

To make the week the more interesting from the autoist's point of view, the Connecticut Automobile Show Association is holding a show at the First Regiment Armory. Here the decorations are not so lavish, though there is far more available floor space on the one floor than is to be had at Foot Guard Hall. The decorations are simple yet effective, and one of the best bands in the State is on duty, rendering all the popular strains for those who come to view the cars.

Here is shown the Houpt, a product of which Connecticut is proud. A 60-horsepower stripped chassis is shown as well as a toy-tonneau car. This is finished in red, and is the highest powered car on exhibition here this week. The McCue and the Staver appear, both in touring models. The Jackson, which is on exhibition at the dealers' show, is also here. Matheson comes to this city for the first time and is an object of much interest. Two Corbin models are shown, as well as the Cameron and Moline. The Belmont is another new Nutmeg product and is shown in this city for the first time. Then, too, the Winton is on view. With two shows in full swing, in addition to private exhibitions, needless to say there is much doing locally this week. The various dealers without exception report a rushing business; there have been a great number of actual sales.

BUFFALO INCLUDES A LIMITED NUMBER

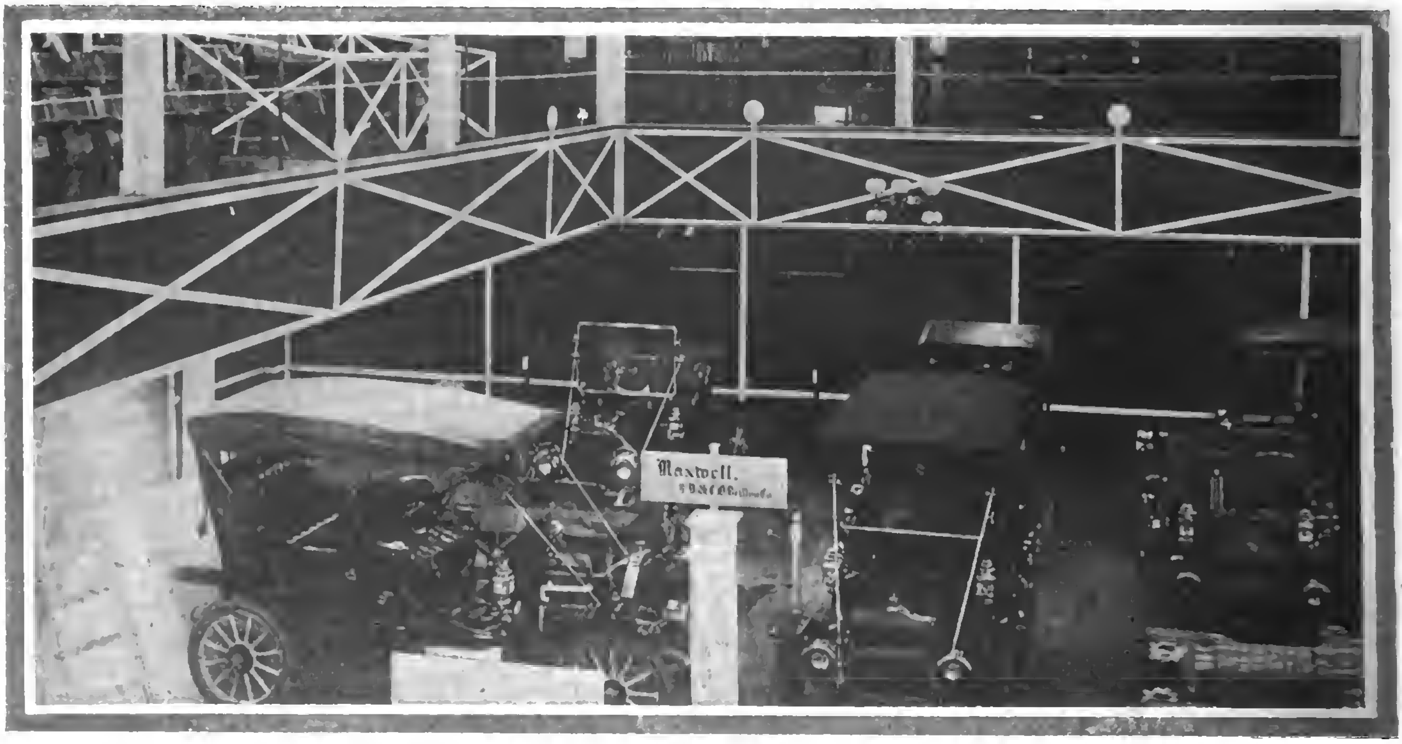
At 8 o'clock Monday evening a bugler sounded the assembly from the balcony of the Broadway Arsenal. At the signal, Mayor Fuhrmann, flanked on the right and left by Charles F. Monroe, president of the Automobile Trade Association, and Laurens Enos, president of the Automobile Club, pressed an electric button. The slight pressure turned on the electric current, and in a twinkling illuminated the Armory with the radiance of a multitude of electric bulbs. The lights rippled and blazed along the folds of the flag that spanned the entire roof of the drill hall, and the exhibitors and visitors bared their heads while the Seventy-fourth Regiment Band played "The Star-Spangled Banner."

The flag, the largest in the world, was the keynote of the decorations. Its symbolization was of the fact that there were only American-built cars in the show. The patriotic suggestion was carried out in the decorations which concealed the walls and even the windows of the dingy Arsenal. National shields decorated the burlap that hid them, and rosettes in the national colors festooned the spaces between the shields.

The Curtiss aeroplane that seemed to float in midair under the folds of the flag was an effect calculated as much for its decorative value as for its drawing power as a curiosity. The machine was too far aloft to afford the curious an opportunity to study its details. It attracted considerable interest, but did not detract from the principal business of the evening, the study of the 1910 models of automobiles.

There was little in the way of ornamentation to distinguish one exhibit from another, save for the difference of space. The signs were uniform in size and shape, consisting of national shields containing a gilt field in which the names of the exhibitors were printed in blue letters. The signs were on standards 8 feet high. Some of the exhibits were on a very large scale, which worked toward keeping their number down, despite the large floor area. There were in all but fifty-two exhibits, including approximately two hundred cars. There were as many more applications for space before the show was opened, but as it was alloted a month ago the latecomers were disappointed.

The Bison Motor Car Company occupies two spaces with its exhibits of K-R-I-T and Abbott-Detroit cars. The Pierce-



HARTFORD'S ATTRACTIVE MAXWELL EXHIBIT, INSTALLED UNDER THE OVERHANGING COLONIAL BALCONY

COLONIAL BACKGROUND, HARTFORD EXHIBIT OF THOMAS, E-M-F, FLANDERS, STUDEBAKER AND WAVERLEY

[illegible] Company occupies three spaces, with four Pierce-Arrow [illegible] a painted chassis. The Stoddard-Dayton exhibited a [illegible] chassis and five 1910 models, together with the torpedo [illegible] runabout. The same agent displayed alongside these [illegible] cars. Three types of Cartercars and a chassis were [illegible] Two Inter-State cars and an Empire car were shown [illegible]. The Franklins were out in three types, together [illegible] and a torpedo runabout. The Buicks turned out [illegible] of these cars filling six exhibit spaces.

[illegible] Stevens-Duryea cars and a polished chassis shared [illegible] with two Hudsons, three Knox touring cars, a Knox chassis and a torpedo runabout. The flock of Chalmers-Detroit "Bluebirds" numbered five, with the "30" and its driver Joe Matson and the "40" and Lee Lorimer. Four cars represented the Oaklands, and ten Oldsmobiles presented the various phases of that car. The total of the different makes of cars exhibited was forty-one.

The Commercial cars and trucks were represented by three makes, the Rapid, the American and the Knox. The electric division was represented by the Babcock and Waverley, the latter having at last headed an invasion of the Babcock in its home city.

HARTFORD DISTRIBUTORS OF THE PIERCE-ARROW AND STEVENS-DURYEA HAD WELL-ARRANGED EXHIBITS

ROCHESTER

ROCHESTER, N. Y., Feb. 14—Notwithstanding a bad snowstorm and general inclement weather, something over 5,000 people turned out on the opening night of the third annual show held by the Rochester Automobile Dealers' Association, packed Convention Hall and gave a start to the undertaking that augurs success. Eighty-five exhibitors crowd the basement, main floor and balcony of this spacious hall almost to the limit, and make a splendid showing.

From a spectacular point of view alone the show is a beauty. The color scheme is white and green, very much after the fashion of that held in the Grand Central Palace in New York City. The walls are adorned with suitable paintings illustrative of the development of the industry. The ceilings are draped with green and white bunting and electric lights, presenting a mild and pleasing general design. Palms and fresh cut flowers are to be found on every hand and the signs and space divisions are uniform throughout. The arrangements for handling the crowds are excellent, and notwithstanding the number of people who attended there was no delay either at the exits or the entrances.

In one respect at least Rochester has outdone all the other shows, even including the national shows. That is in respect to the music. Instead of having one band in the main hall to answer all purposes there are no less than two full military bands and an orchestra. The bands are on the two divisions of the main floor and the balcony and the orchestra is in the basement. The building is so arranged that they do not conflict.

The Aero Club of Rochester has furnished a large model monoplane which hangs conspicuously over the band stand in the main floor, and in the balcony and basement are to be found a number of motor boats and marine engines by way of variety.

Perhaps one of the most expensive exhibits is that of S. J. Macy & Company. That company is showing the identical Palmer-Singer exhibit, Dreadnought and all, that was shown at both New York and Chicago. This entailed some considerable expense and no little work, for the same cars were in Chicago last Saturday night. They were expressed and reached Rochester Monday just in time to be set in place. After this show they are to be shipped to Portland, Me.

The Sullivan Motor Car Company is showing for the first time the Sullivan light delivery wagon. This is a 16-horsepower, two-cylinder car that sells for $1,050.

EXHIBITION

Thomas J. Northway is showing a Ford T polished sectional chassis made in his own shop. Not being able to get one from the factory, Mr. Northway took down one of his cars, polished the chassis and then cut away the engine so as to show the moving and working parts.

Boughton & James are showing for the first time a solid metal non-skid armor that certainly looks as though it will do the things intended. It is cast in sections so as to fit around the tire and is held in place by longitudinal bolts and threads which when tightened hold it fast against the tire and prevent creeping. It is guaranteed against breaking or bending and is said to be absolutely skid-proof even on ice.

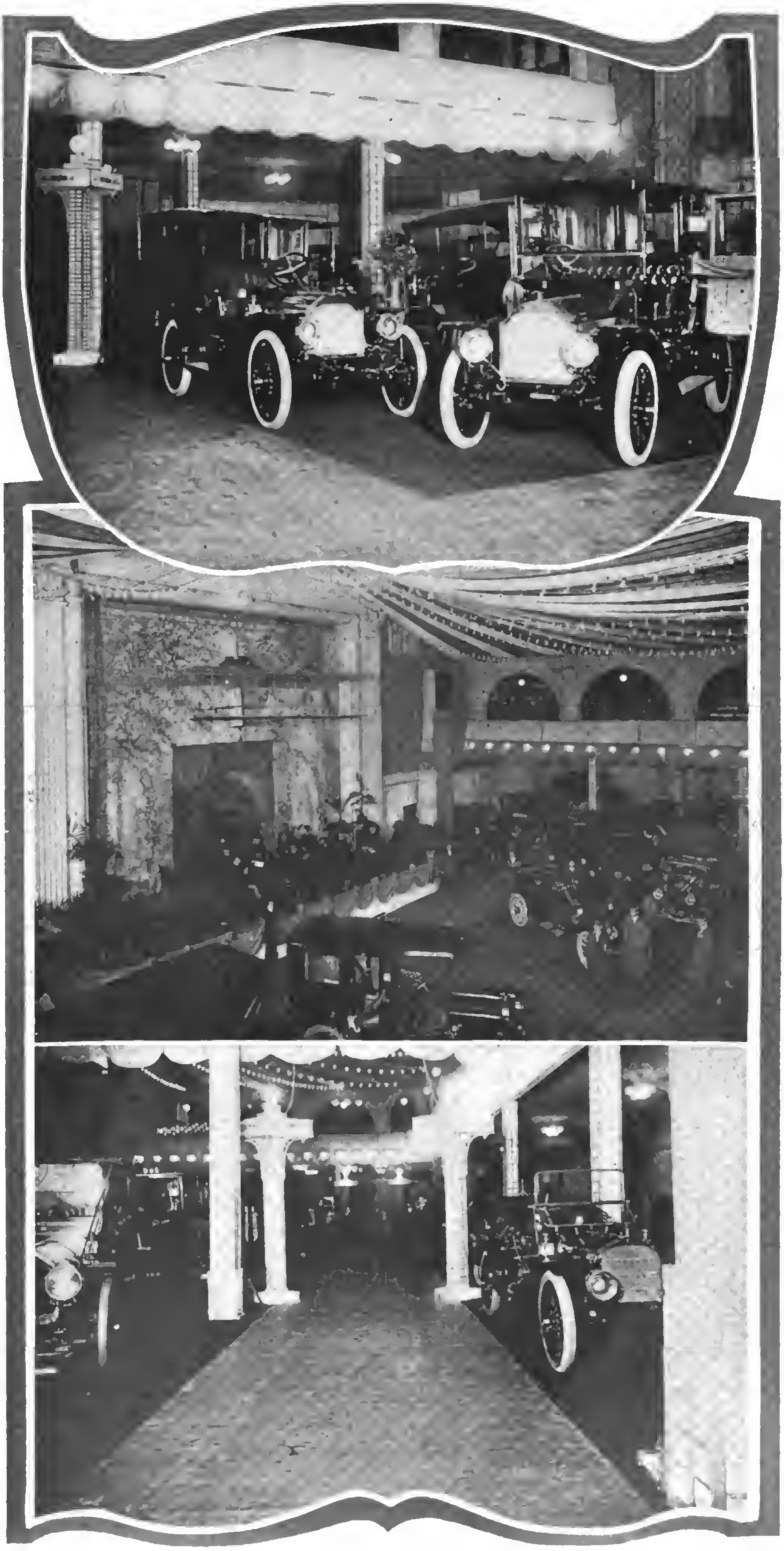
The only car of local make on exhibition is the Rochester Special, shown by C. P. Smith & Company. It is one of several built practically for the local trade. In size it is the largest in the place, being fitted with a Herschel-Spillman motor of six cylinders. 5 1-2 by 6 inches, rated at 75-horsepower. The tire equipment is 40-inch on all four wheels, and the other dimensions are in keeping. Mr. Smith is considering the building of a very large number of these cars this year.

At the conclusion of the first night's exhibit a meeting of the dealers' association was called, principally for the purpose of presenting William C. Barry, Jr., the president, with a token of esteem. in return for his efforts toward the success of the show. Mr. Barry, who is the Selden distributor in this section, has been both president and chairman of the executive board of the dealers' association for three years, and during that time has been most prominent for his devotion to its best interests.

Captain A. C. Simmons, the manager of the show, ruled the meeting. and with a neat speech delivered to Mr. Barry a silver-mounted pigskin suitcase, inscribed with the regards of the association. Mr. Barry responded briefly.

A concerted effort has been made by way of boosting and advertising throughout the neighborhood to reach 30,000 attendance for the week, and it looks as though this will be consummated. Thursday night will be society night at double admittance.

While the snow was welcome at the time of the recent Rochester-Syracuse endurance run, it was far from that to the demonstrators at the show. These were obliged to make their cars do their prettiest in order to make any kind of a showing against the heavy fall of snow.



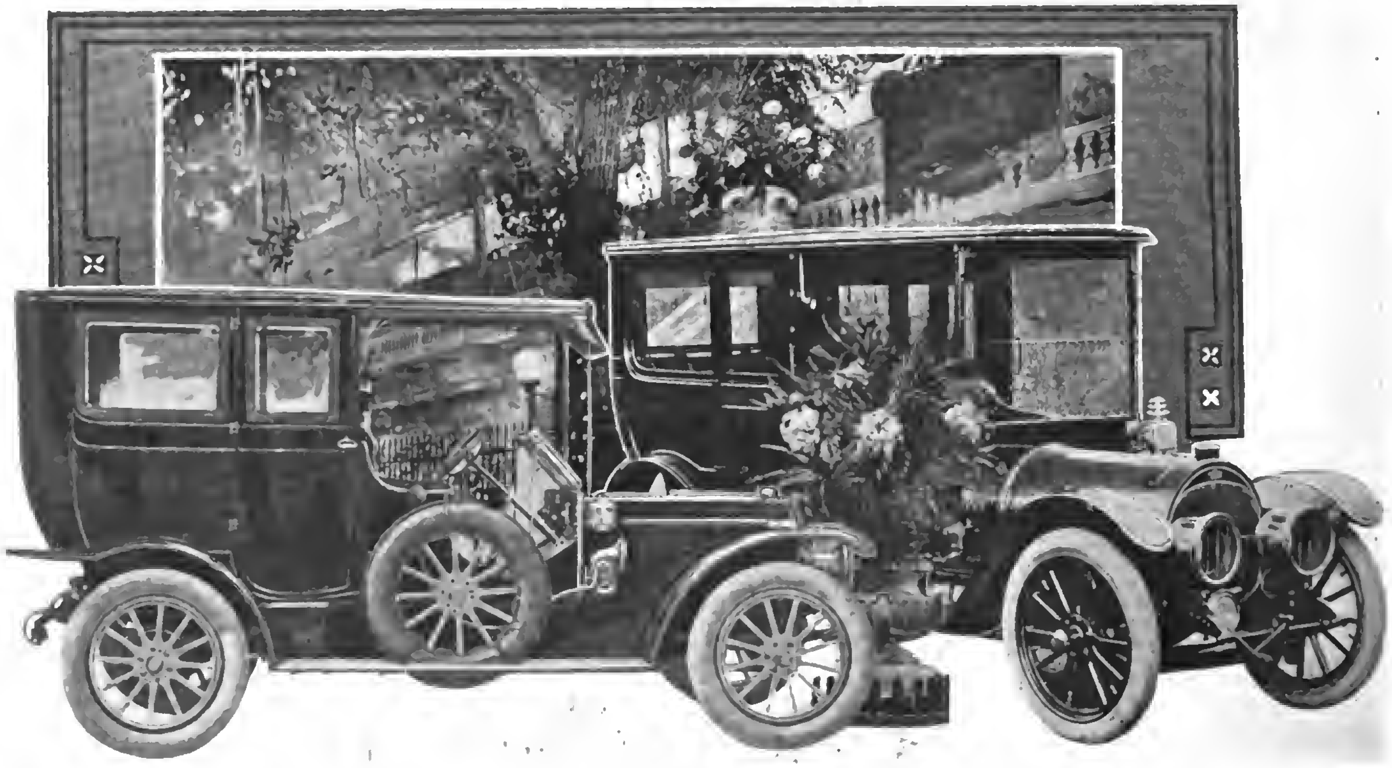
CHICAGO SHOW CLOSES WITH EXCEPTIONAL RECORD

CHICAGO, Feb. 14—The annual show of the National Association of Automobile Manufacturers came to a successful ending Saturday night, and, looking ahead a year, Manager Miles announced to-day that the affair would be repeated in 1911 in the same buildings, the Coliseum and the First Regiment Armory, despite reports that there are plans under way for the construction of a twelve-story building on Michigan avenue, between Twentieth and Twenty-first streets, which might be used for show purposes. Although cognizant of the plans for the erection of this gigantic structure and knowing that the promoters of the enterprise desire his support, Mr. Miles declares that he is not in on the deal and that he is well satisfied with the buildings which he now uses for his big show. No date for the 1911 exhibition has been set as yet, but it will probably take place in February, as it has done for several years past.

Any one who was at the show last week could not but remark at the big attendance and the vast amount of business that evidently was being done by the 267 exhibitors, and it was clearly apparent that the 1910 exhibition of the N.A.A.M. had a larger attendance than any of its predecessors and that more cars were sold, both wholesale and retail, than ever before. Indeed, the claim is made that the Chicago show excels both of the New York affairs put together in attendance and business, and this claim goes without contradiction on the part of manufacturers who showed at both Chicago and New York.

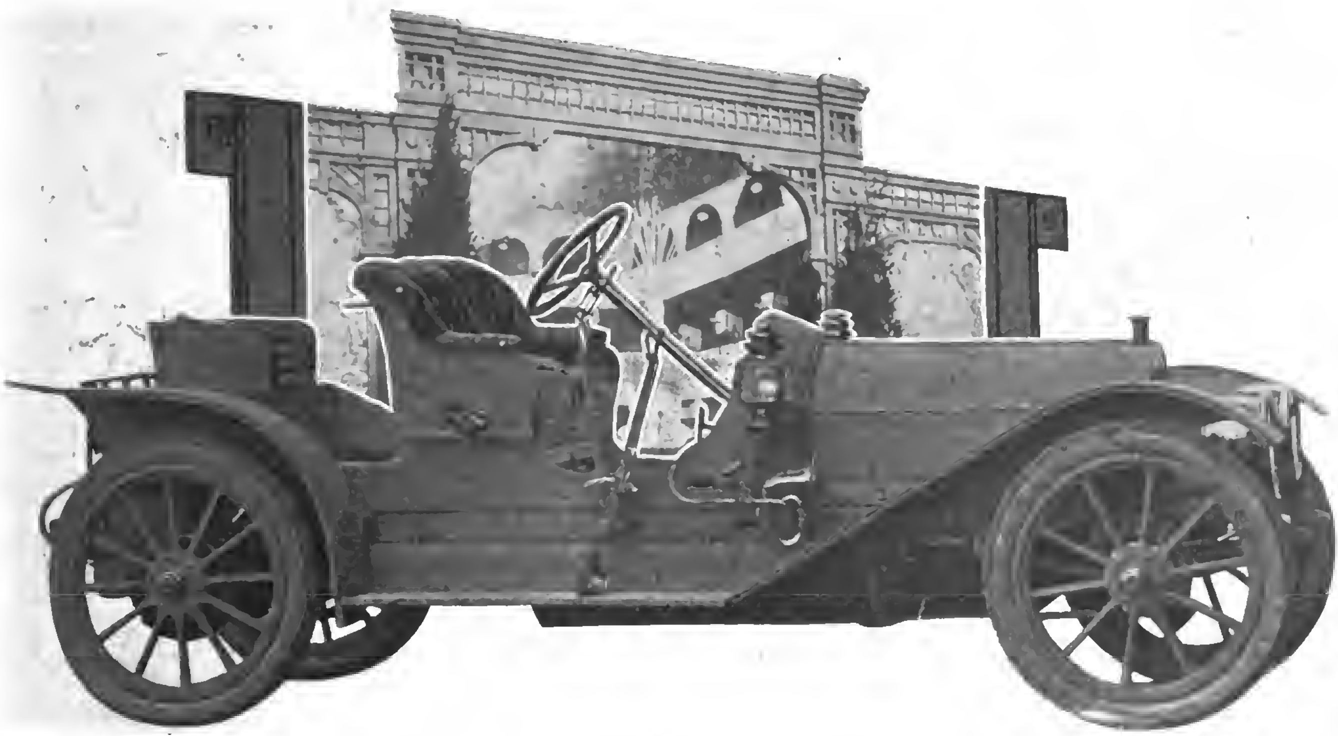
Actually, there were 140,000 paid admissions to the Chicago show for the seven days and nights which it ran, and the number of people who actually passed through the turnstile must have been at least 200,000. The records show that 2,924 exhibitors' buttons and 1,548 dealers' buttons were issued, which, if they were used each day, would add at least 32,000 to the 140,000 paid admissions; on top of this there was the paper of Saturday, the opening day, as well as complimentary tickets issued to the press. Of the 4,500 exhibitors and dealers on the list 75 per cent. came from out of town, and each one of them probably spent at least $50 during the week for his expenses. It is easy to see just what this meant to Chicago—$1,000,000 at the very least. The books show that dealers were here from Maine and Mexico; and some of the larger cities, like Denver, Kansas City, Milwaukee, Minneapolis and Indianapolis, sent large delegations of dealers.

Every one of the big car makers is loud in his declaration that Chicago is the best show of the year. During the week many new agencies were appointed in vacant territory, although it had been generally supposed that nearly every big concern had closed for the year. Besides this, the volume of retail business was so great in contrast to other years as to be most marked. Heretofore few retail sales were recorded, but this time many people actually attended the show and placed their orders, most of it being new business which had not been worked up before, and which, therefore, was unexpected. As to who did the biggest business at the show, there is considerable rivalry. There were several concerns—new ones—which placed many cars, but which hardly claim this was done because of the show, for they had been working through their agents before. For instance, Walter Githens, representing the Everitt in this territory, announces he took orders for 176 cars in his section.



Types of Limousines Which Combine Luxurious Bodies and High Power; on the Left Rambler, on the Right, Royal

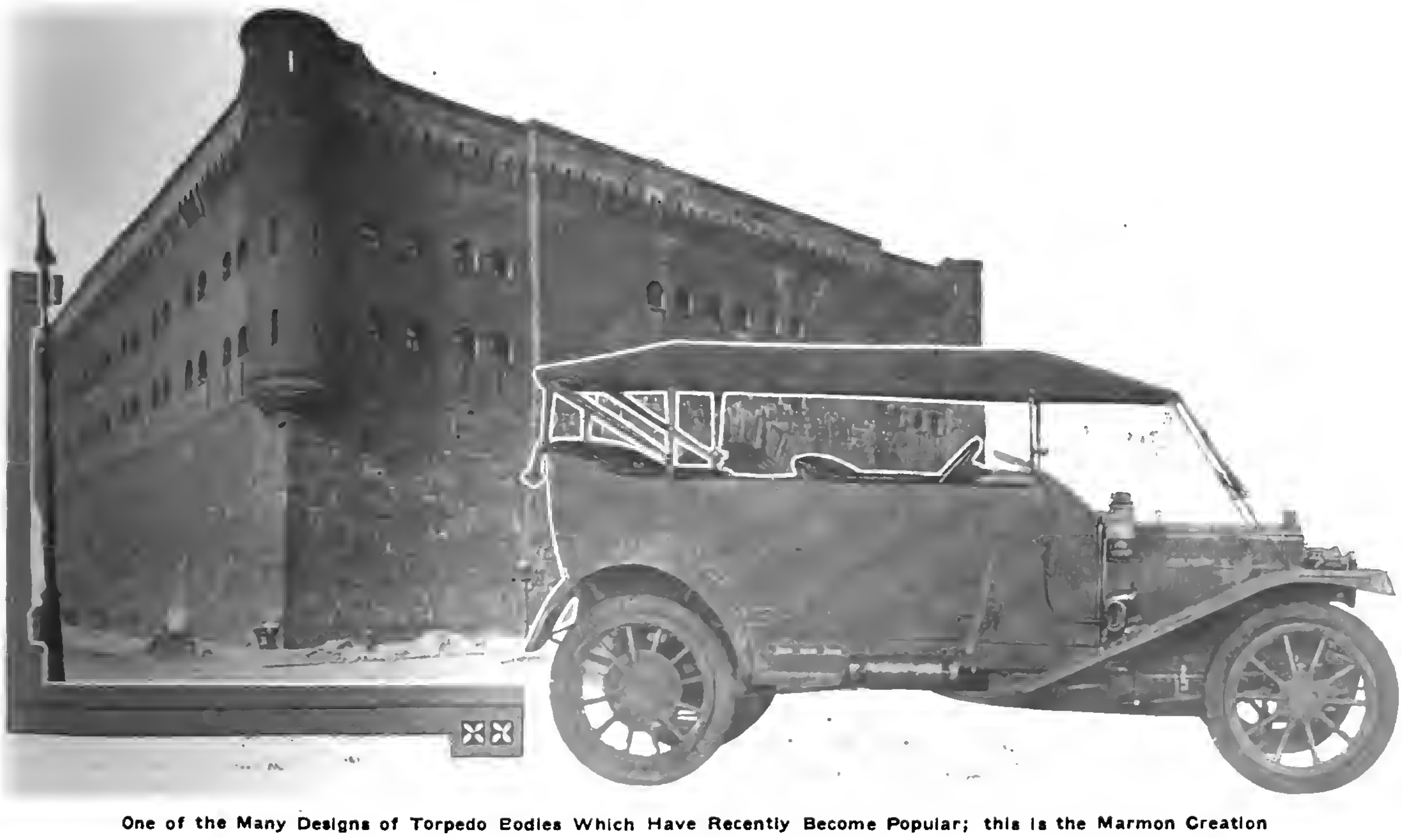
The Pierce-Arrow Company was handicapped somewhat by not having any 1910 cars for sale, business they did do at the shop being confined to 1911. There were few agents at the Pierce-Arrow booth during the week, but notwithstanding all this a fair business in 1911 stock was done. The Packard, which was shown by its local agent, confined itself to retail business, and reports many sales. The Knox Company did a big wholesale business, and the Oakland met with such a demand for its new 30-horsepower model that it was forced to stop taking wholesale orders for that type. Reo did a good business in both branches, and its attendance of agents from all parts of the country was surprisingly large. It reports dealers from Los Angeles, Denver, Omaha and Portland, Ore., and every



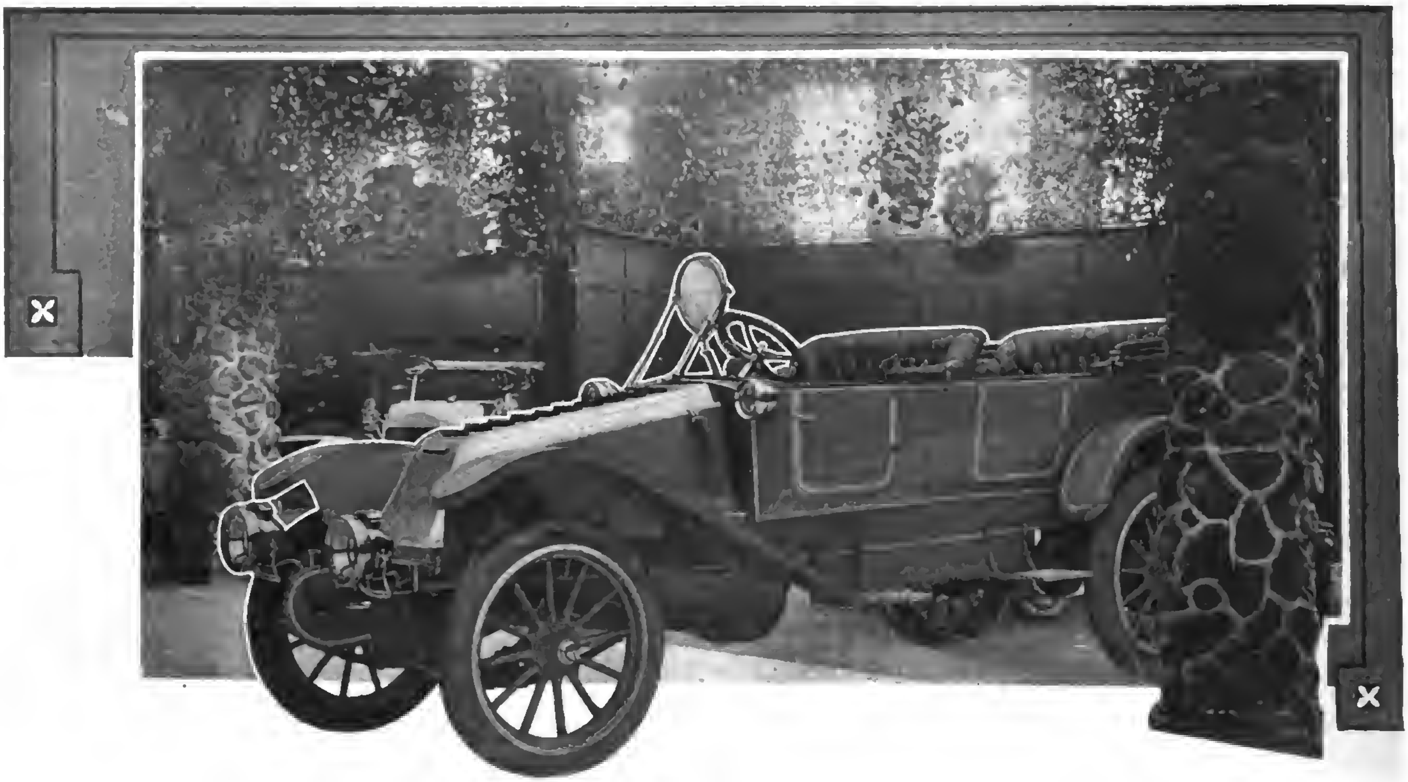
Latest Pierce Six-Cylinder 36-Horsepower Runabout, a Swift and Comfortable Car for Both Business and Pleasure

agent in Illinois was at the show. The foreign exhibitors did well, flattering reports having been received from the Fiat, Renault and Berliet, all of which did a considerable retail business during the show.

A building scheme was sprung yesterday, as referred to above, which promises the construction of a $2,000,000 building, to be devoted to automobile interests only. Those back of the scheme, which is being promoted by the Central Realty and Investment Company, are Lewis M. Stumer, Benjamin J. Rosenthal, Lewis Eckstein and Lee J. Lesser. It is proposed to erect the building on the east side of Michigan avenue, between Twentieth and Twenty-first streets, with a frontage of 307 feet and a depth of 170, the cost to be upward of $2,000,000. It is to be twelve stories high, with foundations and walls to carry six additional stories if found necessary. The twelfth floor will be a roof garden. On one floor will be a convention hall, and in the basement there will be Turkish baths, a swimming pool and a restaurant. It is proposed to fill the rest of the building with automobile dealers, using the eleventh floor for demonstrating purposes, which would make it unnecessary for the occupants of the building to go outside to give their customers a demonstration. However, the fact that some forty local concerns either



One of the Many Designs of Torpedo Bodies Which Have Recently Become Popular; this is the Marmon Creation



Franklin's Torpedo Body is Made with a Sloping Hood, Recalling Foreign Practice, Permitted by the New Motor

have built or are building new homes at the southern end of the row would seem to injure the chances of making this a success.

The show did not end without the Selden patent fight bobbing up, the latter part of the week being marked by a sharp retort from Henry Ford in answer to the warning advertisement of the Association of Licensed Automobile Manufacturers, and an attempt to form an organization of licensed dealers similar to the one started in New York recently. Ford's answer to the A.L.A.M. came out in the Friday morning papers. He made the claim that although the opinion of Judge Hough was filed on Sept. 15, 1909, no injunction has ever been entered against him in the case, nor has any decree been handed down. Ford also states that he still has two chances to fight, one the Court of Appeals and the other the Supreme Court. The delay is said to be due to legal difficulties in changing the name of the Electric Vehicle Company to the Columbia Motor Car Company.

Six-Cylinder American Napier Built in Boston Was One of the Most Conspicuous in the Six-Cylinder Field

NATIONAL LEGISLATIVE CONVENTION IN SESSION

WASHINGTON, D. C., Feb. 16—The New Willard Hotel is the scene of more than usual activity, even considering the many conventions and political gatherings which migrate to the heart of the nation in a year, due to the holding of the National Legislative Convention of the A. A. A., which is headquartered in the red room of the hotel. Numbered among the most prominent of our citizens at the time of the opening were: Vice-President Sherman, Senator Chauncey Depew of New York, the official delegates appointed by the Governors of 20 States and representatives from the 240 clubs which stud the country from Maine to California and from the Gulf to the north frontier.

The administrative staff of the A. A. A. are at the scene of activity in full force, Charles Thaddeus Terry, chairman of the legislative board, being in charge of the campaign, and supported by the immediate efforts of Powell Evans, chairman of the touring information board; S. M. Butler, chairman of the contest board, and George C. Diehl, chairman of the good roads board, is in the midst of the conflict with his coat off and sleeves rolled up. President Lewis R. Speare is making himself of the greatest utility to the cause, benefiting by the far-seeing counsel of vice-presidents R. T. Hooper, Frank N. Joyce and F. C. Donald.

Frederick H. Elliott, secretary of the A. A. A., is kept so much on the go in the performance of his manifold duties that it becomes practically impossible to obtain a comprehensive statement of the progress which is being made, or the results which should reasonably follow this concentrated and wise effort on the part of the A. A. A., to procure sane legislation which will be sufficiently broad in its scope to enable autoists to feel that they are within the confines of their own land when they cross the border of one State into the territory of another.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

James R. Mann, of Illinois, chairman; Irving P. Wanger, of Pennsylvania; Frederick C. Stevens, of Minnesota; John J. Esch, of Wisconsin; Charles E. Townsend, of Michigan; James Kennedy, of Ohio; Joseph R. Knowland, of California; William P. Hubbard, of West Virginia; James M. Miller, of Kansas; William H. Stafford, of Wisconsin; William M. Calder, of New York; Charles G. Washburn, of Massachusetts; William C. Adamson, of Georgia; William Richardson, of Alabama; Charles L. Bartlett, of Georgia; Gordon Russell, of Texas; Thetus W. Sims, of Tennessee, and Andrew J. Peters, of Massachusetts, members. The clerk of the committee is F. A. Donnelly.

The program for to-day beginning at 10 A. M., was as follows:

"The Motor Vehicle, the Road and the Farmer"—Hon. Nahun J. Bachelder, New Hampshire, Master of the National Grange.

"The Federal Registration Bill"—Hon. Reuben C. Moon, Representative from Pennsylvania.

"Inter-State Intercourse by Motor Vehicle"—Col. Charles Clifton, President Association of Licensed Automobile Manufacturers.

"Motor Vehicle and the Roads"—Hon. Charles P. Allen, Chairman State Highway Commission of Colorado.

"Rights and Duties of Motor Vehicle Users and The Federal Bill"—Osborne I. Yellott, of Maryland.

"Traffic Rules"—William Phelps Eno, of Washington, D. C.

"Speed"—Addison Ely, Jr., of New Jersey.

The afternoon session, which will convene at 2 p. m., will include the following:

"Motor Vehicles and Their Regulation"—Major Richard Sylvester, Superintendent Metropolitan Police, District of Columbia, President International Police Association.

"Principal of Federal Bill, Approved by Bench and Bar"—Hon. Neal Brown, State Senator for Wisconsin.

"The Federal Bill"—Frank G. Webb, ex-President Long Island Automobile Club, Brooklyn.

"The Federal Bill"—S. Boyer Davis, Secretary Automobile Club of Philadelphia.

"Road Improvements in Georgia"—Frank C. Battey, President Savannah Automobile Club.

"Inter-State Roads and Inter-State Laws"—George S. Walker, of Wyoming.

"The Federal Bill—Personal Experiences in Touring"—Claud E. Miller, District of Columbia.

The real hearing before the Congressional Committee will take place on Thursday, February 17. The attitude of the delegates is bounded by the path of wisdom, and the many angles of this important situation are being handled by the foremost advocates of good roads, good ethics, and uniform laws, among which Logan W. Page, Director of the Bureau of Good Roads of the United States Department of Agriculture, is a prominent figure. Walter C. Schutz, of Connecticut, in his address, attracted most favorable notice, and said: "Automobile laws should be based on reasonableness instead of on prejudice." Col. Wm. D. Schier, of Boston, member of the Massachusetts Highway Commission, laid great stress on the necessity of licensing the operators of cars, with power to revoke such license for drunkenness, or the high disregard of the rights of others.

UNITED STATES MOTOR CO. ORGANIZING

This $16,000,000 organization, which was projected with a view to bringing together certain of the older and well-known companies, was reported as including the Maxwell-Briscoe interests and the Columbia Automobile Company, which report was subsequently verified, but details were withheld. Benjamin Briscoe, in a special interview in relation to this matter, authorized THE AUTOMOBILE to announce the fact that the permanent organization is sufficiently under way to bring definite results at a meeting which is imminent, and so far it is safe to say that the board of directors will be headed by Benjamin Briscoe and J. D. Maxwell. Of course, everybody knows Benjamin Briscoe as the president and general manager of the Maxwell-Briscoe Motor Company, and J. D. Maxwell as vice-president, general superintendent and designer of the same company. Mr. Briscoe, in his interview, states most emphatically that any statements other than the above will be without authority, and out of tune with the real situation. Nothing more can happen until the balance of the board of directors is chosen.

"TRUE BLUE" IS DETROIT'S LATEST

DETROIT, Feb. 14—The True Blue Motor Company is the latest entrant in the ranks of Detroit's automobile manufacturers. It is capitalized at $100,000, and will bring out a pleasure car to sell at $1,300, the first of the series being almost ready for the road. Among those interested in the concern are Wallace E. Brown, president of the Michigan Gas Mantle Company; Maurice Wolf, secretary and treasurer of the same company, and Edmund H. Coombs, of the Coombs-Gilmour Company, distributor of the Mitchell car in Detroit.

E-M-F-STUDEBAKER QUARREL SUBSIDING

The report to the effect that negotiations were entered into with a view to the settlement of the squabble into which these companies entered, was denied by the E-M-F Company in total, at the same time the whole situation presents a less turbulent tone, and it is now the general expectation that some wise solution will be arrived at in the near course of events.

LOOKS LIKE PACKARD-KNIGHT CONTROVERSY

KNIGHT GIVES HIS VERSION OF PENDING CONFLICT

LEGAL BATTLE MAY DELAY LICENSES

An interview in Motor Age of February 10 with a representative of the Packard Motor Car Company stated that it owns basic patents on sleeve-valve engines for the United States, and that the Knight engine is an infringement of Patent No. 12,991, re-issued to Sidney A. Reeve on July 13, 1909. In justice to Knight and Kilbourne I cannot permit it to pass unnoticed.

For a proper understanding of what has occurred, a brief history of the Knight engine, and its success, is essential.

The formal announcement of the adoption of the Knight engine by the Daimler Motor Company of England was made in September, 1908. Within 60 days after this announcement a number of leading automobile manufacturers of the United States had representatives in England to investigate the merits of the Knight engine. One of these representatives was the chief engineer of the Packard company. Through the kindness of the Daimler company Mr. Knight was permitted to take him through its plant and show him every process in the manufacture and testing of Knight-Daimler engines. A sample engine was shipped to the Packard company early in January, 1909, its chief engineer having returned to the United States in December, 1908. Particular attention is directed to the significant fact that, according to the certified copy of the Reeve re-issued patent, Reeve, on February 9, 1909, within less than two months after the return of the Packard engineer from England, and within less than one month after the receipt of the Knight engine, made affidavit to an application for a re-issue of his patent No. 880,824, of March 3, 1908. This must be taken to mean that the Packard engineers were impressed sufficiently to induce action.

Descriptions of the Knight engine have been published. In a word it consists of two telescoped sleeves, both having ports, and each receiving a definite valving motion from an eccentric properly timed according to the four-cycle principle and operated from the crankshaft. Both sleeves slide within the main cylinder which has a fixed head projecting down into the inner sleeve and carrying the spark plug. This head closes both the intake and exhaust ports of that sleeve. The piston performs its usual working stroke entirely within the inner sleeve. During the compression and explosion strokes, the inner sleeve is hermetically closed above by the fixed head and below by the piston, so that the charge is fully compressed without loss, and when the explosion occurs its full force is exerted directly against the piston in a perfectly cylindrical combustion chamber having neither side chambers nor crevices to detract from the force of the explosion or to catch accumulations of carbon, these and divers other advantages must be taken note of.

The Reeve device is described as a steam engine of the double-acting horizontal type. Referring to Fig. 1, the piston 6 works in a sliding cylinder 5 arranged in a casing 1, which constitutes the steam chest or "head chamber." This sliding cylinder is not operated by an eccentric or other positive means, like the Knight inner sleeve, but is caused to slide endwise by the friction of the piston, so that when the piston starts to move in one direction, the sleeve will slide therewith and cause its exhaust port 70 in one end or the other to register with one of the exhaust ports 10 in the casing of steam chest to permit the steam to escape from the forward side of the advancing piston. In the outer ends of this sliding cylinder 5, however, Reeve places two piston valves 15, which are adapted to close the inlet ports 120 of the sliding cylinder when a spring 119 behind each piston valve forces it inward and the sliding cylinder 5 is forced towards it by the friction of the piston as the piston moves in that direction. The pressure for moving the piston is exerted between the piston valve 15 and the piston, and during the working and exhaust strokes the piston valve is held from moving outward by a latch device, which is supposed to let go at the proper time during the return stroke of the piston to permit the steam that has been compressed between the piston and the piston valve to force the piston valve outward against the spring and cause the piston valve to slide out from under and again open the inlet port in the sliding cylinder 5.

Reeve shows two forms of his device, one of which is constructed as above described. The other is the same, excepting that he has supplied the sliding cylinder 5 with an auxiliary valve 121 at each end for the common purpose of co-operating with the piston valve 15 in cutting off the cylinder admission more economically than could be done by means of the piston valve alone. This auxiliary cut-off valve is found in the steam engine art in various forms, *i.e.* as piston valve, flat slide valve, ring valve and sleeve. Reeve has chosen the ring form, which he places around each of the protruding ends of the sliding cylinder 5, and which he says he operates from the crankshaft by an eccentric in the usual way, although he does not show the eccentric or operating means.

The combination of elements which constitute the sleeve valve inter-

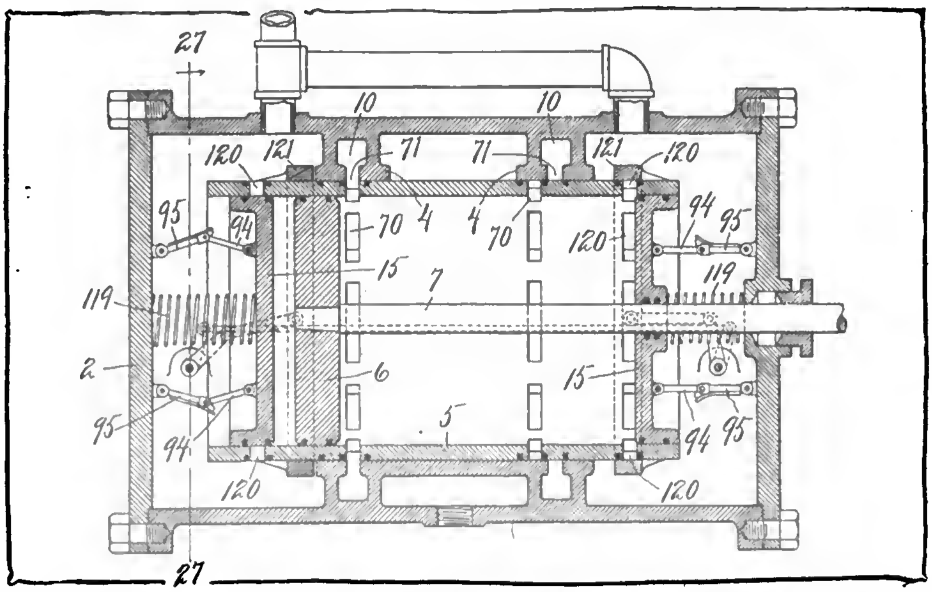


Fig. 1—Reeves valve mechanism as shown by drawings for re-issued patent 12,991, in which the Packard Motor Car Company is interested. Although this is not applied to a standard automobile motor, the principles are said to be the same.

nal explosion motor were common in the steam engine art years before Reeve's invention, as shown in Fig. 2 by the United States patent of Uren, No. 303,344, issued August 12, 1884, to have the main piston B^2 slide in a sliding cylinder C contained within a casing or main cylinder A and having ports adapted to register with ports in the casing for controlling the cylinder admission and exhaust, the internal sliding cylinder being moved by the friction of the piston, as in the Reeve patent, and it was also old in hydraulic motors, as shown in Fig. 3 of United States patent No. 352,797 of Baldwin, November 15, 1886, to provide the internal sliding cylinder K with an auxiliary cut-off valve 1, 2, 3, 4 encircling each end in the form of a ring and controlling the admission ports, i, i^1 in the sliding cylinder K. In this Baldwin patent these cut-off valves are connected together so as to move in unison by a cylinder W surrounding the internal cylinder K, and both of these cylinders are contained within a main cylinder or casing G having an inlet port Z. The cut-off valves 1, 2, 3, 4 receive definite motion from a valve operating rod N, just as in the Reeve patent. The piston in this Baldwin patent is shown at J, and while it is the main piston, it also serves as two piston valves for controlling the exhaust ports M, M^1 in the internal sliding cylinder.

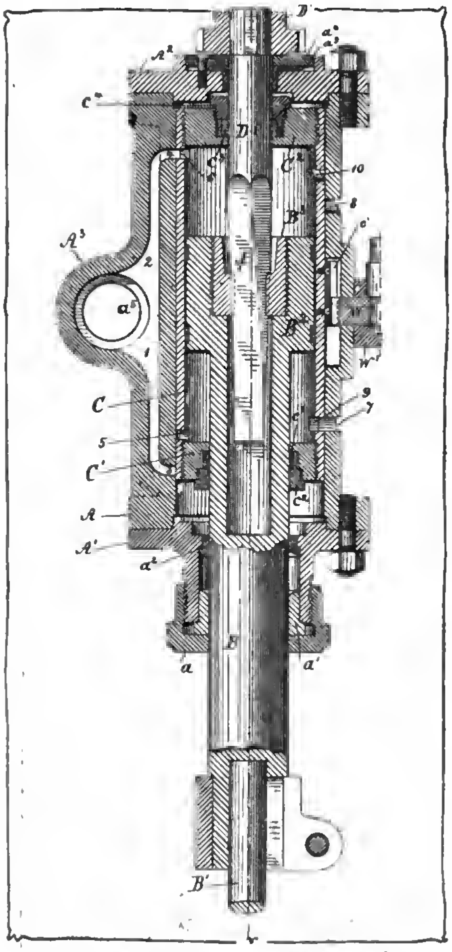


Fig. 2—Uren patent, No. 303,344, which is claimed by Knight interests to conflict with the Reeves patent illustrated above.

The present owners of the Reeve reissue saw and fully appreciated the fact that the Reeve original patent claimed a structure in which no eccentric was employed, and consequently must have claimed the form of the Reeve engine which does not contain the outside auxiliary or cut-off valve. Therefore, when applying for the reissue patent they omitted from the specification the statement of advantages above quoted so as to be able to direct the claims of the reissue to the form of the engine having the outside cut-off valve operated by an eccentric. Consequently, the reissue is for a different invention from that which the patentee intended to cover by the original. The United States Circuit Court at Chicago in the case of Chicago Railway Equipment Co. v. Perry Sidebearing Co., 170 Fed. Rep. 968, has recently settled these questions in a very exhaustive opinion, and this decision has been sustained by the United States Circuit Court of Appeals, and enforced against the reissue even to greater limits. In this decision, the Court said:

Thus it is sought by the language of the reissue claims to broaden the limited claims of the original patent into claims covering the whole field * * *. It seeks to bring within the monopoly of its patent sidebearings not apparently in mind at the time of filing the original application * * *. It can hardly be claimed that the original patent was not a complete device. It was operative just as completely as that of the reissue patent. For all that Wands was seeking, it was in itself a finished sidebearing arrangement. Later he thought he could just as well claim the resilient centering device and make it apply to every friction sidebearing which is centered by a spring. Undoubtedly he made the mistake of not claiming the larger invention, if it be such in his first application; but this is not the mistake the statute and the courts have in mind. (Authorizing the grant of re-issue patents.)

In Campbell v. James, 104 U. S. 356, U. S. Supreme Court said:

When a patent fully and clearly without ambiguity or obscurity describes and claims a specific invention complete in itself so that it cannot be said to be inoperative or invalid by reason of a defective or insufficient specification, a reissue cannot be had for the purpose of expanding and generalizing the claim * * *.

In a further attempt to show that a re-issue must be for the same invention without having its scope or bearing broadened in any particular other rulings may be cited.

The real force of decision is clearly apparent, since Reeve intended by his original patent to cover a steam engine in which there would be no eccentric for operating the valves, whereas in his reissue patent it became necessary to claim the eccentric operated valve in order to establish a color of right to the Knight invention.

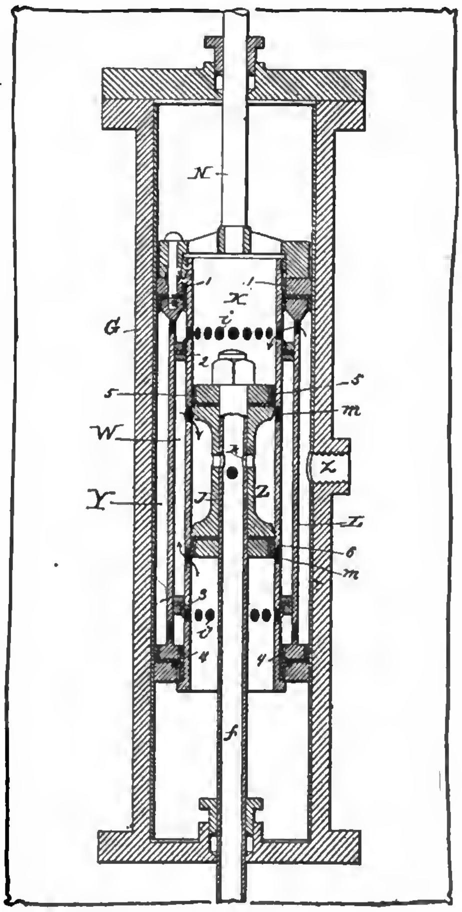


Fig. 3—Baldwin patent, No. 352,797, another valve mechanism resembling that of Reeves and claimed to conflict with it.

In Huber v. Nelson, 148 U. S. 270, the United States Supreme Court held the reissue invalid because it left out one of the elements of the original claims.

In Chicago Railway Equipment Co. v. Perry Co., above referred to, the United States Circuit Court at Chicago, in speaking of the effort of the reissue patentee to enlarge his claim by omitting an element originally described as important in explanation of the situation said:

These two things are vital elements of that patent. Now it is sought by re-issue to drop out the distinctive feature of the patent as described in the claims and substitute another element.

This comment is pertinent because Reeve seeks by his reissue to drop out the statement contained in the original, making essential the form of his engine in which no eccentric is employed for operating the valves, and then to specifically cover this eccentric form by his reissue claims.

The United States Circuit Court of Appeals in New York in the case of Carpenter Co. v. Searle, 60 Fed. Rep. 82, laid down the rule that unless the invention of the re-issue is described as the invention in the original, and that the patentee intended to secure it as his invention in the original, the re-issue is invalid. Other rulings may be cited in support.

(Signed) F. E. Conas,
Attorney for Knight & Kilbourne.

NEW IDEA—POPULAR CAR VOTING CONTEST TROPHY

ANNUAL MIDWINTER NEW YORK TO BOSTON RUN

PERLMAN TROPHY WILL BE COMPETED FOR

THIS contest has been arranged in compliance with the instructions of L. H. Perlman, who desires to open the season of 1910 with a contest that will reflect credit on the trade and invite favorable criticism from the public. The trophy furnished by him at a cost of $500 is to be awarded to the car receiving the greater number of votes cast at the points hereinafter named.

Arrangements have been made with the Hotel Astor to have its dining room open for breakfast at 5 a. m. Saturday morning, March 5, 1910, and the contestants will get away at 6.

Under no circumstances are the speed ordinances to be violated at any time during the day. There are no speed requirements and it is specifically understood and agreed that none will be indulged in, consequently no one will be permitted to pass the pace-making car. Any entrant who passes the pace-making car will be disqualified and must withdraw from the contest.

Each contestant will be provided with a set of flags bearing the name of the car, in large distinct letters that the public may easily discern.

Each car will receive when arriving on the starting line the official ballot box. When reaching a voting station or control the representative of the car must place this box in a conspicuous place, but under no circumstance must he allow it out of his possession.

The controls or voting stations are at the following points: Bridgeport, New Haven, Hartford, Springfield, Worcester and Boston.

Cars must follow the official route and comply with the speed regulations which will not allow of passing the pacemaker.

A contestant must not stay more than 30 minutes in the control or the vicinity. There is no restriction as to the number of passengers, or the method of soliciting votes.

A daily paper in each city which has been selected as a station, will for one week, beginning Monday, publish in its columns the official ballot, none other will be recognized. The daily printed ballot will carry the names of the cars entered up to the time of going to press.

When there is more than one car entered of the same make, each will receive a ballot box, but the votes will be counted collectively.

The polls will be under the jurisdiction of the show committee at Boston who will appoint tellers. Polls will close at 9 p. m. Saturday night. If a contestant has not reached Boston by that hour he will be considered out of the contest.

Each checking or voting station will be under the direction of the referee of that city and his appointment will be made by the paper which is running the ballot. The moment that the show committee announce the winner the award will be made. As a method of determining the relative popularity of the various cars entered, the run should be productive of interesting results. At any rate, it is a distinct novelty among contests.

The violation of any of these rules and conditions particularly as relates to speed will be judged by the referee. An official representative of the contest board of the American Automobile Association will accompany the tour.

Entry blanks for this contest may be had by applying to T. F. Moore, manager of the contest, whose address is 91 West 103d street, New York City.

Notable among the many affairs of the sort which accompanied the Chicago show was the dinner given by F. C. Roble, president of the Excelsior Supply Company, of Chicago, to the salesmen and department heads of his organization. The dinner was held Thursday, February 3, in the clubrooms of the Chicago Automobile Club, of which Mr. Roble is a member. Besides the officers and staff of the home company, practically all of the traveling representatives were present, only two or three being too far distant to attend

NATIONAL LEGISLATIVE CONVENTION AT WASHINGTON

WILL DISCUSS NEEDS OF UNIFORM AUTOMOBILE LAWS

NATIONAL REGISTRATION BILL GIVEN HEARING TUESDAY

STATESMEN, legislators, and prominent automobilists from all parts of the country will assemble in Washington this week for the three days' session of the National Legislative Convention, which will be held in New Willard Hotel on Tuesday, Wednesday and Thursday, February 15, 16 and 17. This convention has been organized and will be conducted under the auspices of the American Automobile Association, and its primal objects will be the securing through national legislation of the Federal Automobile Registration Bill, and at the same time a wider recognition by the various State officials who have been appointed by their respective Governors, of the benefits of the uniform State automobile law.

Coming within a month of the big convention in Washington of the National Civic Federation, which was devoted to the highly important subject of uniform laws, this legislative convention, which will be solely devoted to the needs for uniform and more equable automobile legislation, will be, perhaps, the greatest public demonstration of the sort ever seen in this country towards securing favorable legislation for an industry which has suddenly assumed gigantic proportions in the commercial life of this country, while vitally affecting the comfort and convenience of thousands of individuals.

Invitations extended on behalf of Charles Thaddeus Terry, chairman of the Legislative Board of the A. A. A. to the Governors of all the states in the Union, have met with the most favorable response. Official representatives have been appointed by the Governors of nearly twenty States, in many cases these delegates including the Secretaries of State and the State Highway Commissioners; thereby showing the increasing interest in the subject of automobile legislation and the apparent willingness of the various States to enact harmonious laws. From the automobile clubs throughout the country, as was naturally expected, the response has been highly satisfactory, and the delegates named from scores of clubs, as well as many state automobile associations, include most of the prominent motorists who are well known as earnest workers for the best interests of automobiling.

Secretary Frederick H. Elliott, of the A. A. A., arrived in Washington on Thursday to open headquarters in the New Willard Hotel.

President Lewis R. Speare, Chairman Charles Thaddeus Terry, A. G. Batchelder, chairman of the Executive Committee, and other officials will follow, and by Monday the reception of the visiting delegates will be well under way. The national officials will be aided in their arrangements and reception of delegates by the Automobile Club of Washington, which has appointed a committee of twenty-five to act as the Washington reception committee. President H. Chadwick Hunter, who has taken an active part in working for the success of this convention, will act as chairman of this committee of twenty-five, and his assistants will be John K. Heyl, Elliott P. Hough, W. S. Duvall, Lester D. Moore, Louis A. Dent, William D. West, J. Hamilton Smith, R. B. Caverly, J. H. Falconer, D. J. Dunigan, Fulton R. Gordon, Harrington Mills, A. Ward Evans, Franz Kopp, W. A. Copenhaver, Charles W. Bender, John F. Maury, H. C. Chandlee, W. W. Chiswell, O. J. De Moll, William Muehleisen, Jr., F. H. Edmonds, A. L. Cline.

The opening day of the convention on Tuesday will be mainly devoted to the subject of uniform State legislation in automobile matters, at which time particular attention will be given in the various addresses and discussions to the necessity of enacting uniform laws by the different States in the Union. This is a subject that the national automobile association has been working for during the past half dozen years, and its efforts have been crowned with success in several states. The salient features of the uniform State motor vehicle bill as drafted by Mr. Terry about four years ago have already been adopted by several States, and the benefits that have accrued thereby not only to motorists but to all the users of the highway have been such as to recommend a similar system of uniformity in other States.

President Speare, of the American Automobile Association, will open the convention at ten o'clock Tuesday morning, and he will be followed by Senator Chauncey M. Depew, of New York, who will make the address of welcome. Chairman Charles Thaddeus Terry, of the Legislative Board of the A. A. A, as well as of the National Legislative Convention, will then outline the purposes of the convention, explaining in detail the merits of the uniform State motor vehicle bill, as well as the benefits to be derived by the National Federal Registration Bill. Among the speakers who will follow him discussing different phases of the uniform legislative question will be Senator Rayner, of Maryland; Senator Beveridge, of Indiana; Congressman Dalzell, of Pennsylvania; Secretary of State Rogers, of Connecticut, and Secretary of State Martindale, of Michigan. Among the prominent speakers in the afternoon session will be Logan Waller Page, Director of United States Office of Public Roads; James H. MacDonald, Highway Commissioner of Connecticut; Secretary of State Thompson, of Ohio, and Secretary of State Bailey, of Vermont.

The second day's session of the convention on Wednesday will be chiefly devoted to the Federal Registration Bill, which will be outlined in the discussion by Congressman Moon, of Pennsylvania; President Charles Clifton, of the Association of Licensed Automobile Manufacturers; Hon. Henry B. F. Macfarland, President of the Board of Commissioners of the District of Columbia; Hon. Neal Brown, State Senator of Wisconsin; Frank G. Webb, of the Long Island Automobile Club, and S. Boyer Davis, of the Automobile Club of Philadelphia. Other addresses will be made by William Phelps Eno on "Traffic Rules"; Hon. Charles P. Allen, Highway Commissioner of Colorado, on the "Motor Vehicle and Roads," and Addison Ely, Jr., of New Jersey on "Speed and Its Regulations." Ex-Governor Bachelder, of New Hampshire, will speak on "The Motor Vehicle, the Roads and the Farmer."

To the automobilists of the country who have been working for and are deeply interested in this vital subject of uniformity, the great day of the convention will be on Thursday, the closing day, when the hearing will be held on the Federal Registration Automobile Bill. This bill is already before Congress, having been introduced by Congressman Cocks, of New York, a year ago, and has been referred to the Committee on Interstate and Foreign Commerce, before which the hearing will be held in the Capitol.

The complete list of delegates to date, is:

Delegates Appointed by State Governors

Colorado—Charles P. Allen, Chairman Colorado State Highway Commission; appointed by Governor Shafroth.

Connecticut—Secretary of State Matthew H. Rogers and Arthur Ffoot; appointed by Governor Weeks.

Indiana—Carl G. Fisher and Clarence A. Kenyon, of Indianapolis; appointed by Governor Marshall.

Michigan—Secretary of State Frederick C. Martindale; appointed by Governor Warner.

Maryland—Osborne I. Yellott, of Baltimore; appointed by Governor Crothers.

Vermont—Secretary of State Guy W. Bailey; appointed by Governor Prouty.

Wisconsin—James T. Drought, of Milwaukee, and Capt. William Mitchell Lewis, of Racine; appointed by Governor Davidson.

Wyoming—J. E. Mershon, Rock Springs; Fred. Fisher, Fayette; Elmer Lovejoy, Laramee; George S. Walker, Cheyenne; appointed by Governor Brooks.

Florida—Edward Holder, Jack Camp, J. D. Robertson and R. L. Anderson; appointed by Governor Gilchrist.

Oregon—Dr. C. B. Brown, Portland; appointed by Governor Benson.

Kentucky—George H. Wilson; appointed by Governor Willson.

Delaware—F. Allen Hilles, Wilmington; appointed by Governor Pennewill.

Delegates from A. A. A. Clubs

Colorado—Charles P. Allen, Denver Motor Club.

Florida—T. Edward Bryan and Capt. C. S. Washington, Tampa Automobile Club.

Georgia—John J. Woodside, J. D. Rhodes, R. J. Guinn, Atlanta Automobile Association; F. C. Battey, Savannah Automobile Club.

Iowa—Dr. Harry Pierson Engle, Newton Motor Car Club.

Massachusetts—A. E. Lerche, president, and S. L. Haynes, Automobile Club of Springfield; John P. Coghlin, president, and F. A. Easton, Worcester Automobile Club; W. H. Chase, president, Wachusetts Automobile Club.

Minnesota—Dr. C. H. Kohler, Minnesota State Automobile Association.

New York—S. C. Tallman, president; Hon. Sereno E. Payne, Charles L. Sheldon, Arthur J. Blauvelt, Automobile Club of Auburn; H. A. Meldrum, president, and Bert Van Tuyle, secretary, New York State Automobile Association; Allen C. Alderman, president, Frank G. Webb and Dr. William P. Richardson, Long Island Automobile Club; H. G. Strong, president, Bert Van Tuyle and W. W. Dake, Automobile Club of Rochester; Dr. E. G. Cox, president, and Henry Martin, Albany Automobile Club; William H. Mendel, president, and J. J. Sinnott, Mt. Vernon Automobile Club.

New Jersey—Frank B. Stratford, J. H. Edwards, Dr. Henry Spence, J. V. Z. Anthony, Automobile Club of Hudson County; Dr. J. N. Faulkner, vice-president North Jersey Automobile Club; J. H. Wood, R. A. Greene, C. H. Bissell, New Jersey Automobile and Motor Club.

Ohio—Dr. A. B. Heyl, secretary, Ohio State Automobile Association; C. J. Forbes, Jr., secretary, Cleveland Automobile Club.

Pennsylvania—B. D. Wright, Edward J. Kent, Edward Kneeland and Paul C. Wolff, secretary, Automobile Club of Pittsburg; Hon. William M. Brown, ex-Lieutenant Governor, Hugh Graham and Jere Bauman, Automobile Club of Lawrence County; S. Boyer Davis, secretary, Howard Longstreth and Harrison K. Caner, Automobile Club of Philadelphia; G. Douglas Bartlett, G. Hilton Gantert, Quaker City Motor Club; I. D. Wood, J. E. Mitchell and A. H. Tomlinson, Automobile Club of Delaware County; E. Foster Heller, Wilkes-Barre Automobile Club.

Vermont—W. W. Brown, president, Allen M. Fletcher, Charles C. Warren, Addison Ely, Jr., James Boutwell and S. S. Ballard, secretary, Automobile Club of Vermont.

Virginia—H. H. Trice, Tidewater Automobile Club; J. H. Marsteller, Roanoke Automobile Association; C. B. Richardson, Richmond Automobile Club; William E. Barrett, Peninsula Automobile Club; M. C. Watts, Valley Motor Club.

Wyoming—George S. Walker, Cheyenne Motor Club.

Wisconsin—Hon. Neal Brown and James T. Drought, secretary, Wisconsin State Automobile Association.

Illinois—Dr. W. W. Williams, Quincy Automobile Club; Fred W. Blockl, Chicago Automobile Club.

Connecticut—John N. Brooks, Secretary, Connecticut Automobile Association; Walter S. Schutz, Automobile Club of Hartford.

Kentucky—George H. Wilson, Louisville Automobile Club.

West Virginia—C. N. Brisco, secretary, Monongahela Automobile Club; T. A. Westmeyer, Ohio Valley Automobile Club and State Association; W. T. Carter, Parkersburg Automobile Club; Dr. R. H. Pepper, Huntington Automobile Club.

PREMIER MAKES ENTRY IN FLAG-TO-FLAG RACE

THE first entry for the approaching run from Denver to Mexico City for the Wahlgreen trophy was made recently by President H. O. Smith of the Premier Motor Manufacturing Company. The entry blank was filled out and delivered to George A. Wahlgreen, of Denver under whose direction the contest will be held. On May 2 it is expected that the tourists will start from Denver and the first car to be sent away will be a Premier driven by Ray McNamara.

Details of the event are being arranged by Mr. Wahlgreen, who has received assurances from so many prominent licensed automobile manufacturers of their support that there seems no doubt but that this interesting contest, which was postponed from last Fall, will actually be held. The Premier interests have felt that this grueling test will be another opportunity to show additional evidences of the ability of their cars and and additional chance to repeat the successes in recent Glidden and other hard contests. About three weeks will be necessary for the machines to make the trip, and in that space of time they will cross part of Colorado, all of New Mexico, part of Texas and run through nine States of the Republic of Mexico. The distance is about 2,400 miles, which is nearly as long as the 1909 Glidden Tour, and much longer than the route for the next A. A. A. event.

MILESTONES FOR THE AUTOMOBILIST

Feb. 14-19........Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dai H. Lewis, Manager, 760 Main street.

Feb. 14-19........Hartford, Conn., Foot Guard Armory, Third Annual Show, Hartford Automobile Dealers' Association.

Feb. 14-19........St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington avenue.

Feb. 14-19........Rochester, N. Y., Convention Hall. Third Annual Show, Rochester Automobile Dealers' Association. Captain C. A. Simmons, Manager.

Feb. 15-19....... Washington, D. C., American Automobile Association's National Legislative Convention.

Feb. 17-19........Grand Rapids, Mich., First Annual Automobile Show, Grand Rapids Automobile Club.

Feb. 19-26........Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.

Feb. 19-26........Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 19-26........Los Angeles, Cal., Hamburger Building, First Annual Show, Licensed Dealers of Los Angeles.

Feb. 19-26........Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South street.

Feb. 19-26........Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.

Feb. 21-26........Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.

Feb. 22-26........Baltimore, Second Annual Automobile Show, Auto Club of Maryland, Fifth Regiment Armory.

Feb. 21-26........Portland, Me., Auditorium, Fifth Annual Automobile Show. F. M. Prescott, Manager.

Feb. 22-27........Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.

Feb. 24-26........Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 24-Mar. 3....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Mgr.

Feb. 28-Mar. 5....Omaha, Neb., Auditorium, Automobile Show, Omaha and Council Bluffs Automobile Dealers.

Feb. 28-Mar. 5....Kansas City, Convention Hall, Fourth Annual Automobile Show, Automobile Dealers' Ass'n.

Mar. 5-12........Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.

Mar. 5-12........Cleveland, Central Armory, Cleveland Automobile Club Eighth Annual Show.

Mar. 5-12........Des Moines, Ia., Coliseum, First Annual Automobile Show, Des Moines Automobile Dealers' Ass'n.

Mar. 7-12........Albany, N. Y., Armory, Automobile Show.

Mar. 12-19........Syracuse, N. Y., State Armory, Automobile Show. Syracuse Automobile Dealers' Association.

Mar. 17-19........Louisville, Ky., Armory, Louisville Automobile Dealers' Association Annual Automobile Show.

Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsman's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 21-28........Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.

Mar. 26-Apr. 2....Pittsburg, Pa., Dusquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Mar. 26-Apr. 2....Montreal, Coliseum, Motor and Sportsmen's Show. E. M. Wilcox, Manager.

Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

THE AUTOMOBILE

Vol. XXII Thursday, February 17, 1910 No. 7

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, Geueral Mauager

231-241 West 39th Street, New York City

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United States aud Mexico - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Uniou, iucluding Ceueda - - - - One Year, 5.00
To Subscribers—Do uot send mouey by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 186 Streud, London, W. C., and all bookstalls aud ageucies in Great Britaiu; also in Paris et 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berliu.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), Mey, 1902, Dealer and Repairmau (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Good roads, if they mean anything at all, represent the key to general prosperity. The automobile, no matter what else of good may be ascribed to it, is the greatest influence for advancement of all the devices which men of the last century reduced from a state of chaos, or placed in the hands of workers.

If there are a few minor defects of the automobile, as it is met with on the road, even if a few "road hogs" make things unpleasant on occasions, the fact still remains that the demand for good roads is the surest indication of the intrinsic value of the automobile industry, taking it as a whole. It is useless to try to dam up an ocean; pigmy minds may not be able to project thought for a distance beyond a pug nose, but the industry will go on just the same, and the roads, which are, in all truth, the other half, will be designed and constructed.

That the roads, if they are to be good, will have to be designed, seems to be too true to be disregarded any longer, and when the truth is told it is likely to lay bare the entire absence of designing, considering some of the roads which seem to pound out rather too soon to allow of realizing a fair return on the cost. It is easy enough to say that this high depreciation is due to automobiles, and it may be true that automobile traffic is too much for certain kinds of roads.

Before automobiles came into vogue there was trouble enough with these same roads, and every State had its laws which regulated the width of tires in proportion to the load which weighed them down, and is here mentioned merely to indicate that it is easy enough to forget that the trouble now complained of is the same trouble that obtained for many years, and long before the automobile was in use at all.

Just as it is possible to go back to a time when roads were so bad that no one ever thought of complaining about them, it is now possible to foresee a time when they will be so thoroughly good that there will be no reasonable ground for complaint. For the present it is a matter of education; it is necessary to remove the last vestige of complaint which is so prone to overshadow all else, and this can be accomplished by teaching drivers of automobiles to respect the rights of others, and requesting others to reciprocate.

The automobile shows which are now being held at important centers all over the country are working out the problem of the automobile to a far greater extent than show managers contrived. The shows interest an increasing circle of citizens from year to year, and in view of the merit of the automobile as the servant of the whole people, all that is necessary is to have them come and see —they do come to the shows, and, what is equally to the point, they do see.

Purchasers, when they decry a practice, which to them seems out of step with the spirit of the times, are, more likely than not, on the second lap of a fallacy. In the manufacture of anything, be it a peacemaker for an infant in the shape of a sweetened rag on the end of a string, to the house on wheels which contents the soldier of fortune who seeks adventure in Spain, demand comes first; supply is the answer.

If a maker is trying to foster upon the supporters of the automobile industry, something out of the cloth called by the name shoddy, it must be true that the maker is either without any experience at all, or, experience has shown to him that there are enough shoddy purchasers on the horizon to support the industry. If the maker is mistaken in his notion, if there is no demand for his wares, the receiver will follow him like misfortune after its mate, and the law of supply and demand will be satisfied.

That makers do anticipate demand is not to be denied, and that this idea is a safe one in a sense, is proven; if a certain automobile, after much experience, presents stable characteristics, and the demand for it is constant, it is good practice to examine the sales books, ascertain the strength of demand and take advantage of lowering costs which come from manufacturing on a basis of a steady rate of output.

The antithesis of constant demand and manufacture for stock account is present when purchasers of shoddy characteristics follow the bent of normal inclination and encourage the manufacture of equipment which is not under the restraint of the conventions; the bait being greed; the hope being that something will be had for nothing; the end, like in shoddy cloth, leaves a mesh of entangled rope ends—the part which deceives, like the varnish over the unfaithful automobile, falls to the ground; it may not respond to the expectations of the purchaser, but it cannot escape the influence of gravity.

MOTOR RATINGS DISCUSSED

POWER provides a never-failing source of discussion for the automobilist. No other term in his vocabulary is so misused or misunderstood, or has so many interpretations, and at the same time it is a subject of vital interest, inasmuch as it affects his comfort, his pride or his bank account. It is that quality which makes the difference between passing that other car on the road, and being forced to take its dust; or between climbing a hill in good form, and being obliged to get out and push. Naturally, when he invests a thousand, or several thousand dollars in a car, he wants all the power that his money can buy.

Power, as a technical term, has a very definite meaning. It is defined as the rate of doing work. Work, in turn, is the product of a force and the distance it moves. Thus power is force, times distance, divided by time. It is expressed in units implying these three quantities, as pounds per foot per minute, or kilograms per meter per second. A horsepower is 33,000 foot-pounds per minute; that is, a power which can lift 33,000 pounds one foot in one minute, or one pound 33,000 feet in one minute, or one pound one foot in 1-550 second.

In a gasoline motor power is developed by the burning, and consequent expansion, of the gaseous mixture. The expansion results in a force exerted on the piston head; the travel of the piston on its stroke gives the distance, and the number of strokes per minute adds the time factor. Given the pressure in pounds, the stroke in inches or feet, and the number of strokes or revolutions per minute, the horsepower developed in a gasoline motor cylinder can be readily figured. Although the last two quantities are easy enough to obtain, the first, unfortunately, cannot be had without the use of delicate and costly instruments.

Nevertheless, these instruments, known as indicators or manographs, form part of the equipment of every modern testing laboratory, and valuable results are obtained from their use. On the indicator or manograph card the pressure at every point in the cycle, or in a succession of cycles, is graphically indicated. The pressure on the expansion stroke shows the force which is doing useful work. This pressure is a variable, high immediately following the explosion, and falling off as the piston nears the bottom of its stroke. To make it available for calculation it must be averaged; the average figure, known as the mean effective pressure, is the quantity which, taken with the stroke and the revolutions per minute, will give the power developed in the cylinders, or indicated horsepower.

However, not all of the power developed in the cylinders is delivered at the flywheel. Friction takes a share, in the thrust of the pistons on the cylinder wall, the necessary tightness of the piston rings, the bearings of the connecting rods and the crankshaft journals. More power is lost in driving the valves, the pump, magneto and oiling system. The amount of these losses varies with the construction of the motor; here care and accuracy of workmanship make themselves felt. For motors in good running order the loss is a fairly constant percentage.

To determine the power actually delivered by the motor numerous methods are in use; all depend on the absorption and incidental measurement of the power, as by a friction brake, an electric generator, a water pump or a fan. As the earliest and best known of these the friction, or Prony brake, method may be described. Like all the others, it depends on the definition of power as force times distance, divided by time. The application is quite generally familiar; a brake band or shoe applied to the flywheel, and prevented from rotating with the flywheel by weights on the end of a lever arm. The weight, or the length of the arm, is adjusted until the weight is in equilibrium, tending neither to rotate with the flywheel, or to drop under the force of gravity. The weight then gives the force, the length of the arm the distance, and the number of revolutions per minute the time factor, necessary for calculating the horsepower.

Brake horsepower, as the figure thus obtained is called, is usually regarded as the best standard for judging the ability of an automobile. However, in order to determine the power actually available for driving the vehicle, it is necessary to gauge the power delivered at the rear wheels; for there are losses in the transmission from the flywheel to the drivers, just as there are in the transmission from the cylinders to the flywheel. Horsepower at the rear wheels may be measured by a Prony brake, or by the other forms of testing devices mentioned, just as power at the flywheel may be measured.

No form of brake horsepower lends itself to a method of rating; obviously the only way to measure brake horsepower is to perform the actual test. To get a rating by which the power can be estimated without an actual test, or even before the motor is built, it is necessary therefore to go back to the less desirable form, indicated horsepower. The quantities needed for the calculation are here the area of the piston head on which the pressure acts, easily obtainable from the cylinder bore; the

INDICATED HORSEPOWER OF MOTORS

$$\text{Power} = \frac{\text{Force x Distance}}{\text{Time}}$$

$$\text{HP} = \frac{\text{Force (lbs.) x Distance (ft.) per min.}}{33{,}000}$$

Force = M.E.P. (lbs. per sq. in.) x Area of piston (sq. in.) x No. cyls.

Distance per minute = Stroke (ft.) x ½ Revolutions per minute

$$\text{Indicated HP} = \frac{\text{P x A x N x S x R}}{66{,}000}$$

STROKE, REV. AND PISTON SPEED

	R.P.M.						
Stroke.	900	1000	1100	1200	1300	1400	1500
3½....	525	583	642	700	758	817	875
3¾....	562	625	687	750	812	875	937
4	600	667	733	800	867	933	1000
4¼....	637	708	779	850	921	992	1062
4½....	675	750	825	900	975	1050	1125
4¾....	712	792	871	950	1029	1108	1187
5	750	833	917	1000	1083	1167	1250
5¼....	787	875	962	1050	1137	1225	1312
5½....	825	917	1008	1100	1192	1283	1375
5¾....	862	958	1054	1150	1245	1341	1436
6	900	1000	1100	1200	1300	1400	1500

number of cylinders; the stroke of the pistons; the speed in revolutions per minute at which the power is to be figured, and the mean effective pressure. The last is the only one which offers any difficulty.

Of course it is just as impossible to predict exactly what will be the mean effective pressure of any motor, as it is to predict what weight its flywheel will balance on a five-foot lever arm; but it is possible to take an average figure for the mean effective pressure which will be a reasonable expectation, given detail design and workmanship up to the standard. For this purpose the mean effective pressures of a number of well-known motors have been worked out from their known performances, and are given herewith for reference. It will be noted that the powers used in deriving these figures are all brake horsepowers, and that the mechanical losses between the piston heads and the flywheel have been ignored. The actual pressures must in all cases be sufficiently higher than those given to balance these mechanical losses. Therefore, if the expectations of the power to be developed by a suppositious motor are based on these figures, the expectations will be in terms of brake horsepower rather than indicated horsepower, which is exactly what is wanted.

The figures quoted for mean effective pressure range, it will be observed, from 70 to 100 pounds per square inch. The latter is the pressure attained by the English Daimler motor with the Knight sliding-sleeve valve system, and is one of the highest ever reached on a stock motor. The examples show, further, that the

BRAKE HORSEPOWER OF MOTORS

$$\text{Power} = \frac{\text{Force x Distance}}{\text{Time}}$$

$$\text{Horsepower} = \frac{\text{Force (lbs.) x Distance (ft.) per min.}}{33{,}000}$$

Force = Weight (lbs.) applied on lever arm
Distance per minute = 2π Length (ft.) of lever arm x Revolutions per minute

$$\text{Brake HP} = \frac{2\pi \text{ L x R x W}}{33{,}000}$$

mean effective pressure for any motor is by no means constant. If it were, the power curve of that motor would be a straight line, showing variations in power exactly proportional to those in speed. As a matter of fact, the pressure falls off with an increase of speed over a certain point, determined, of course, by the peculiarities of the individual motor. Figures on the Daimler-Knight motor show a pressure of 100 pounds at 1,172 revolutions, whereas at 1,500 revolutions the pressure is but 93.9 pounds, this in spite of the admitted fact that the Knight valves are better adapted to high speeds than poppet valves.

It must not hastily be assumed that the excellence of a motor is shown by its mean effective pressure; the designer's intentions should be considered. A high-pressure motor is naturally subject to more severe strains and stresses than a low-pressure one, and, other things equal, may be considered shorter lived. The question of flexibility also enters largely. To secure high compression, and consequent high pressure at high speed, the initial compression may be made so great that the motor will not throttle down. This is often seen in racing motors.

In devising a rating formula from the formula given for indicated horsepower, it is first of all necessary to assume arbitrarily a figure for the mean effective pressure, as this is the most dangerous variable quantity to be reckoned with. Most formulas take 70 pounds as the average; a figure conservative, but not unjust. Secondly, the speed must be assumed. A formula

DERIVATION OF A. L. A. M. FORMULA

$$\text{Indicated HP} = \frac{\text{P x A x N x S x R}}{66{,}000}$$

Assume P (Mean Effective Pressure) = 70.
Assume piston speed is a constant = 1,000 ft. per min.;
then 2 S x R = 1,000, and S x R = 500

$$\text{Ind. HP} = \frac{70 \text{ x } \tfrac{1}{4}\pi \text{ D}^2 \text{ x N x } 500}{66{,}000} = \frac{\text{D}^2 \text{ x N}}{2.4}$$

$$\text{A. L. A. M. HP.} = \frac{\text{D}^2 \text{ x N}}{2.5}$$, for convenience in calculation.

often favored is horsepower = one-tenth the piston displacement, in cubic inches. For a four-cylinder 5 by 6 motor, in which the piston displacement is 471.2 cubic inches, this gives a rating of 47.1 horsepower. A moment's calculation will show that this formula is based on the assumption of 70 pounds as the pressure, and 1,131 revolutions per minute as the speed, or of other figures in proportion.

The formula in widest use is that known in this country as the A. L. A. M., and in England as the R. A. C. This differs from the preceding in that the second quantity assumed is not revolutions per minute, but piston speed. If, as before, 70 pounds is taken as the pressure, the piston speed will be close to 1,000 feet per minute. Corresponding speeds in revolutions, for motors of a given stroke, may be obtained from the table. In the table of pressures one figure for each motor is at the speed at which the motor should develop its A. L. A. M. horsepower; the justice of the assumptions may be deduced from these figures.

The value of any horsepower formula depends, therefore, on the accuracy with which its assumptions fit the motor in question. The A. L. A. M. formula obviously does not fit the Daimler-Knight motor, which develops 58-horsepower under the conditions which by formula should give 38. For the great majority of motors it comes close to the facts; a few may even be flattered. In view of the popularity of testing laboratories, the usefulness or desirability of formulas seems limited. Under any circumstances, the only real way of determining the horsepower of a motor is by a brake test. More and more popular among the manufacturers is the practice of stating in their catalogs the actual brake horsepower developed by their motors at a given speed; unless the speed is stated, however, such figures are valueless. An authenticated test is always worth any number of formulas to the automobile buyer.

MEAN EFFECTIVE PRESSURES

(Disregarding Mechanical Losses)

Make.	Cylinders.	H.P.	R.P.M.	M.E.P.
Daimler...	Four 124x130mm.	58.0	1,172	106.8
National...	Four 5x5 11/16 in.	64.0	1,400	81.1
National...	Four 5x5 11/16 in.	54.1	1,055	90.9
Pierce.....	Six 4x4¾ in.	44.5	1,263	76.1
Pierce.....	Six 4x4¾ in.	30.9	800	85.4
Rambler...	Four 5x5½ in.	43.5	1,091	73.1
Rambler...	Four 5x5½ in.	40.0	900	81.3
Rambler...	Four 4½x4½ in.	34.0	1,333	72.2
Rambler...	Four 4½x4½ in.	29.0	900	89.2
Thomas...	Six 4¼x5½ in.	49.0	1,091	76.0
Thomas...	Six 4¼x5½ in.	34.5	700	83.4

DYNAMOMETER METHODS EMPLOYED

MAKERS of automobiles, when they desire to determine definitely the power which may be taken from the motors after they are produced, resort to the use of a dynamometer of some sort, and, in the absence of just a little practice, are likely to adopt the most simple form of Prony brake, primarily on account of its low first cost, then in view of the small amount of time required in rigging it up, and finally with the hope that it will suffice for the purpose.

Experience with this simple form of measuring device leads to the conclusion that, while it may be suitable for emergency use and will serve a certain crude purpose, it is not, by any means, an instrument of precision such as may be relied upon in these days, considering the exacting requirements of automobile motor testing, especially if account is taken of the high rotative speed of automobile motors.

In testing an automobile motor for power and flexibility, there are conditions as follows to be satisfied:

(A) The motor must be run in; the bearings must be brought to a state of well being, and the parts must be limbered up.

(B) A test to determine maximum load must be run, and in order to realize an advantage from this effort, it is necessary to prolong the run for a sufficient time to determine if the motor will perform continuously at the maximum load.

(C) The next point is to ascertain, by a run of sufficient duration at low speed, if the motor will heat up; if the radiator is of adequate capacity, and if the flywheel is heavy enough to afford all the advantage that can be induced in this way.

(D) Flexibility is the next point to be fixed upon; a motor may perform well at the two limits of speed and be absolutely lame at some intermediate speed. The best way to ascertain if this desired condition is present will be to run a test at equidistant points in the speed range, and plot a curve to show torque for speed.

There is no form of simple Prony brake that will allow of tests such as these, and, unless these tests can be made, it is doubtful if there is any use of going to the trouble and cost of rigging up to make any test at all. A practical man, in the absence of a Prony brake, will be able to tune up a motor so well that he will be able to judge its performance in a general way, and he will get along just as well without the crude device above mentioned as he will with it.

In many automobile plants where motors are made in quantities, the run-in test is regarded as a necessity, and it is a simple expedient to attach a fan to the crankshaft, in place of a clutch, and, if the fan is properly devised, it will limit the speed of the motor to that which should obtain in actual service when the motor is doing its accustomed work. The fan requires no attention, it offers a constant resistance so long as the speed of the motor is maintained constant, and, if speed changes do creep in, they will indicate that some adjustment is necessary, either to the carbureter or the sparking equipment, but there will be no damage done even if the adjustments are not made. This form of dynamometer is economical, it takes up almost no added space, and it is, in first cost, at the bottom of the list. In some instances the fan dynamometer has been fitted out with a tachometer, by means of which the speed is counted, and by previously calibrating the fan, the power delivered may be noted by ascertaining the speed and comparing it with a chart of power for speed as determined by a previous calibration.

The fan dynamometer may be used to note the effect of maximum load, provided the speed of the motor is maintained at the point which will cause the fan to load the motor, and the endurance of the motor under conditions of maximum load may be noted. For the minimum load, it is not practicable to employ the fan unless it is so designed that the blades may be shifted to offer just the amount of resistance to rotation which will afford the minimum load under conditions involving the best fuel mixture.

It is at this point that the fan falls short of the best requirement; it depends, for result, upon speed. When it is desired to ascertain the range of power of a motor at a given speed, which range is then brought about by changing the quantity and character of the mixture, the fan dynamometer fails to serve the purpose.

TESTING DEMANDS USE OF FLEXIBLE DYNAMOMETER

It is this condition of flexibility which must be given the greater amount of attention, although it is of the greatest importance to ascertain if the parts, as crankshaft, connecting rod, piston pin, and bearings, will sustain under conditions of maximum load and when the speed changes violently. To be able to determine flexibility, it is but a matter of employing a suitable dynamometer, of which there are types to be had as follows:

(A) Dynamo electric machine, to be driven by the motor to be tested; the output to be absorbed by a suitable rheostat.

(B) Electro-dynamometer, which differs from the dynamo test to the extent that the torque is exerted on a lever-arm which is secured to the field (frame) of the dynamo, and by measuring the pull in pounds, considering the length of the lever, the power of the motor to be tested may be determined.

(C) Hydro-dynamometer, which is made up of a disc, or a

EFFICIENCY OF DYNAMOS

Dynamos or motors, as used in testing automobile motors, must be calibrated. The losses must be determined:

(A) Bearing, friction, and windage losses.

(B) Loss in brushes due to friction.

(C) Loss due to hysteresis and eddy currents.

(D) Loss due to foucault currents.

(E) Loss due to armature resistance at the several loads.

(F) In separately excited machines the field (winding) losses do not count.

(G) Since it takes approximately five hours to heat a dynamo or motor to its maximum under full load, it follows that any testing done by means of such a machine, to be accurate, must allow for temperature increase or the test must be conducted after the dynamo or motor is heated up to the maximum.

(H) Measuring instruments, as volt, ampere and watt meters, must be calibrated at frequent intervals, and always before and after an important test. A double set of instruments will add materially to the accuracy of all such tests made.

FORMULA OF PRONY BRAKE

$$H.P. = \frac{2\pi R S P}{33{,}000} = \text{brake horsepower.}$$

$$R = \frac{H.P. \times 33{,}000}{2\pi S P} = \text{radius of arm in feet.}$$

$$S = \frac{H.P. \times 33{,}000}{2\pi R P} = \text{speed in r.p.m.}$$

$$P = \frac{H.P. \times 33{,}000}{2\pi R S} = \text{pull on lever.}$$

plurality of discs which are rotated at high speed in a water bath within a suitable housing.

(D) Balanced electric system of testing, which comprises a plurality of separately excited electric machines, they being capable of operating as dynamos or motors, at the will of the operator. Control is by use of suitable field rheostats, by means of which the fields of the machines are altered as to strength at will; if the field is weakened the machine will deliver a lower voltage, and it will then be driven, as a motor, by the mate to it, which will run as a dynamo.

In a plant where a large number of automobile motors have to be tested in, the balanced electric system has many advantages. There may be any number of sets of these machines; all that is required to satisfy the conditions is to have the machines in pairs, referring to the electrical relation; in this way one machine (of each pair) is driven as a dynamo, which furnishes current to the other, which, as a motor, drives the motor to be run in. The dynamo, of course, loads the motor, and it furnishes the power, which is electrically transmitted, to drive the second motor, which is being run-in during this period of time. Since the conditions may be reversed at will, the operator simply manipulates the change-over switch as conditions indicate the necessity.

Electrical instruments, placed on a convenient board together with all necessary switches, tell of the power which is delivered by the first motor of a pair in driving the dynamo, and the electrical energy which is converted to mechanical work, tells of the power requirement in running in the second motor of the pair; there may be any number of sets of this equipment in a test room, and a single operator can handle possibly 20 sets. This method eliminates rheostats, lamp-banks and other troublesome features, and it has the virtue of being economical as well as flexible.

There is still one other possibility; if the automobile motors to be tested are connected to pumps (of the centrifugal type), and the pumps in turn are connected, by piping, to a reservoir, the power required to pump the water to the reservoir may be adjusted to equal the ability of the motor to be tested, and the work done in the process may be turned to good account—the water stored by this process in the reservoir may be used for fire and other purposes around the plant. This method of testing has the virtue of being both stable and flexible, and the only point which would have to be taken into account as being a possible obstacle, is, the water pumped would have to be turned to good account or the work done by the motors being tested would be wasted just as it is now in the other methods of testing.

It will be understood that the motor-testing question has other angles besides the one which is being considered here; investigation of the internal conditions, requiring the use of a manograph, is one phase of the subject. Brake tests, however, are made after the motor is finished, and when the designer has concluded all other investigations.

When the brake test is concluded, it is then proper to go into the question of the relation of the motor to the car; this involves the gear ratio, speed changes, power required to propel the automobile, hill-climbing ability, and performance when the going is bad. Very many satisfactory automobiles may have been investigated only to find that the motor was not capable of driving them as fast as they would have to go to satisfy the gear ratios established.

The remedy, in a case of this sort, lies in increasing the gear ratio; this will allow the motor to speed up to a higher point considering the speed of the automobile, and, as might be expected, will have the effect of lowering the speed on the level, but the ability of the motor will be in better keeping with the requirement when the automobile is making a hill or is down in the mud and the demand is maximum.

If a dynamometer test permits of determining the torque of the motor at its different speeds, it does not help to determine the torque requirement as indicated by the automobile on the road, and it is this condition which indicates that a certain amount of power is needed at each speed; the motor must be capable of delivering this power at the speed as fixed by the gear ratio.

The character of motor to use depends upon the character of the service demanded; it is not the same in touring work as it is in racing, and flexibility of the motor is what is wanted in touring, just as in racing maximum speed is the main requirement. It is especially difficult to so design a motor that it will give the last "drop" of power at a very high speed, and, at the same time, realize flexibility to a degree.

Flexibility comes when the motor is especially designed for just this property, and, when characteristics of motors are being discussed, it is necessary to consider the work which is to be performed when the merit of the motor is being fixed upon.

The probabilities are that the most flexible motor will be the one with a high mean effective pressure relative to the maximum explosive pressure, and especially if the torque is represented by a straight line throughout the range of speed as it is fixed by the gear ratio and the ability of the motor, considering the power required by the car.

COMPUTING LOSSES IN CALIBRATION.

$$\text{Efficiency} = \frac{\text{output in watts}}{\text{input in watts}}$$

$$= \frac{\text{output}}{\text{output} + \text{core loss} + \text{copper loss} + \text{friction} + \text{etc.}}$$

Characteristics of the losses:

(A) The core loss, which is made up of the hysteresis loss and eddy current loss remains constant at a constant potential.

(B) The copper loss changes as follows:

$$W = I^2 R; \quad \frac{E^2}{R}; \text{ measured in watts.}$$

Considering the machine as a motor:

(C) $$I = \frac{E - e}{R} = \text{current in amp. input.}$$

(D) $$W = E \; \frac{E - e}{R}$$

(E) $$w = e \; \frac{E - e}{R}$$

RELATION OF POWER TO SPEED

CONCEALED within the problem or the interrelation of power, weight and speed are a number of smaller, lesser, but nevertheless important minor matters. These, although slight, have enough of a bearing upon the main problem to necessitate a careful consideration. The whole subject, in fact, is one of such close interrelation between the several components as to require close study to secure a firm grip on it.

So it will be well to look into the subject as a whole. The prime source of speed is, of course, power. The development of this has been covered previously, as well as its accurate determination or measurement. When it comes to use, however, another question enters, namely, the matter of efficiency of the transmitting members. This is determined as much by the design and location of the members themselves as by their bearings.

Without going into the former, the latter may be expressed in tabular form. Thus there are several forms the transmission of power between the engine and road wheels may take. The following might be mentioned: Bearings, plain, taper, roller, ball; shaft drive means either bevel or spur gears, of which there are several kinds, while chain driving introduces another variable. Tabulating these and the losses which their use entails, all of the figures being for a single unit of the kind mentioned, the table below is obtained. To care for the figures in the case where more than one of each kind of unit is used, simply multiply by the number used.

POWER LOSSES FROM VARIOUS SOURCES

Source of Power Loss	Amount of Loss Per Cent	Efficiency Per Cent
Plain Bearing	2 1-2	97 1-2
Taper Roller Brg	1-4	99 3-4
Annular Ball	1-8	99 7-8
Universal Joint	4	96
Roller Chain	2	98
Silent Chain Hor	2	98
Silent Chain Vert	4	96
Spur Gears—Steel Greased	9	91
Spur Steel Pinion—Fiber Gear	11	89
Spur Rawhide Pinion—C. I. Gear	12	88
Spur Steel Oil Bath	7	93
Bevels Steel Oil Bath	11	89

This table gives a clear idea of how the power is lost between its generation in the cylinders of the engine and the tire surfaces where it becomes of use. Some idea of this total loss may be gained from the simple statement that the whole efficiency, considering every member and every bearing, is taken as 70 per cent. This is to say, that 30 per cent. is lost through the various small items, given in detail in the above table.

Between the surface of the tires and the road surface, or metal, as the English call it, there is a sort of bond of union, which is called adhesion. This is due in part to the action of gravity pressing the load above down onto the tire so that the latter must adhere fairly close to the road surface, and in part to the natural adhesion of rubber, although smooth to the rough road. Adhesion as a physics term is defined as the molecular connection of bodies in contact. This expresses the exact idea. The car standing on the road, so that the tires are in molecular and intimate contact with it, causes the rubber to adhere to it. The influence of gravity being a constant quantity is at some times a detriment to speed, which is but the instantaneous removal of parts from adherence, only to permit new and instantaneous adherence to take place at an advanced point.

There is, then, a continual breaking of old bonds and a making of new. The rate at which these are broken and remade determines the speed, the making depending mostly upon the weight of the vehicle, while the breaking of them depends solely upon the amount of power supply and the method of its use. This adhesion is a variable, and as yet not exactly determined quantity, but for all ordinary computations it is taken as 148 pounds per ton.

Against speed driving and, in particular, against high speed, the road surface offers a resistance of its own. This is irrespective of other conditions of tractive force, of adhesive effort or any one of the other items which enter into the complex problem. It is another quantity which has not been determined with a positive and certain accuracy, so must be taken as about 50 pounds per ton of actual weight of vehicle. It is an actual resistance, which must be overcome by the power which is at hand, and therefore a subtractive quantity considering the power alone.

To mention another subtractive quantity, the wind. The resistance of the air to the swift passage of any body is very great fully as great as the force of the wind moving at the same speed against the stationary vehicle, action and reaction being equal That this is not a negligible quantity is best expressed by the statement that electric trolley car builders found that straight front cars could not be used for speeds above 60 miles per hour. For very high speed work it was found necessary to so shape the front as to "cut" the air, making its entrance easier. While this does not actually reduce the cross-section, or area of the body.

RELATION OF WEIGHT AND SPEED

$$\text{Energy} = \frac{\text{Weight} \times \text{Velocity}^2}{2 \times \text{Gravity}} = \frac{W \times V^2}{2g} = \frac{W V^2}{64.4}$$

Taking a velocity of one mile per hour

$$\frac{5{,}280 \text{ ft.}}{3{,}600 \text{ sec.}} = 1.466 \text{ ft. per sec.}$$

V equals miles per hour times 1.466,
So, V^2 equals V^2 (m. p. h.) x 1.466,
Substituting:

$$\text{Energy} = \frac{1.466}{64.4} W V^2 \text{ (m. p. h.)} = .02276\ W V^2 \text{ (m. p. h.)}$$

Thus, if a car weighs 4,000 pounds, at 20 miles per hour its energy of motion is: .02276 x 4,000 x 20^2 or, 36.416 foot pounds.

On the other hand, a car weighing but half of this or 2,000 lbs., running at the same speed, has an energy of motion of: .02276 x 2,000 x 20^2 or 18,208 foot pounds, just half the previous case.

The effect of speed is much greater than that of weight. Suppose the speed be twice that of the first case, or 40 m. p. h. Then: the energy is .02276 x 4,000 x 40^2 or 145,664 foot pounds, four times as much as before. The conclusion, then, is that doubling the weight doubles the energy of motion or inertia, while doubling the speed quadruples the energy of motion. Excessive speed, then, possesses twice the menace to life and limb that very high weight does.

RELATION OF WEIGHT TO POWER

Let W equal weight of car, P equal power, E equal the efficiency of transmission, that is back of engine and up to but not including tires on road, V equal the speed in miles per hour, K the coefficient of adhesion of the tires, of the efficiency of contact between tires and road surface.

Then, the maximum power which can be supplied, a further application resulting in slippage, is:

$$P\,(\text{Max}) = \frac{88\ W \times V \times K}{33{,}000 \times E}$$

That is, expressed in words, the power necessary or maximum is equal to the inertia of the moving body times its efficiency of contact with the road surface, reduced from foot pounds to horsepower, and divided by the efficiency between the engine and the tires.

To take a numerical example of this, let the weight of the car be 4,000 pounds as before, the speed 40 miles per hour as before. Now the weight on the driving wheels is never more than six-tenths (.6) of the total weight, so the weight to be substituted in the formula is .6 x 4,000 or 2,400 lbs. The efficiency of the transmission from engine to wheels may be taken as 70 per cent. By experiment it has been found that a fair figure for the efficiency of tire adhesion is 60 per cent., substituting in the formula:

$$P = \frac{88 \times 2{,}400 \times 40 \times .6}{33{,}000 \times .7} = 219.4 \text{ horsepower.}$$

by making its entrance and exit easier, brushing aside the resisting air, so to speak, the speed was found to be greater. Not only was a higher speed permitted, which previously was impossible, but this was done with a lower expenditure of power than before. The back of the car received as much attention as did the front, for it was figured that if the resistance in front was so great there must be a tremendous suction behind. That this was actually the case was shown by the speed which the cigar-shaped electric cars of the German railways attained, 127 miles per hour, with a comparatively modest power plant.

This point was well accented by the experiments of S. F. Edge with a Napier car at Brooklands track in England. In the tests a six-cylinder car of 38.4-horsepower was used, upon the front of which had been erected a framework. This had for a facing removable laths which were added to or reduced in successive experiments. The actual speeds made with the varying sizes of frontal area were as follows:

EFFECT OF FRONTAL AREA ON SPEED

Area of Screen	Time Seconds for Quarter	Speed Miles per Hour
30	18.4	47.85
28	18.0	50.0
26	17.0	52.9
24	16.0	56.2
22	16.6	54.0
20	16.2	55.5
18	15.8	57.0
16	15.6	57.6
14	15.0	60.0
12	14.4	62.5
10	14.0	64.2
8	13.6	66.2
6	12.8	70.3
4	12.0	75.0
2	12.2	73.8
None	11.4	79.0

This table explains more clearly than words the effect of an adverse head wind. If it be considered that the engine developed its maximum, and therefore the same power in every one of these cases, the very large loss in power due to wind resistance may be noted, the difference in the speed between full screen and no screen being no less than 65 per cent. This expressed in terms of the ordinary power plant would mean the difference between a 25-horsepower unit and one of 42 horsepower.

This, of course, was by way of an unusual addition to the usual frontal area, and one that would hardly ever be met with in ordinary work, but it serves to show the very marked influence of a quantity ordinarily neglected. Makers of racing cars should give this point as much attention as is given to the refinement of power plants, because this economizes power. Except for a few sporadic attempts on the other side, and the Baker "Teakettle," this is a carefully neglected point. It is worthy of mention that the latter astonished the world with its performences on the Florida sands some few years ago. The credit was given, however, to the unusual power development of the engine, rather to the non-air-resisting qualities of the peculiar body shape, which economized on the power output.

For all ordinary cases of figuring out power for any given case, the frontal area is taken as 15 square feet, but cases have been known in which this has been reduced to 12 square feet without affecting any other part or function of the car as a whole. This seems like but 3 square feet, but it really is a subtractive quantity of 1/5 or 20 per cent. In the Edge experiments, tabulated above, the first 20 per cent. reduction in frontal area increased the speed or power if you wish it, by 17.4 per cent., while a second reduction of any equal amount increased the speed or power by less than 2 per cent. It is apparent from this, then, that the first reduction is by far the most important, and carries by far the greatest weight.

To propel the car at a high speed, or better, at a very high rate of speed, the necessary tractive adhesion falls off somewhat rapidly, the more so than the speed increases. This may be noted from a careful inspection of the various formulas given elsewhere on this page and the opposite one. At slow speeds, and for starting purposes, high tractive adhesion is a positive necessity. This really is a fortunate circumstance, if it may be called that, being one of Nature's immutable laws, for at high speeds, the tire tread is in poor contact with the road, due to its own and the road's irregularities, which keep it bumping into the air a goodly portion of the time. The need is thus apparent for high tractive adhesion for ordinary uses, for starting, and for running at slow speeds, but at high speed, that is, for racing work, the law allows of "weight paring." More than the fact that the latter is not a necessity, it becomes a duty to take as much of the weight as possible from the tires, for these have come to be the real stumbling block in the way of excessive speed. Not that the tire makers have not done their part—for they have done very well—but the nature of the service is such that no delicate fabric could be expected to withstand it. This is a trying situation, and one which the tire companies are making efforts to cope with in a manner similar to the tire situation.

AIR AND TRACTIVE RESISTANCES

Air resistance enters as follows: Power is reduced by the resistance to traction, to the force of gravity tending to hold the car stationary, and by the resistance of the air. This is expressed in the formula:

$$V\,(\text{Speed}) = \frac{P \times E \times 375}{(T_r + G_r) \times W + A \times R_a}$$

In which, P is the actual power, E the efficiency of transmission, T_r the tractive resistance, G_r the resistance due to gravity, W the total weight, A the frontal area, and R_a the air resistance, which is found by $R_a = V^2\,(\text{m.p.h.}) \times 1.466 \times .0017 = V^2 \times .00249$.

SOLUTION OF RADIATOR TROUBLE

Editor THE AUTOMOBILE:

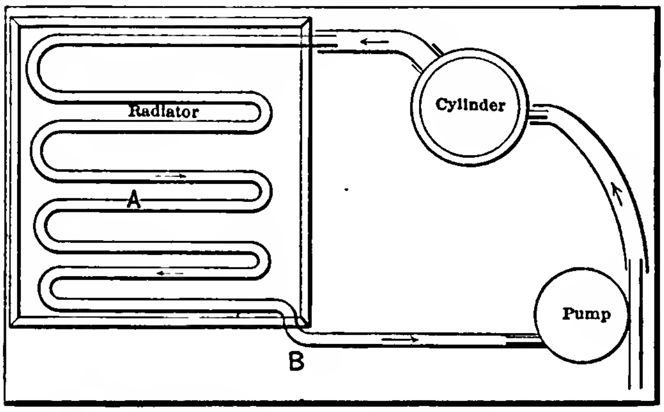
[2,168]—Should the outlet elbow on the bottom of the radiator be as large as the circulating tubes in the radiator? I derive much help from your answers to "Letters" about automobile troubles, and hope that you can help me. I have a Northern two-cylinder, 5 1-4 by 5 1-4 car, with which I have always had considerable trouble from overheating. The water boils and steams more or less all of the time. In putting on new hose connections the other day, I noticed that the brass elbow outlet on the bottom was very much smaller than any of the other pipe connections on the top, either to the pump or to the cylinders. When the radiator was steaming and boiling at the top, I placed my hand on the small outlet and found it to be barely warm. It occurred to me that the water could not flow fast enough through this reduced outlet to circulate the water to the pump as fast as the latter could handle it. The pump does not suck the water to it but merely circulates the water it receives. Would you recommend putting on a larger outlet? I enclose a sketch showing the connections.

Newark, N. J. R. E. HEINISCH.

As the letter is understood, the outlet referred to is marked B in the appended sketch. This would probably be of a smaller size than the inlet at the top of the radiator, where the heated waters enters, on purely technical grounds. The reason for this is—heating the water expands it just the same as it does any metal, and unless the speed of flow is increased, which is not advisable, the same amount of water flowing in the same length of time would need a slightly larger opening at 200 deg. Fahr. than at 70 deg. Fahr. As a matter of fact, radiators to-day are made with equal sized inlet and outlet openings, as a matter of reducing the number of different parts used, and thus, the cost, the same casting being used (where possible) for both inlet and outlet. This opening is, however, proportioned to the water flow at the highest possible temperature and consequently highest possible volume, being at the same time proportioned to the lowest useful speed. It is then too large at lower temperatures and speeds. This is, however, a very good fault, and one from which the radiator is not suffering as evidenced by the steaming and boiling which the writer mentions.

By all means put on a new connection, and make it larger, much larger than the old one, even going to the extreme of making it larger than the inlet. If this does not stop the steaming and general overheating of the cooling system, the radiator capacity is too small for the size and power of the engine. If you do all in your power to get the water into the radiator and out again, that is all that can be done with the given size of radiator. If more capacity is necessary, as shown by continued steaming and overheating, after this is done, the only thing left is to get a new and bigger radiator.

There is this to be said about getting a new radiator: the radiator builders have reached such a high degree of skill in building coolers, that the same sized radiator as they are now built will doubtless suffice to cool your engine. It is, of course, possible that there is something wrong with the water jackets or other internal parts of the engine, which cause it to overheat more than other engines, but by following out the advice given in regular order, you will soon arrive at the proper conclusion.



Sketch of Radiator Layout Which Gave Trouble

LETTERS INTERESTING

IDENTITY OF VARIOUS CARS

Editor THE AUTOMOBILE:

[2,169]—Will you please answer the following questions through "Letters Interesting, Answered and Discussed?" 1. Is the Keystone car made at Yonkers, N. Y., of foreign construction? 2. Is the Simplex car driven by Robertson in the Fairmount Park race an American or a foreign car? 3. What car is acknowledged to be the fastest stock car in the world? 4. What became of the Haynes car that ran in the 1906 Vanderbilt Cup race.

Denison, Kan. LISLE H. SCNEDER.

Many questions are very hard to answer with a direct yes or no, and the above, or some of them, come in this class. Thus, question 3 cannot be answered in this way. No one car has ever so overshadowed all others as to receive by universal consent the title of champion stock car. In fact, it is just this little difference of opinion as to which is the best that continues to furnish material and men for the constantly recurring stock car races. As to question 4, the best way to find this out will be to write to the Haynes Automobile Company, Kokomo, Ind., couching your question in easily understood language, that is, making it clear just what you want to find out.

The other answers are: 1, the Keystone car made at Yonkers is made from American materials, by American mechanics. This company was formerly located at Dubois, Pa., when the car was called the Keystone Six-Sixty. It was fully described in THE AUTOMOBILE for July 15, 1909, page 109. Question 2. The Simplex car which Robertson drove in the Fairmount is made in New York City, and of a very high grade of material. This car uses much of imported steel, and other material, but does not build a special racing car, its racing machines being but stripped stock cars.

CHECKING UP TIMING FROM MARKS

Editor THE AUTOMOBILE:

[2,170]—Please tell me through "Letters" how to check up the timing of my engine. The timing is marked on the flywheel, but I am only a beginner and do not understand it. How much clearance should be allowed between the slider and valve stem?

Hammondsport, N. Y. S. M. B.

The flywheel will be marked with four or five marks, which are labeled as follows: Inlet opens, inlet closes, exhaust opens, exhaust closes, and possibly an additional line, marked firing point, although the latter is doubtful, as the firing point varies so widely.

The marks mean just what they say. When the flywheel is turned so that the line marked "inlet opens" comes up to the pointer, then the inlet valve in the cylinder should just begin to open at that point, being partly opened farther on and entirely closed at a previous point. Similarly with the exhaust. Turn the flywheel over slowly until the line "exhaust opens" comes up to the pointer, then just at that point, no sooner and no later, the exvalve must begin to open. In case yours is a multi-cylinder engine, there will be four times as many marks as indicated above, these being marked with the number of the cylinder to which they apply. Cylinders are always marked from the front end back, the front cylinder being called one, the next two, the next three, and the rear cylinder (on a four) four. Then, when the mark says Number 1 inlet opens, you will know just which cylinder to look to, to see if the marking is correct. The clearance varies by small amounts, but it would be safe to assume it as between 1-32 in. and 1-16 in., but nearer the former.

ANSWERED AND DISCUSSED

FLYWHEEL WEIGHT AND VIBRATIONS

[2,171]—I have a four-cylinder, four-cycle marine engine of 7-inch bore and 6-inch stroke. Valves are 3⅛ inches in diameter and the flywheel size 17 inches. The flywheel weighs 125 pounds. This engine is in a speed boat, in which it runs up to 1,000 revolutions per minute. When running at 200 to 500 revolutions there is practically no vibration and the engine runs finely. At 600 to 700 revolutions the vibration is very bad, but at 900 to 1,000 revolutions it disappears again. I have tried all kinds of mixtures with three different carbureters. The pistons of this engine weigh 20 pounds apiece and have four rings, all placed at the top. About how much power would I gain if I took off two of the top rings and bored the piston out on the inside so as to make it lighter by three pounds per piston? What is the need of four rings on a piston, anyhow, as I read of some racing cars with but one piston ring?

Haverhill, Mass. J. G. HUDSON.

Balance, which is reflected in steady running and the absence of vibration, is brought about by a flywheel which is in correct static and running balance, as well as moving parts (crankshaft, connecting rods, pistons and piston pins). If these are out of balance the engine will run streaked as you say yours does. A good scheme would be to use a larger, heavier flywheel, as increased flywheel weight and diameter, which usually spells weight, increase the steadiness of running of any engine. In fact, with a large enough flywheel, the small vibrations due to a lack of balance of the reciprocating parts are completely offset.

Reducing the weight of the pistons will help, although it may alter the compression and seriously. The function of piston rings is to make a sliding connection which is gas tight against high pressures. If the makers judged four rings to be about right for this purpose, reducing the number to two would double the chances of the compression pressure escaping. As to racing machines using but one ring, the writer has heard of but one, and that machine used what was one ring in name only, being actually double arrangement so that the result was that usually obtained by two or more rings, this unique construction being resorted to in order to save weight down to the very last ounce. The change in the pistons, that is, boring them out, will be a very good one, but every one must weigh exactly the same.

LEMOINE TYPE AXLE DESCRIBED

[2,172]—I have frequently heard of and read of the Lemoine axles, but have never seen or heard anything to give me a clue as to just what was meant. Will you tell me through the columns of "Letters" the name of this firm, where it is located, what the firm makes, and also what the special type of axle is, which has been given the firm's name?

Far Rockaway, N. Y. G. A. ERNEST.

A section through an axle known as the Lemoine is shown. This firm is a famous French one, which has turned from fine work in machinery to automobile products, and now makes and sells springs, axles, transmissions, steering gears, and many other parts, all of the highest quality. The full name and address is just plain Lemoine, 21 Rue de Lappe, Paris.

The front axle to which this name has been given is so made that the axle bed or central part is placed on the axle spindle so as to rest upon it, with thrust washers interposed. Other front axles are placed either yoked around the spindle so as to touch it both above and below, or the reverse of this, with the spindle end yoked around the axle end, so as to touch it both above and below. Actually, the difference is one of shape.

ONE CYLINDER FIRES PREMATURELY

Editor THE AUTOMOBILE:

[2,173]—As I have not seen anything in "Letters" which gives any information on my particular trouble, I ask you to answer this. I have a four-cylinder Autocar, with everything in good condition excepting only number three cylinder, which fires prematurely. It always does this after getting warmed up, say, after running a mile. When stopping and cutting off the current the engine will continue to run, and the water will stay boiling hot for several minutes. I took off this cylinder and found a spot, a depression, or rather concave part of the piston about 2 inch by 1-2 inch beginning about 1 inch above the lower ring and running toward the bottom or third ring. It was black and rough, caused by burnt lubricating oil. The cylinder walls show nothing but a perfectly smooth wall, with bright regular surface and ample evidence of plenty of oil, also the other cylinders are in prime condition. Remember the four rings of number three piston are all right, showing that every portion of the rings has worked up against the walls. Kindly let me know what is the matter and how to remedy it, as I am at a loss what to do.

Darlington, Md. H. KENTON WHITEFORD.

Since missing is usually if not always due to some flaw in the ignition system, and nothing is said about this important part of the power plant, it is rather hard to give a definite and useful answer to the above case of trouble.

Generally speaking, missing may be caused by a weak spark, which is caused by a wet or damp coil. To remedy this dry out the coil before a slow fire. Missing is also caused by batteries being exhausted. Remedy, test batteries with a voltmeter, and finding this to be correct, substitute new batteries. This kind of trouble usually manifests itself by the engine misfiring after running some time. The cause of it is, the weak cells gather some strength when standing, so fire the engine all right at starting, but after running a short distance, say a mile, the weakened condition of the cells shows itself in the continued missing.

It may be that the spot you mention has something to do with the trouble, but it is hard to see the connection, as it is not exposed either to the fresh gases, to the spark, or to the burned gases at any time in the stroke.

CYLINDER TEMPERATURES AND RECORD

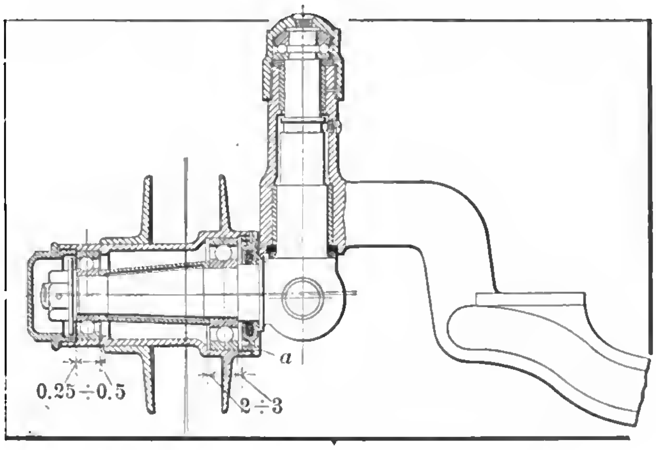
Editor THE AUTOMOBILE:

[2,174]—Please advise me through "Letters Interesting, Answered and Discussed," at what temperature of the cylinder walls, the gasoline engine will be most efficient. I read part of a discussion about this in "The Automobile" at one time, but understand that the figures have been revised since then. Also, will you tell me what make of car holds the time record from coast to coast, or from New York to San Francisco?

Silver Springs, N. Y. HORACE B. BLACKMAN.

The exact temperature to which you refer is just as much in doubt as it was some years ago. Supporters of one kind of engine say at 200 deg. Fahr., while those who favor another type of engine are equally steadfast for a temperature of 350 deg.

Franklin holds the coast to coast record, made however, from the West to the East, or in the reverse direction.



Section Through Lemoine Type of Front Axle.

MERITORIOUS IDEAS FROM ABROAD

Starting a Long-Unused Motor—M. Feron, in *Omnia*, offers a good suggestion as to the best method of starting a motor that has long been unused. He advises the injection of lubricating oil, or of a mixture half oil and half kerosene. Says M. Feron:

"The root of the trouble is in the fact that during the long period of idleness all the oil has run down from the cylinder walls into the crankcase. The pistons are consequently dry, and the metal surfaces are in direct contact with each other, so that they will not hold any gas pressure.

"If a small quantity of thinned lubricating oil is injected, it will flow between and around the piston rings and form a good gas seal; it will disperse the old, dried oil or liquefy it and so render it useful; the motor will answer sweetly to the starting crank, a good suction will be exerted on the carbureter, and the motor will start merrily."

Gnome Inlet Valve—Although the seven-cylinder rotating Gnome motor, which has met with such success in aeronautic work, has been very generally illustrated and described, there is one feature of it which has not received much attention. This is the inlet valve, which is placed in the center of the piston head.

In operation, this inlet valve is automatic. The gas enters the crankcase through the hollow stationary crankshaft. Each valve is balanced against the centrifugal force set up by the rotation of the motor by two small counterweights. The valve spring is a single flat blade, set between these counterweights in such a manner that it is bent whenever the valve opens. Especially neat designing is revealed by the method of setting the valve seat into the piston head, in connection with the bosses for the piston pin.

The piston rings are also unusual. There are in reality two of these, though they look like one. The inner one is of cast iron and the outer, shaped like the letter "L" in cross-section, is of sheet brass. The shape of the ring is such that pressure of gas above it only forces it into closer contact with the cylinder wall.

Cast-Steel Omnibus Wheels—Of a startlingly light appearance, considering the use to which they are to be put, but nevertheless abundantly strong, are the wheels provided by the Atlas Resilient Road Wheels, Ltd., for the London General Omnibus Company. On account of the London police regulations governing the weight of omnibuses, one of the chief considerations in designing these wheels was to make them as light as possible.

The material used is cast steel, and felloe, spokes and hub are all cast in one piece. There are but eight spokes, of an X-shaped cross-section, to each wheel. The average thickness of the steel is about a quarter of an inch. The rims, which are a part of the wheel casting, are adapted to take single solid tires in front and double solid tires in rear. The weight of a front wheel without tire is 88 pounds, and of a rear wheel 203 pounds. The maximum weight allowed to the omnibuses on which these wheels are used is three and one-half "long" tons.

Wimperis Accelerometer—In *Automotor Journal*, January 22, is described and illustrated an instrument recently placed on the English market which indicates the rate at which the car to which it is applied accelerates or slows down. In appearance the device resembles a speedometer, but does not need to be connected to the wheels.

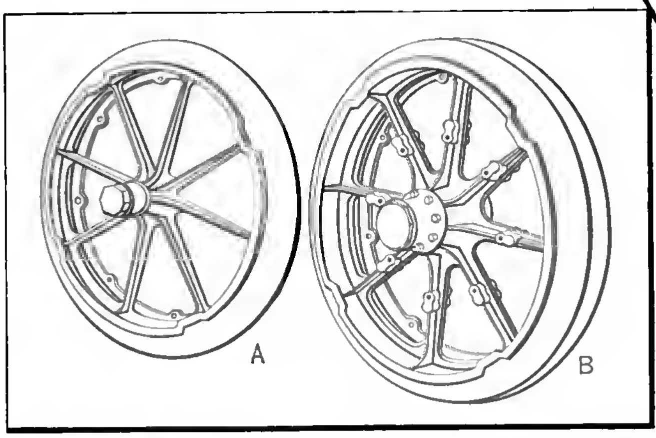
When the car is started the needle swings backward over a part of the scale marked "acceleration," and the figure to which it points gives the rate of acceleration in feet per second per second. Suppose, for example, the needle points to the figure "5"; at that instant the car is then increasing its speed at the rate of 5 feet per second during each successive second of time. If the speed at that moment happened to be 10 feet per second, at the end of a second it would have increased to 15 feet per second.

On the other side of the central zero the scale shows the retardation, as produced by the effect of the brakes, or when the car is coasting to a stop. Secondary scales beneath show upward and downward gradients in fractional form; the readings on these are correct only when the car is at a standstill or moving at constant speed. The instrument singles out and indicates only the acceleration produced by the motive power of the car; if the motor is powerful enough to give an acceleration of 2.2 feet per second per second on level ground, the instrument will still read 2.2 whether the start is made up hill or down hill. The same applies to the deceleration due to brake action.

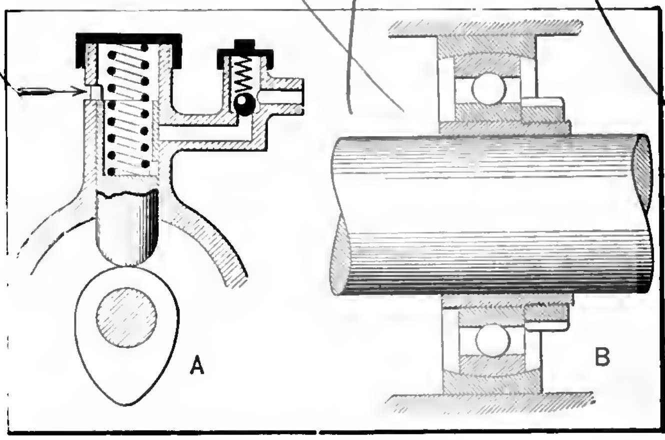
The principle of operation is that of inertia; inside the instrument there is a horizontal copper disc with an eccentric center of gravity, controlled by a light spring similar to the hairspring of a watch, and damped magnetically.

Wolseley-Siddeley Air Pump—This account of the pump fitted to maintain air pressure on the gasoline tank of the 20-28-horsepower Wolseley-Siddeley car is one of the novelties culled from the January 22 issue of the *Automotor Journal*.

A hollow plunger, with a key to prevent twisting and a spring to give return motion, is operated by a cam on the camshaft. On the upward movement of the plunger, the air contained in the upper enclosed chamber is compressed until the highest position of the plunger is reached; a small delivery port in the plunger then registers with a port in the cylinder, and the pressure is released into the pipe communicating with the tank. A ball check



Cast steel wheels used by the London General Omnibus Company, now regular equipment on vehicles plying in the English metropolis. A front, B rear wheel.



A shows diagrammatically the air pump used to maintain gasoline pressure on the Wolseley-Siddeley cars; B is the Stichel spherical-seated ball bearing.

valve assists in retaining the air thus entrapped. Owing to the proportion of clearance above the plunger, the air cannot be delivered at a pressure of more than 4 pounds to the square inch.

The spring returns the plunger, setting up a slight vacuum. As soon as the intake port is uncovered, the chamber is again filled at atmospheric pressure, and the compression is repeated. All the objections to the exhaust-pressure arrangement seem to be overcome by this pump. There can be no water introduced into the gasoline, no failure of pressure when the engine is running light, no sticking of the valve from gummed lubricating oil deposits. Of course, no safety valve is required.

Bingham Piston-Valve System—This ingenious valve motion, which was applied to a Bentall chassis on exhibition at the Olympia show in London, is described in the January 22 issue of the *Automotor Journal*.

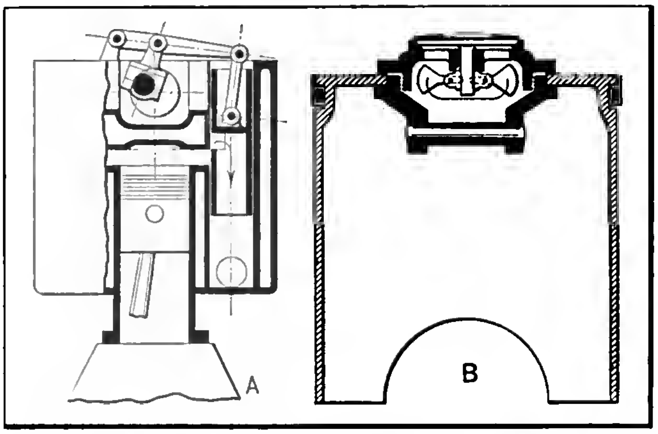
The overhead shaft is revolved at one-quarter the speed of the crankshaft, as the rectangular ports in the valve piston register with the cylinder port on both the up and down stroke of the valve. The very slow "valve speed" thus obtainable, together with the comparatively small diameter of the valves themselves, are points which should both tend toward long life. It should be noticed that during the power stroke the valves are not in lateral balance, the valve surface subjected to the explosion pressure being an area equal to that of the cylinder port; as, however, the valves are very long, the thrust from the explosion is distributed over a considerable surface.

One objection to the system is the five pin joints necessary to drive each valve. The two at the ends of the valve connecting rod are lightly loaded and have but a slight angular motion; the other three have little more movement, but approximately three times the load. There are several points of excellence—slow "valve speed," silent driving gear, probable immunity from leakage owing to small valve diameter, and considerable port area.

Daimler Spring Shackle—In the January 22 issue of the *Automotor Journal*, in a contest describing novelties seen at the Olympia show, one of the prizes is given to a description of the front spring shackle of the new Daimler cars.

When one front wheel of a car has to mount a considerable obstacle, in order to allow for the deflection of the spring on that side, the springs on both sides must necessarily twist. The ordinary spring shackles allow only for an equal spring deflection on both sides. For the twisting strain so often sustained the ordinary laminated spring is entirely unsuited, and this strain is the cause of much of the wear on the shackles and their pins.

The Daimler spring shackles at the rear ends of the front springs are designed so that they can swing laterally from pins arranged lengthwise of the car, which at the same time give the backward and forward play necessitated by the compression of the spring. As shown by the drawing, when one end of the axle is considerably raised, both shackles swing until their pins are approximately parallel to the axle. A slight spring torsion must still take place, however, as the unshackled front end of the spring will not allow any sidewise swinging. At the same time there is no additional complication.



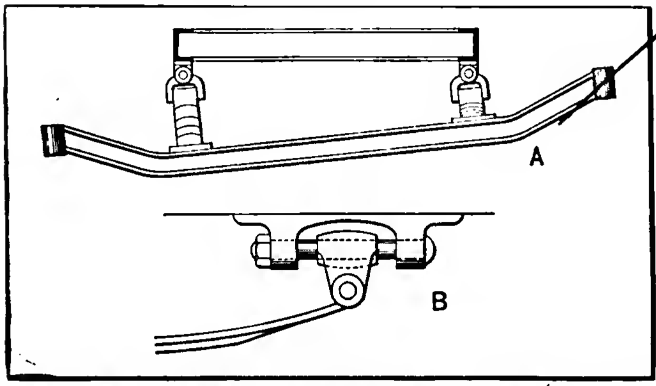
A—The Bingham piston valve system used on the Bentall cars; B—Inlet valve located in cylinder head, on the seven-cylinder Gnome aeronautic motor.

Stichel Ball Bearing—German patent No. 216,502, granted to Otto Stichel, of Leipzig, covers a ball bearing mounted in a spherical seat. The construction of the bearing permits a lengthwise movement of the shaft, such as may naturally occur through changes in temperature, and also a change in direction of the axis, a condition especially to be provided for in automobiles. Thus is prevented any pinching of the balls, which is likely to result in breakage. The outer ball race is spherical on its outer surface, and has a special ring with a spherical inner surface to receive it. The outer surface of this ring is cylindrical, and is mounted in the usual manner, with a slight allowance for endwise motion.

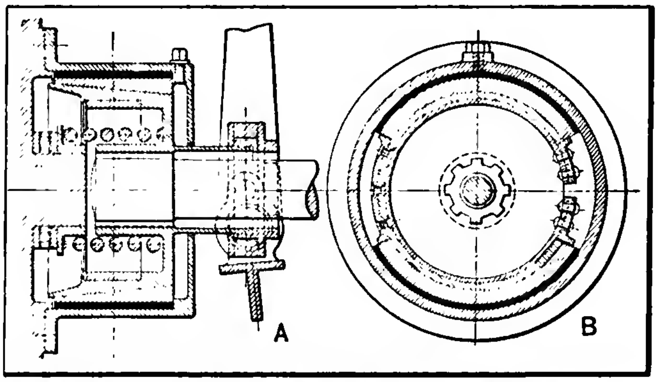
Expanding Band Clutch—The clutch illustrated herewith is used by several makes of French commercial cars, and has been found very satisfactory. It consists of a cast-iron cylinder, bolted to the flywheel, inside of which a brake band is caused to expand by a sliding cone.

There are two brake shoes, faced with a suitable friction material, with their inner faces of a conical shape. They are supported by a conical-faced drum keyed to the clutch shaft, and are held from revolving with respect to the drum by angle pieces riveted to the face of the latter. Inside of the drum is a spring-steel band, the ends of which project through a split in the drum and bear against the sides of the brake shoes. Thus each shoe is supported on one side by a stop on the face of the drum, and on the other by an end of the steel band. The conical drum is pressed out by a coil spring, in its turn thrusting the brake shoes apart and into engagement with the inner surface of the cylindrical drum bolted to the flywheel. To release, the cone is pushed in, and the spring band draws the brake shoes together and out of engagement.

Much smoothness of engagement, besides a quick and positive disengagement, are claimed for this form of clutch. In addition it is simple, not likely to get out of order, cheaply built and has little inertia to cause spinning in gear-changing.



Two views of the Daimler shackle used on the rear end of the front spring. A shows the displacement of the axle, and B the shackle itself.



Expanding band clutch used successfully on several French commercial cars; A shows the longitudinal, and B the lateral section of the clutch.

RECENT CLUB ACTIVITIES

BUCKEYE CAPITAL'S CLUB TO BE REORGANIZED

COLUMBUS, O., Feb. 14—A complete reorganization of the Columbus Automobile Club will be made at a special meeting to be held in a few weeks. This was decided on recently when a committee was named to draft a new constitution and by-laws which will be presented to the membership. The plan is modeled after that in vogue in Cincinnati and Cleveland, which has proved a success.

The feature of the plan is a board of governors, which will meet weekly with the salaried secretary. All matters of moment will come before the board of governors and this will take the work and responsibility off the officers, as has been the case in the past. A campaign for membership is being started and it is expected to double the number of members.

A. C. A. ACTIVITY OF A TECHNICAL CHARACTER

A. L. McMurtry, chairman of the technical committee of the A. C. A., is kept very busy these days making tests and investigations of a character which should prove of the greatest possible interest to the automobile industry at large as well as to the members of the club. The facilities afforded for original research at the club are such that the results should be reliable, and, in the hands of McMurtry, exactness is to be expected. The club dynamometer is receiving a quota of attention, and it may be that something will be made of it in the long run. It is now proposed to eliminate errors by driving from the dynamometer motor through a device which will be fastened to the wheel of the automobile. This will, to some extent, lessen the present slight errors due to tire slippages.

IOWA CITY GETS AUTO CLUB

Articles of incorporation of the Iowa City, Iowa, Automobile Club have been filed with the county recorder. This club is not born for pecuniary purposes, and has no capital stock. The object of the organization is to battle for good roads and to secure if possible other much needed reforms.

The incorporators and directors are: F. C. Carson, F. X. Freyder, O. H. Carpenter, James W. Dvorsky, Ed. B. Wilson, John McCollister and Will Carson. The charter officers are: President, Frank C. Carson; Vice-President, F. Freyder; Secretary, O. H. Carpenter; Treasurer, James W. Dvorsky.

OHIO'S GROWING ROLL OF COUNTRY CLUBS

CANTON, O., Feb 14—At a meeting of autoists of Stark County, held at this city recently, the organization of the Automobile Club of Star County was effected. The club starts with a membership of 126. A fee of $5 is charged, which entitles the members to membership in the A. A. A. The club will hold monthly meetings. Officers were elected as follows: J. H. Kenny, president; Charles Steese, Jr., Massillon, vice-president; W. A. Hoberdier, secretary-treasurer. The board of governors consists of Edward E. Bender, J. R. Dangler, John Sherer, W. L. Stolzbacher and J. G. Best.

ANNUAL ELECTION OF CENTURY MOTOR CLUB

The Century Motor Club of Philadelphia, at its annual meeting, elected the following officers: J. Fred Hartman, president; Frank R. Isaac, vice-president; C. D. Holden, secretary; F. R. Davis, treasurer, and the following board of directors: Edwin M. Abbott, J. Howard Clarke, Edward H. Ervin, H. G. Evans, Henry Goldthrop, Ralph Humphreys, Lucien V. Leach, Dr. C. F. Rau, Dr. Clayton S. Schwenk, C. B. Sears and R. N. Storey. Edwin M. Abbott was elected counsel for the club.

ANOTHER COUNTY IN WISCONSIN HEARD FROM

The Rusk County Automobile Club has been organized with headquarters at Ladysmith, Wis., and will doubtless affiliate with the Wisconsin State Automobile Association. E. M. Worden, of Ladysmith, was elected president and the other officers are: T. M. Thomas, secretary; H. W. True, treasurer.

SHOW BREVITIES

INDIVIDUAL SHOWS IN INDIANAPOLIS

INDIANAPOLIS, Feb. 14—The annual automobile show in this city will be held during the week of March 28, and as usual will be under the auspices of the Indianapolis Automobile Trade Association, which now has forty-nine members, embracing dealers and manufacturers, both of cars and accessories. This year's show will be of more importance than usual, owing to the general enthusiasm that is being shown in the plans.

Each dealer and manufacturer will exhibit in his own establishment. This will be necessary from the fact that the only building that would be evailable for a show all under one roof, is located at the State Fair grounds, about four miles from the city and regarded as too inaccessible to the public. To make up for the fact that the show will not be under one roof, the association arranged an elaborate program of outdoor events.

The first of these will be a magnificent floral parade on Wednesday afternoon. On Thursday afternoon there will be a program of speed trials and novelty events at the Indianapolis motor speedway, taking the place of similar events that have been held on the North Capital avenue boulevard during show week in previous years. Another parade will be given Friday, exclusively for commercial cars, of which there are about 150 in the city.

Officers of the I. A. T. A. are: President, Fred I. Willis, of the Hearsey-Willis Company; secretary, Frank B. Willis, of the Willis-Holcomb Company, and treasurer, Frank L. Moore, of the Fisher Automobile Company.

DENVER ENTHUSIASTIC OVER SHOW PROSPECTS

DENVER, Feb. 11—The preparations for the second annual automobile show, to be held in the Auditorium, February 23 to 26, are almost complete, and are most encouraging to the members of the promoting body, the Denver Motor Club. The show will undoubtedly rank high among those held west of Chicago. The club has had an artist busy for several days on the color schemes and decorative effects, so that the decorators have a plan to work on. All exhibits will be decorated uniformly.

With the exception of a few small boxes the floor space has already been disposed of. The list includes dealers handling 37 makes of automobiles, besides a number of motorcycles and a goodly array of accessories.

PROSPERITY SHOVES OMAHA SHOW TO FRONT

Everything points to the show this year being a tremendous success. Not only is the entire main floor filled up, but the management has been compelled to open up the basement, and the space there has also been contracted for.

LAW AND THE AUTOMOBILE

FEW CHANGES DESIRED IN BAY STATE LAWS

BOSTON, Feb. 14—Little inclination on the part of automobilists or "antis" to tinker with the Massachusetts automobile law has yet appeared in the Legislature. Apparently all hands prefer to wait until the law, which became fully effective the first of the year has been given a test before suggesting amendments or changes. But whatever the cause may be there have been fewer bills filed at the State House relating to the operation of automobiles than in any session of the Legislature for a long time. There are some important measures proposed concerning highways and therefore indirectly affecting the motorists, but of strictly automobile bills there are only three or four.

Two of these are the so-called "light" bills, a piece of legislation that has been proposed in recent years as often as the Legislature has met, and has been as regularly rejected on account largely of the rural influence, which objects strongly to protecting itself by carrying a light on horse-drawn vehicles at night. Both the bills propose that all horse-drawn vehicles using the highways from a half-hour after sunset until a half-hour before sunrise shall carry a light or lights, the size and location of which are left to the determination of the Highway Commission. These bills have been referred as usual to the committee on roads and bridges.

The bedlam created especially in the cities, by that part of the new law requiring the sounding of a warning signal by an automobile operator when approaching a corner, curve, intersecting way or a pedestrian not on the sidewalk has got on the nerves of some people, and a bill has been filed designed to diminish it. This bill would limit warning devices to the ordinary horns and bells and prohibit the harsh-toned instruments of torture that have become common of late and which, being easily sounded, are set off in complete compliance with the law. It may be also that some effort will be made to modify the law so that incessant sounding of horns will be unnecessary.

The Highway Commission this year makes no recommendations whatever for changes in the automobile law. It makes some important suggestions, however, in regard to highways. One of these is that in the process of elimination of grade crossings with railroads which is going on all over the State, more attention should be given the rights of automobilists and other users of the highways. It recommends that in cases where the railroad is carried over the highway there shall be a clear view ahead of at least 150 to 200 feet and that on curves there shall be a clear view of the roadway for at least 150 feet. In some cases where crossings have been abolished the conditions for users of the highway have been made more dangerous than before, and the board cites instances where underpasses are paproached at sharp angles or where the bridge is too narrow, in some cases vehicles being obliged to approach a blind turn and swing onto electric car tracks in order to go under the railroad. Another important suggestion of the Highway Commission is for a broader administration of the highways by their division into main, secondary and local routes. Such a system would lend itself to better and more economical administration.

VERY STIFF SENTENCE FOR CAR STEALER

BUFFALO, Feb. 14.—Nine years and eight months imprisonment at hard labor was the sentence passed upon an inveterate motor car thief by Justice Truman G. White in Part III of the Supreme Court to-day. The prisoner earning this the stiffest sentence that has been dealt out for grand larceny in Buffalo in a long time was Ed. Houck. But for the fact that the law prohibits a sentence under which prisoners are liable to leave prison in the cold months, Justice White would have given Houck the limit, 10 years.

Houck was convicted of stealing an automobile the first time in 1906. He was given a suspended sentence for this. The next year he stole another machine, and was sentenced to a year in the Elmira Reformatory. When he emerged in 1908 on parole, he stole another machine, and was given another year for violating his parole. He had not been out a month after serving time for the theft of the third automobile before he stole his fourth.

ROAD BUILDING NEWS

GOOD ROADS PLENTIFUL IN THE BLUE GRASS COUNTRY

LOUISVILLE, KY., Feb. 14—In the mountain sections of Kentucky, Tennessee and Virginia, where formerly the roads were practically nothing more than creek beds, available in dry weather and impassable in the rainy season, it is interesting to note the development with reference to improved highways. Appreciation of good roads by the people of the Cumberland Mountains has been due in a large measure to the construction of the military road through Cumberland Gap. This road was built by United States Government engineers as an object lesson, for the purpose of showing that road building is possible in any section. It has been in use for more than a year and is as smooth as asphalt.

The road was constructed along the line of the old Wilderness road, through which pioneers first entered eastern and interior Kentucky. It is the great traveled highway from Virginia to Kentucky and Tennessee. Since its completion, the Cumberland Gap Military road has been used continuously for automobiles, log wagons and all sorts of vehicles.

Automobilists passing through this part of the country will be most richly repaid. In its sublimity the scenery cannot be equalled anywhere and the environments are full of historic interest. If the shade of Daniel Boone could see the excellent highway that has supplanted his old trail he, too, would be convinced that good road ideas have spread marvelously since his day.

Since the advent of the automobile, road development throughout the entire South has been more pronounced than any previous period. Miles and miles of roadway, as level as a well-kept boulevard, can be found in the Blue Grass section of Kentucky. This part of the State is famous for its good roads, which are among the finest in the country.

In Kentucky there has been considerable speculation in respect to the relative severity of the automobile and the horse-drawn vehicle on macadam highways. Numerous tests have been made practically all of which have developed the fact that an automobile is less destructive than horse-drawn vehicles.

The Louisville Automobile Dealers' Association deserves the good will of every automobilist who has used the roads in the vicinity of Louisville. It has been instrumental in the posting of the roads throughout this section of the State. The work has been in progress many months, and the various signs indicate all bad places, the speed limits as well as the distance to the various points about the city. As a result of the efforts of the Louisville Automobile Club and the Louisville Dealers' Association the roads in the vicinity of Louisville are in an excellent state of repair. This is a condition much to be desired, and one that other parts of the country might well try to match.

HERRESHOFF

HERRESHOFF, in the car for 1910, is offering a car which especially appeals to purchasers who put quality ahead of price, and, in view of the mechanical perfections of the power plant, it is made the feature of this article. This plant is of the unit type, with the magneto on the left and the carbureter on the right side.

SELF-CONTAINED POWER PLANT REPRESENTS A UNIT

The motor is of a four-cycle, four-cylinder, water-cooled type, with cylinders cast in pairs, with integral water jackets. The cylinder bore is 3 3-8 inches, and the stroke is 3 3-4 inches. The inlet and exhaust valves are of large diameter, interchangeable, and are located on one side. This construction operates to reduce the loss of heat in the water jackets and to conserve the power, since the incoming gas helps to cool the exhaust chamber.

The valves are operated by very hard steel cams, on one camshaft, which is mounted on imported ball bearings. The inlet and exhaust manifolds are large and have no elbows or corners for the collection of gas. The former is designed to allow the passage of gas to the cylinders with the least amount of friction and the latter to relieve the cylinders of the burnt gases with the least possible back pressure—thus preventing overheating and a consequent loss of power.

The crankshaft runs on three imported ball bearings; it is a drop forging of the best grade of steel for the service it performs, and ground to exact size. In order that it will run without vibration, the shaft is "balanced" as a unit and with flywheel assembled.

The connecting rods are of drop-forged steel of I-section, designed to withstand the heavy compressive stress they necessarily have to carry. The connecting rod caps are doweled and held in place with chrome nickel-steel bolts. The bearings on the crankshaft are of ample proportions and made of special grade of die-cast babbit. The upper ends of the connecting rods are securely clamped to hollow wrist-pins of special design, which have their bearings in the pistons. The latter are made of the very best grade of gray iron, and well ribbed to withstand the high pressure of the explosion. There are four eccentric piston rings, made of special cast iron and ground to size.

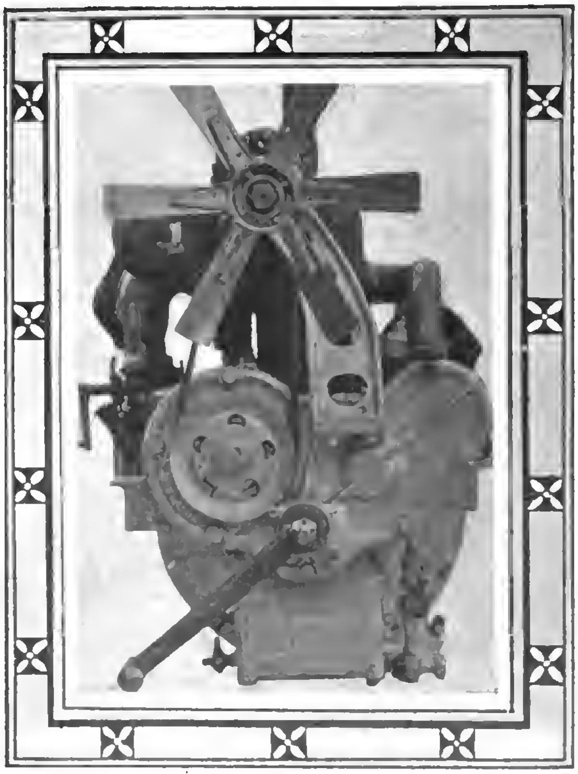


Fig. 1—Front end view of the motor, depicting the encased half-time gear system, air propeller and starting crank.

The carbureter is of the float-feed automatic type, the gasoline feed being regulated by a graduated needle valve. The gas is controlled by a hand lever on the steering wheel and by a foot acclerator. The gasoline tank is placed under the driver's seat, the gasoline being fed by gravity to the carbureter. On the runabout and tourabout types, an air pump is provided for pressure feed for use on hills.

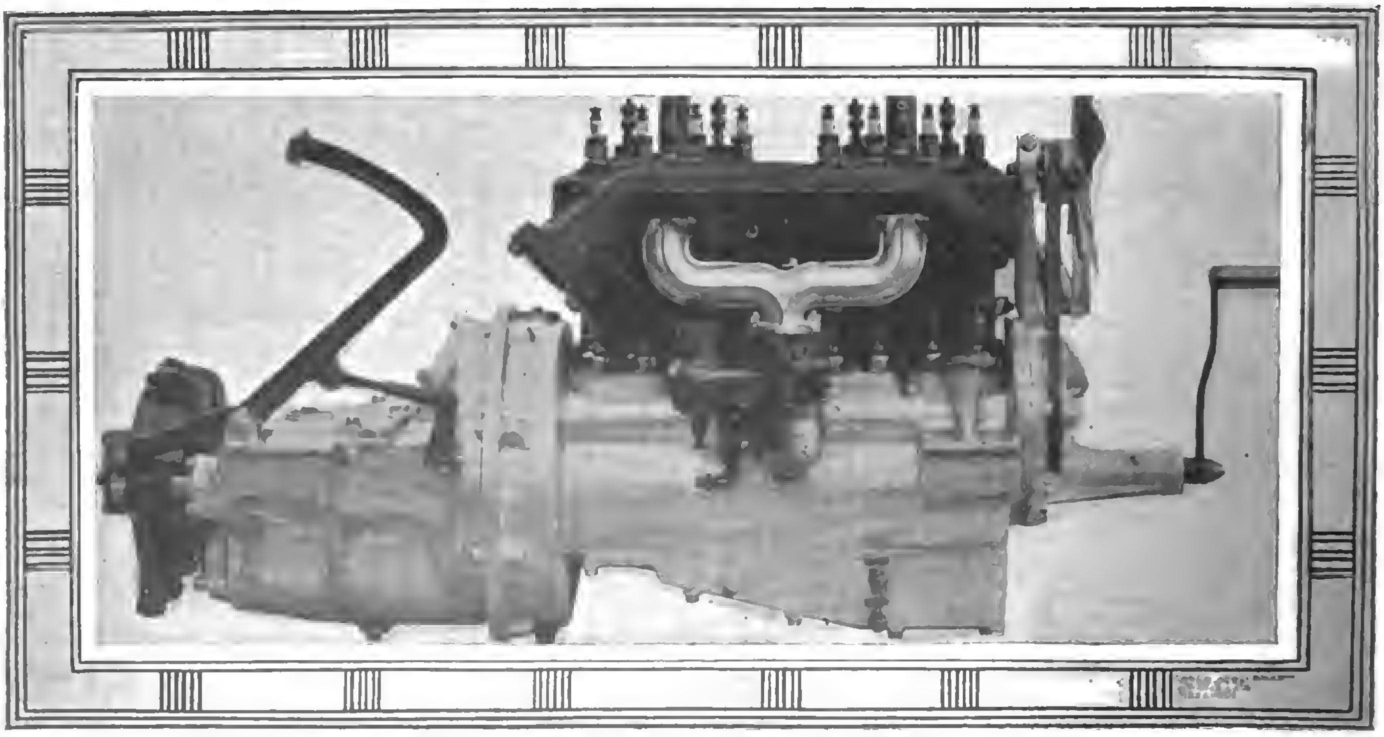


Fig. 2—Right side of the unit power plant, showing location of carbureter, contour of piping and compactness

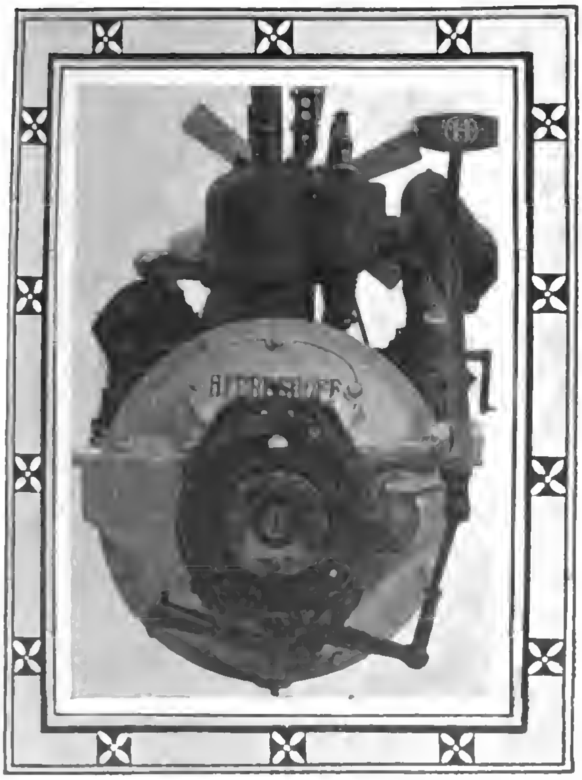


Fig. 3—Rear end view of the motor looking into the flywheel, showing details of the connections for the clutch

COOLING SYSTEM INCLUDES A VERTICAL TUBE RADIATOR

The vertical type radiator is of large capacity and of such shape and proportion as to give the car an imposing front. The drawn brass pipes, which carries the water to and from the cylinders are carefully proportioned, and of large capacity—thus facilitating the thermo circulation. The fan behind the radiator is mounted on ball bearings, and driven by a V-shaped belt from a pulley keyed to an extension of the camshaft.

Two of the best independent systems of ignition are provided—high-tension Bosch magneto, operated with a fixed spark; and a storage battery, four-unit coil and timer. These two systems are controlled by a switch in easy reach on the coil box, located on the dash.

The magneto is located on the left-hand side of the crankcase and is held in position by a clamped band. It is driven from the crankshaft gear through an idler gear. A flexible coupling is provided in its driving shaft, which shaft is mounted upon imported ball bearings. All high-tension cables are carried in insulated brackets so that short-circuits are practically impossible. The timer in connection with the storage battery circuit, runs on ball bearings, and is of approved design, and driven from the magneto driving shaft by spiral gears.

CONSTANT LUBRICATION BY POSITIVE FEED SYSTEM

The lubrication of the motor is by a constant feed system and operated by a self-contained gear pump. A reserve reservoir is located underneath the crankcase proper, from which the oil is pumped through a copper tube to the sight feed on the dash, from which it is fed by gravity into the two compartments of the crankcase, where a constant level is maintained. The lower tips of the connecting rod bolts dip into this oil and throw it to all parts within the case and pistons. A strainer is provided in the reserve reservoir so that foreign substances are not drawn into the system. The gear pump is driven by the same spiral gear which drives the timer.

Adequate lubrication is one of the most essential features of a successful car, since without it the most perfectly constructed mechanism will not give satisfactory service and will wear out quickly. Our oiling system is positive in its action, and can therefore be depended upon to keep in well-lubricated condition our carefully designed mechanisms. This system has been successfully used for years past on prominent makes of cars.

The Herreshoff Motor Car Company, Detroit, Mich., is the maker of this product and, contrary to the usual agency methods, the cars are handled direct from the plant. There are two models, one of which is a runabout, and the other, as a touring car, seats four.

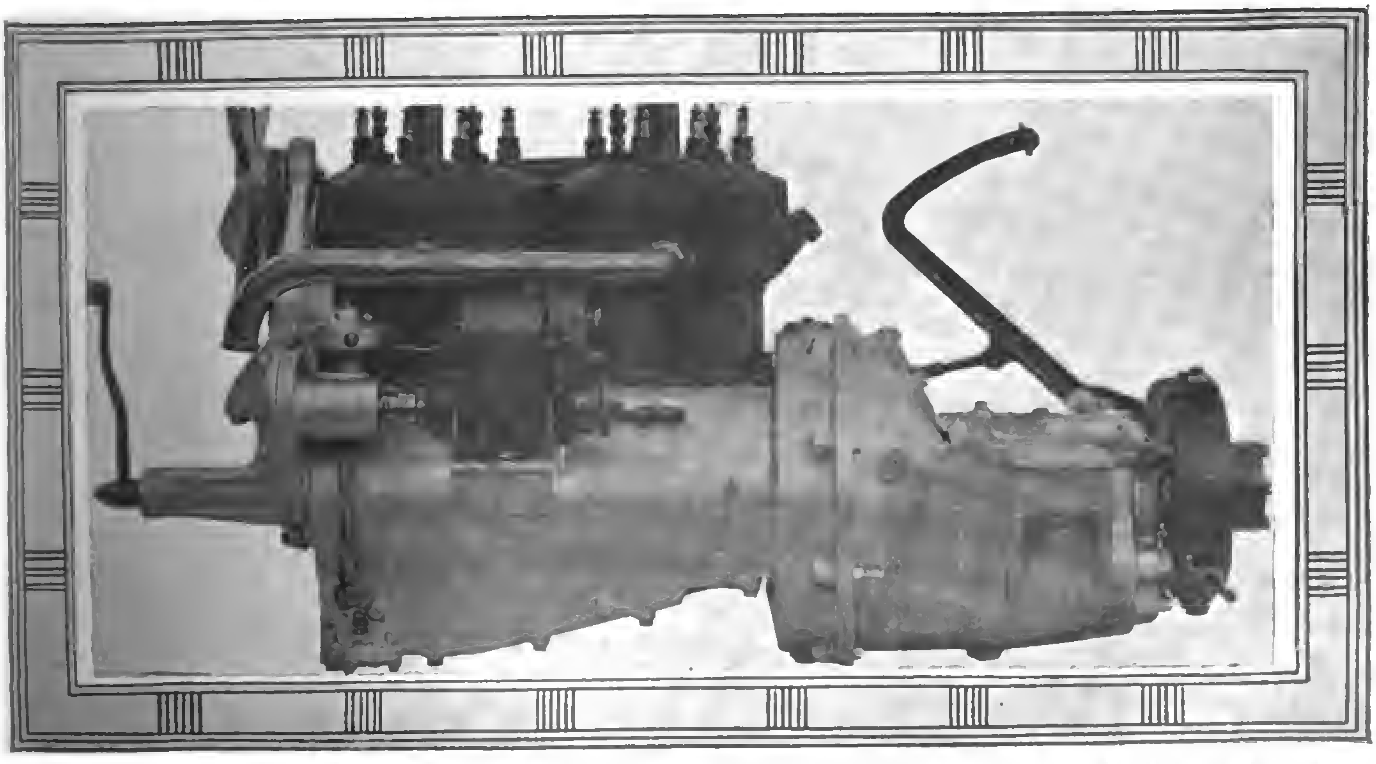


Fig. 4—Left side of the power plant, showing location of magneto, method of fastening and other mechanical features of note

DIFFICULTIES IN THE WAY OF STANDARDIZATION

THAT the automobile will ultimately be standardized is one of the things that is fast becoming too apparent to be disregarded, and this point is never so clearly brought out as when a "public letting" has to be struggled with. When some branch of the Government undertakes to purchase an automobile an elaborate contract is first drawn up, it being the handiwork of the office of the Corporation Counsel or other legal illuminaries with specific reference to a general specification of the automobile which is wanted. The lawyers seem to have very little trouble in drawing up the contract, but the mechanical experts fail utterly to describe a theoretical automobile which will come within many miles of what the bidders would have to offer, there being no definite relation of the several makes of automobiles to a theoretical standard (or standard arrived at by engineering bodies), so that all the legal phraseology which comes from the office of the Corporation Counsel, for illustration, is wasted in view of the absence of any language which will fairly describe an automobile in the abstract, with the understanding that the lowest competent bidder will truly deliver a satisfactory machine and with the further understanding that every maker will be equally and justly treated. A purchasing contract seems to be a most formidable document, and with the idea of showing something of this angle a blank form which emanated from the legal department of a city government is here given. The real question, however, remains unanswered, and it is believed that this question should be discussed at sufficient length to harmonize the details so that in the long run purchasers will be enabled to determine as to the real value of the respective automobiles if purchased under a contract such as this. The columns of THE AUTOMOBILE are open to pertinent discussion from any competent source.

CONTRACT AND SPECIFICATIONS

FOR FURNISHING AND DELIVERING ONE (1) AUTOMOBILE AND ACCESSORIES

Parties

This agreement entered into this..............................day of..................in the year nineteen hundred and.............., between .... of .... City.................County and State of.......................... to be known hereinafter as the "Purchaser," and.................. ....of..................City.................County and State of..............................to be known hereinafter as the Contractor.

Covenant

Witnesseth, the parties of these presents, each in consideration of the agreements on the part and behalf of the other herein contained, have agreed, and hereby agree, the party of the first part for himself and with successors, and the party of the second part for him (or them) self (or selves) and his (or their) executors and administrators, as follows:

(A) That wherever the term "purchaser" is used, or a pronoun instead, such term shall refer to and mean the party first above mentioned, and no other.

(B) That wherever the term "contractor" is used, or a pronoun instead, such term shall refer to and mean the party second above mentioned, and no other.

(C) Wherever the word "engineer" is used in these specifications, or in this contract, it refers to and designates Mr............ .... supervising engineer of the purchaser, acting either directly or through any assistant or inspector, duly appointed by the purchaser, or designated therefor by the supervising engineer of the purchaser, or through any such assistant, to receive, weigh, inventory, or inspect the automobile, in whole or in part, or the accessories thereunto belonging, or to be furnished, limited by the particular duties intrusted to him, or them.

(D) Wherever it is provided that anything is to be, or to be done, if or as, or when or where "approved," "required," "directed," "specified," "designated," or "deemed necessary," it shall be taken, unless otherwise expressed, to mean and intend, approve, required, directed, specified, designated, or deemed necessary, as the case may be, by the purchaser or the engineer of the purchaser.

(E) The contractor will provide, furnish and deliver to the purchaser, at his own cost and expense, at the time and place, and in the manner and under the conditions hereinafter specified, the automobile and accessories mentioned, and described in the specifications and schedule, and will accept as full compensation therefor the sum set opposite the respective articles or classes of articles in the specifications or schedule herein contained or hereto annexed, the said sum being the amount at which the contract therefor was awarded to the contractor at the letting thereof.

(F) This contract and specifications is the complete and final instrument embodying this entire transaction, superseding all previous written and oral discussions, agreements, or understandings in relation to this subject matter, subject to no changes, additions or subtractions whatsoever, excepting by virtue of a written supplementary contract, duly executed by the parties hereunto.

(G) The contractor will give his personal attention constantly to the faithful prosecution of the work; he will not assign, transfer, convey, sub-let, or otherwise dispose of this contract, or his right, title or interest in or to the same or any part thereof, without the previous consent in writing of the purchaser, endorsed hereon, and he will not assign, by power of attorney or otherwise, any of the moneys to become due, and payable under this contract, unless by such previous written consent, signified in like manner. If the contractor shall, without such previous written consent, assign, transfer, convey, sub-let, or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys to become due under this contract, to any other person or other corporation, this contract may, at the option of the said purchaser, be revoked, annulled, and the purchaser shall thereupon be discharged from any and all liability and obligations growing out of the same to the contractor, and to his assignee or transferee, provided that nothing herein contained shall be construed to hinder, prevent or affect an assignment by the contractor for the benefit of his creditors, made pursuant to the statutes of the State of..........................; and no right under this contract, or to any money to become due hereunder, shall be asserted against the purchaser, in law or in equity, by reason of any so-called assignment of this contract, or any part thereof, or of any money to grow due hereurder, unless authorized as aforesaid, by the written consent of the said purchaser.

(H) The said automobile and accessories and each and every part thereof shall in all respects conform strictly with the herein-contained specifications, and schedules referred to, by the purchaser as a standard of quality, style, finish, or manufacture that will be required.

(I) The purchaser may appoint such engineer, inspector, or assistant as may be deemed proper to inspect the automobile or the accessories furnished and delivered under this contract, and such engineer, inspector, or assistants are authorized and empowered to reject and refuse any part, or the entire equipment, if any part thereof offered under or in fulfillment of this contract does not comply in kind, quality, or quantity, size or number, or weight, or in time or in place of delivery, with the said specifications.

(J) Any part or parts of the said automobile or accessories delivered or offered to be delivered under this agreement, which shall be rejected by the engineer, inspector, or assistant, as not conforming to the aforesaid specifications, shall be forthwith removed, and the part or parts which do so conform shall be furnished and delivered in the place thereof.

(K) The automobile and accessories provided for in this contract and set forth in these specifications must be delivered within .... (........) days, exclusive of Sundays and legal holidays, from the date of order.

(L) To prevent all disputes and litigations, the "purchaser" shall in all cases determine the amount or the quantity of the automobile and accessories to be paid for under this contract, and shall determine all questions in relation to said automobile and accessories, their quantity, delivery and condition, and he shall in all cases decide every question which may arise relative to the execution of this contract, on the part of the contractor, and his estimate and decision shall be final and conclusive and shall be a condition precedent to the recovery of any sum or sums of money by the contractor under this contract.

(M) If the contractor shall well and faithfully perform and fulfill this contract and keep every covenant on his part herein contained, the purchaser will then, but not before, pay to the contractor the sum of ....dollars ($..............), but no more.

(N) The contractor shall not be entitled to demand or receive payment for the said automobile and accessories, or any part thereof, or accept in the manner set forth in this agreement, nor until each and every one of the stipulations herein mentioned are complied with, and the engineer shall have given his certificate to that effect, provided that nothing herein be construed to affect the right hereby reserved by the purchaser to reject the whole or any part of the automobile, and accessories, delivered or offered for delivery, should the said certificate be found or known to be inconsistent with the terms of the agreement or otherwise improperly given.

(O) The contractor shall be responsible for any claim made against the purchaser for any infringement of patent right for the sale, supply or use of any patented articles, materials, or apparatus furnished or supplied under this contract, and that he shall save harmless and indemnify the purchaser for all costs, expenses and damages which the purchaser shall be obliged to pay by reason of any infringement of patent resulting from such sale, delivery, or use of said automobile and accessories, or any part thereof.

(P) If the contractor shall fail to furnish and deliver the automobile and accessories as herein agreed to be furnished and delivered, or any of them or any part of them, at the time or in any manner when or wherein they are agreed to be delivered, or if this contract shall be sublet or assigned by the contractor otherwise than as herein specified, the purchaser shall have the power to notify the contractor to discontinue all delivery, or any part thereof under this contract, by a written notice signed on behalf of said purchaser by himself or the engineer to be served upon the contractor either personally or by leaving the same at his residence or with his agent in charge of the work; and thereupon the contractor shall discontinue the delivery of said automobile and accessories or such part thereof as the purchaser may designate, and the purchaser shall thereupon have the power, in the manner described by law, to contract for the completion of the work, by contract or otherwise, as the purchaser may deem advisable, and charge the expense thereof to the contractor, and the expense so charged shall be deducted and paid by the purchaser out of the moneys that may then be due, or thereafter grow due, to the contractor under and by virtue of this agreement, and in case such expense shall exceed the sum which would have been payable under this contract, if the same had been completed by the contractor, then the contractor shall pay the amount of such excess to the purchaser or notice from the purchaser of the amount of such excess, and in case such expense shall be less than the sum which would have been payable under this contract, if the same had been completed by the contractor, then the contractor shall receive the difference, after deducting ten (10) dollars per day for each working day, between the contract date of delivery and the date of completion of the work.

(Q) The residence or place of business given in the bid or estimate upon which this contract is founded is hereby designated as the place where all notices, letters and other communications shall be served, mailed or delivered. Any notice, letter or other communication addressed to the contractor and delivered at the above named place, or deposited in a post-paid wrapper in any post office, shall be demed sufficient service notice thereof upon the contractor. The place named may be changed at any time by an instrument in writing, executed and acknowledged by the contractor, and delivered to the purchaser. Nothing herein contained shall be deemed to preclude or render inopsrative service of any notice, letter or other communication upon the contractor personally.

(R) The contractor may make delivery of the said automobile and accessories within........................... (................) days, Sundays and legal holidays excepted, and.................. .... (................) days, Sundays and legal holidays excepted, from the date of execution of this instrument by the parties hereunto.

(S) In case the contractor shall fail to complete the delivery of such automobile and accessories in accord with the specifications, and to the satisfaction of the purchaser, within the time aforesaid, the contractor shall and will pay the purchaser an amount equal to 1 per cent. of the contract price for each and every day the time consumed in said delivery may exceed the time hereinbefore allowed for the purpose, which said amount, in view of the difficulty of ascertaining the loss which the purchaser will suffer by reason of delay in the delivery of the said automobile and accessories, or any part thereof, is hereby agreed upon, fixed and determined by the said parties hereunto as the liquidated damages that the purchaser will suffer by reason of said delay and default, and not as a penalty, and the purchaser shall and may deduct and retain the amount of said liquidated damages out of the moneys which may be due or become due to the contractor under this agreement. Nothing herein contained shall be deemed to preclude or render inoperative the right of the purchaser as set forth in clause (P).

(T) The purchaser shall not be precluded or stopped by any return of certificate made or given by the engineer or assistants of the purchaser under any provisions of this agreement, from, at any time (either before or after the final completion and acceptance of the work and payment therefor, pursuant to any such return or certificate) showing the true and correct amount and charaoter of the work done and materials furnished by the contractor, or any other person under this agreemsnt, or from showing at any time that any such return or certificate is untrue and incorrect, or improperly made in any particular, or that the work and material, or any part thereof, does not in fact conform to the specifications; and the purchaser shall not be precluded and estopped, notwithstanding any such return or certificate and payment in accordance therewith, from demanding and recovering from the contraotor the refunding to the full amount of the contract price, less 1 per cent. of the contract price for each and every week the time consumed by the purchaser up to the day upon which notice is served upon the contractor that the said automobile and accessories, or any part thereof, do not conform to the specifications, and it is the purpose of the purchaser to surrender, the said automobile and accessories upon receipt from the contractor of the contract price, less deductions as herein set forth.

(U) The contractor shall not pay, directly or indirectly, to any agent, representative or employee of the purohaser any commission, or other compensation, upon any account whatsoever bearing upon this contract, and the purchaser shall not be precluded or estopped from demanding and recovering a sum equal to any such payment upon discovery of the fact, or deduoting the amount from the contract price before payment, if the information is obtained prior to the date of settlement.

(V) The contraotor shall stand for loss or damage due to or caused by fire or other source sustained by the said automobile and accessories, or any part thereof, prior to the date of acceptance of the automobile and accessories by the purchaser.

(W) The said automobile and accessories when delivered shall be in good running order, fully adjusted in all its parts and ready for service forthwith, including a full supply of lubricating oil, liquid fuel, and nseded supplies up to the limit of the storage capacity provided and specified.

(X) The contractor shall insure the said automobile and accessories against fire and accidental damage, and pay ths premium thereon, and the said insurance policies shall be assigned to the purchaser forthwith upon delivery and acceptance of the said automobile and accessories. The said policies and each of them shall be taken out for one year, and each of them shall have at least nine-ninths to run upon the date of transfer from that date.

(Y) The initial run shall be made on such roads as the purchaser will select, and all damage sustained during the trial run by the automobile and accessories, or any part thsreof, shall be borne by the contractor, provided the oontractor or his representative is present, or if the contractor elects to allow the purchaser to proceed unattended.

(Z) The initial run shall be for a distance of fifty (50) miles out and back by any public highway the purchaser may select, and failure of the said automobile and accessories, or any part thereof, to properly perform shall constitute just and proper grounds for the rejection of the said automobile and accessories, or any part thereof, by the purchaser.

(AA) The clauses as follows are excluded from this contract. (..........), (..........), (..........), (..........), (..........), and the parties hereunto do agree hereby that the said clauses as herein set forth so exoluded are not and shall not constitute a part of this contract.

Witnesses:

....

....................Purchaser (L.S.)

....

By............Representative

....

....................Contractor (L.S.)

By............Representative

QUESTION, WHAT IS A CHASSIS?

FROM a discussion recently closed in *Motor Car Journal* (English) it appears that some uncertainty exists even in the trade as to the limits of a chassis, styled and purchased as such. A perusal of the interesting correspondence referred to shows that the issue really centers in the question as to whether tires are to be considered as an intrinsic part of a chassis in the absence of any special reference to, or scheduling of, them in makers' or importers' lists. Most persons seem agreed that steps, mudguards and other accessories appertaining to the body work are not to be expected with a standard quoted chassis. There is, of course, something to be said for the non-inclusion of a set of tires in a chassis purchase. Down to a year or so ago much more might have been urged against their inclusion because, while the consensus of trade practice was to include the tires, it was almost as often the experience that those furnished were unequal to the weight of the vehicle and speeds expected by the purchaser. Hence the practice grew of listing as an accessory stronger tires, or alternatively, by some equivalent means bringing it to the purchaser's notice that the standard equipment had a certain value, and a limitation that were for himself to determine should or should not be obviated at an added cost to himself. Present practice is more or less uniform in the matter of tire sizes for a given category of car. For this we have to thank the tire manufacturers, who indirectly have brought it about by the steps they took to prevent the unfair exploitation of their wares in the manner indicated. That the question of the inclusion or non-inclusion of tires as a standard part of present day chassis has now been raised is partly due to the effect of the tire companies' action, and largely to the stress of competition during the particularly bad and recent period. There is no doubt that precedent counts for much when disputes are referred to the courts, and there is equally no doubt that precedent as to the issue in question is on the side of including tires as a standard part of a chassis' equipment. The fact that, more recently, the practice has been opposed might, or might not, be regarded by the judges as having that sanction necessary to establish in the judicial mind evidence of trade custom; much in the same way that while hitherto and for the present a man's suit of clothes is taken to include the lining, trimmings and buttons, but a woman's costume is usually listed with the same items separately assessed, the sartorial trade might tacitly decide for a common rule in respect of the garments for both sexes. It takes time to establish a precedent having the sanction needed to invest it with a judicial worth, but it takes even longer to upset a precedent once accepted as a rule. Applying this dictum to the case of the tire, and having regard to the circumstances that brought about the recent departure, it may be doubted if a sufficient reason exists for debarring a purchaser from concluding—in the absence, of course, of a direct intimation properly promulgated to the contrary by the seller—that the purchase sum for a chassis is to be taken to include all appurtenances necessary to enable the machine—for such a chassis is until it is transformed into a carriage or other distinctive type of vehicle—to be adequately tested. A chassis without tires cannot be run, and as such lacks one of the essentials to the purpose and style of its construction regarded as a piece of mechanism, carrying an implied warranty of suitability for the purpose intended. No one would contemplate the purchase of a tire-less horsed vehicle, why then exempt a mechanically propelled one from the common rule and precedent?

While the same does not apply to the situation on this side of the Atlantic, all cars here being sold with tires, and with adequate sizes at that, nevertheless, it is of interest as showing the other man's viewpoint.

Great Western plant, where Great Western automobiles are made, depicting a Winter's scene and evidences of activity portrayed by a string of empty freight cars on the siding

Theodore Barnes, Jr., and David S. Hendrick have entered a partnership in Washington, D. C. They will handle the Pullman in that city and Virginia. Mr. Barnes was formerly connected with the Cook & Stoddard Company as a Franklin salesman. Mr. Hendrick was with the Warner Motor Company, agent for the Crawford.

The Pittsburg Automobile Company, Pittsburg, Pa., has removed from its former quarters in the Denny Building, at Seventh avenue and Grant boulevard, to Baum street. Leo Kauffman, dealer in auto oils and automobile supplies, has sublet its former establishment.

A. C. Harrington, for the past nine years with the Packard Motor Car Company, and late of the New York City branch, has left that company to take charge of the sales department of S. J. Wise & Company, New York distributors of the American Simplex.

The Kenny Motor Car Company opened its new building at 1474 Bedford avenue, Brooklyn, N. Y., on the evening of February 12, with an informal reception to the trade and others interested. A complete line of Rambler cars was on exhibition.

The Standard Motor Co. of Boston, Mass., recently incorporated, with headquarters in Boston, is agent in Massachusetts and Rhode Island for the Standard "6" and the Standard "4" types made by the St. Louis Car Co.

The Jonas Automobile Co., Davis Manufacturing Co., and Bartels-Maguire Oil Co., all well-known Milwaukee concerns, have been elected to membership in the Merchants' and Manufacturers' Association of Milwaukee.

Taylor Bros., of Milwaukee, Wis., representing the Hupmobile, have leased quarters at Wells and Sixteenth streets for garage and salesroom purposes. The firm has recently obtained sales rights for the Fiat in Wisconsin.

Henry Ford, president of the Ford Motor Company, who has stood for five years against the A. L. A. M.

L. B. Robinson now has charge of the Studebaker Auto Co. in Louisville, Ky. Mr. Robinson comes from Sioux City, Iowa. The new garage and salesroom is about ready for use.

Charles M. Green has been appointed distributing agent for the Monarch shock absorber. He has opened offices at 1036 Old South Building, Boston, Mass.

The Reliance Automobile Company, San Francisco, Cal., will shortly receive the Knox raceabout, with a 70-mile per hour speed guarantee.

Earlywine & Lewis will handle the Great Western "30" exclusively in Kosciusko County, Indiana, from headquarters at Mentone.

The Iron Range Automobile Co., of Virginia, Minn., is operating a garage and salesroom in that city. It handles the Ford car.

O. R. Hughes, of Marshfield, Wis., district agent for the E-M-F "30," has broken ground for his new garage on City Hall Square.

Taft & Henderson, of Whitewater, Wis., are handling the Ford in several counties of southern Wisconsin.

The Green Bay Motor Car Co., of Green Bay, Wis., has taken the agency for the Maxwell and Regal.

Ward & Dorr, of Whitewater, Wis., have been appointed district agents for the Brush runabout.

Great Western cars will be sold in Champaign County, Illinois, by Cruse Brothers, of Champaign.

The Lambert Automobile Co., agent for the Maxwell car, has taken on the National car.

Hans Sattler, of Sheboygan, Wis., is a new district agent for the Overland.

PERSONAL TRADE MENTION

J. R. Windsor, formerly with the E. R. Thomas Motor Co., Buffalo, N. Y., as special traveling representative in Iowa and the Middle West, has accepted the position of sales manager of the store opened at 1934 Broadway, New York, where A.-K. cars are handled. This company is the representative in the Eastern district for the Pierce-Racine cars, as well as having direct factory connections with the famous German house of Mercedes and the equally famous French makers, Lorraine-Dietrich. The company was formerly located at 3 West Forty-fourth street.

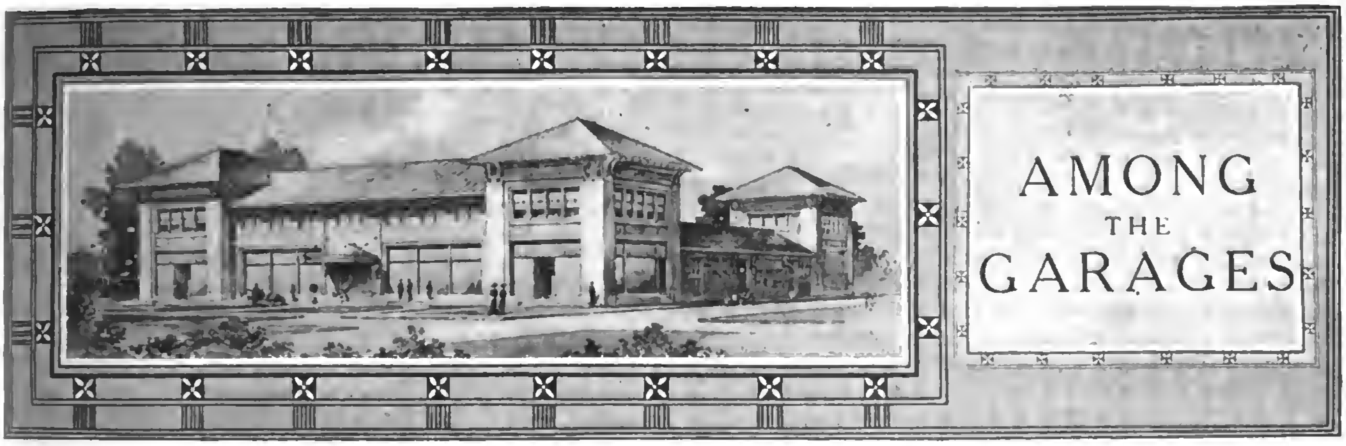
W. H. Wray, Jr., formerly with the Studebaker Co., of New York, has assumed charge of the motorcycle department of the Atlantic Motor Car Co., located at 225-227 West Fifty-seventh street. Mr. Wray is well known as the holder of many motorcycle records, among which may be mentioned the mile straightaway at Ormond Beach, Fla., against time, 44 2-5 sec. The Atlantic company handles, besides the New Era motorcycle, of which Mr. Wray will have charge, the Stoddard-Dayton and Courier automobiles.

J. V. Alden, of the Seamless Rubber Co., is making a tour of the country establishing branch houses. Mr. Alden has just completed this work in Boston, where a branch house was started at 685 Boylston street, under the supervision of A. W. Randall. Leaving there as soon as the business had gained a good start, Mr. Alden proceeded to New York to assist in starting the New York branch, which is mentioned elsewhere, and of which company he is vice-president.

F. A. Hall has been elected as vice-president and treasurer of the Cameron Engineering Company, Brooklyn, N. Y. For the past twelve years he has been manager of the chain block and hoist department of the Yale & Towne Mfg. Co. R. R. Hodgkins will succeed Mr. Hall.

E. H. Whitman, for the past ten years with the National Biscuit Co., has accepted the management of the New York branch of the Seamless Rubber Co., at 2002 Broadway.

Arthur M. Crumrine, formerly automobile editor of the Columbus, O., *News*, has been elected assistant secretary of the Columbus Automobile Club, succeeding Harry D. Sims.



New Baker Electric Garage at Cleveland, which is one of the most up-to-date structures of the kind, in which art, convenience, and economy of management are blended for a most complete whole

The opening of the Alvan T. Fuller Service Depot in Boston, at the junction of Commonwealth and Brighton avenues, marks an important epoch in the local trade, for it stands as a monument to the permanency of the industry and to the building up of the largest retail automobile business in the country. Fifteen years ago Mr. Fuller started in business as a bicycle dealer with a small store on Columbus avenue. He will observe his anniversary on Washington's birthday by inviting his customers to inspect the new service depot constructed at a cost of $300,000 solely for the care of Packard and Cadillac cars, for which he is the agent. It was made necessary by a business which this year will reach $3,000,000 in volume.

The service depot is of concrete and steel, absolutely fireproof, 70 by 341 feet in dimensions and with four stories and a basement. From top to bottom it is equipped with the most modern of machinery for automobile work and with the latest labor and time-saving devices. Every convenience for workmen and administrative force has been installed, the different floors and departments being connected by double stairways, a passenger and a large automobile elevator, electric dumb waiters, pneumatic tubes and telephone system. The administrative and sales department occupies the Commonwealth avenue end of the first two floors, the sales and show room being two stories high and the bookkeeping department being located on a mezzanine. There are private offices for the manager, the superintendent and the technical department.

On the basement level is the boiler room, a washing and storage room for cars belonging to the establishment, locker room for the workmen and lunch rooms. There is also the oil and kerosene room, from which lubricants and kerosene are pumped to all parts of the building. Gasoline is kept in a 1,000-gallon tank outside and pumped to all floors. On the street floor are two wide automobile entrances. This floor is used for minor repairs and adjustments and for the storage of repaired cars ready for delivery to their owners. On the second floor is a stock room carrying parts and accessories valued at $140,000, and a room for the storage of bodies, limousines in Summer and tourists in Winter. On the third floor is the department for the inspection of new cars and the attachment of accessories, the upholstery and top repair department and a large paint shop. The top floor is devoted exclusively to overhauling cars; it is possible for about fifty cars to be worked upon at the same time. On this floor are the forge shop, machine shop, tool room and cleaning room. Every floor has its oil and gasoline room, and there is a special room for recharging batteries and repairing magnetos.

Mr. Fuller will retain his quarters in the Motor Mart in Park Square for sales purposes and the large second-story apartment formerly used as a shop is being transformed into a salesroom for second-hand cars, the salesrooms on the street level being used exclusively for the exhibition and sale of new Packards and Cadillacs.

The Columbus, O., agency of the Oldsmobile and Oakland, which has been financed by H. E. and E. B. Armbruster, has been purchased by G. W. Miller and W. L. Offenbacher. The agency will remain at the same location, 61 East Spring street. The concern expects to sell a large number of cars during 1910.

The Harper Auto Inn & Sales Company, of Wauseon, O., capital stock $20,000, has been incorporated by R. F. Harper and W. J. Harper, two well-known repair men in Fulton County. The new concern will have the agencies for the Buick, E-M-F, and Hupmobile. Plans have been prepared for the erection of a garage 60 by 200 feet, two stories high and fireproof.

The American Machine Co., of Eau Claire, Wis., organized several weeks ago by J. C. Tanberg, a well-known automobile dealer, to manufacture a new type of spark plug of pipestone, chemically treated, has started work on an order for 500,000 plugs from a big motor supply house in Chicago. (Ed.—Can't ascertain name.) The order was obtained by Mr. Tanberg. This and other large contracts have made the present quarters on North Dewey and Wisconsin streets entirely inadequate and until larger shops can be leased other Eau Claire manufacturers will assist in the production.

The Chicago Motor Car Co. announces that it has completed its facilities at the new establishment which has been under preparation for some time, the location of which is Michigan avenue and Twenty-fourth street. The new establishment is so commodious in its appointments that the usual highly efficient Packard service will be the regular thing.

The Wilke Auto & Machine Co., of Sheboygan, Wis., has moved into its new quarters, at Center avenue and North Eighth street. The new garage is 60 by 38 feet in dimensions, with concrete floors, steam heating system and a complete station for recharging electrics. The shop will remain in the Deland building, where it is now located.

G. H. Luch & Co., of Keene Valley, N. Y., is building a garage which will be positively fireproof and 32 by 70 feet. It is proposed to make this garage one of the best in this section of New York. The tool equipment is to include every possible facility for efficient garage work.

Under the new selling arrangement recently adopted by the manufacturers, Fulton, Conway & Company have taken the Louisville and Kentucky agency for the E-M-F car. The concern has established headquarters at 819 West Main street.

Axel Peterson, of Escanaba, Mich., has purchased the Lacomb building, at 303 Ludington street, and will convert it into a garage. Mr. Peterson has had quarters in the Knights of Columbus building, at Ludington and Wolcott streets, Escanaba, for some years.

Trachte & Grahlman, of Johnson Creek, Wis., implement dealers, have decided to remodel their new building and devote a large part to a garage. They are considering several well-known lines, appealing to small towns and country districts soon to be announced.

James Couzens, general manager of the Ford Motor Company, who supports the Ford policy

REALM OF THE MAKERS

Thomas "Big Six" on the road as the jewel in a Winter's setting fully equipped for touring and the instrument for enjoyment to the owner of the wintry weather

It has been definitely settled upon that the Racine Manufacturing Co., of Racine, Wis., which suffered the loss of its plant by fire on December 12, will rebuild in Racine. The first move is the filing of an amendment to the articles of incorporation increasing the capital stock to $400,000 from $50,000. Racine and Milwaukee capital has been interested in the new issue. Contracts have been awarded for the first new building, to be completed in May. L. E. J. Gittings, formerly associated with the J. I. Case Threshing Machine Co., of Racine, becomes treasurer of the company. F. F. Blandin remains as president, and George Jaegers as secretary and general manager. The company is now in temporary quarters, employing 600 of the original force of 1,200 men, and more than 4,000 bodies are now being finished. The company will confine its efforts to the manufacture of automobile bodies, the piano stool end having been taken over by Solomon Grollman, who has incorporated the Racine Stool Manufacturing Co. Every style and type of body will be produced.

The Superior Motor Vehicle Company, which is now located at 150 Michigan street, Buffalo, N. Y., was recently incorporated to manufacture motor trucks and commercial vehicles. The company will build a more extensive plant than was at first intended, and has purchased additional land for that purpose at Elmwood avenue and the New York Central Belt Line. This location is just opposite the plant of the Pierce-Arrow Motor Car Company. Two buildings will be erected, both two stories high; one of them will be 70 by 400 feet and the other 70 by 500 feet. The plant will also include an engine and boiler house. J. Willard Lansing is president of the new company.

The Falls Machine Co., of Sheboygan, Wis., has increased its capital stock from $15,000 to $150,000 for the purpose of engaging in the manufacture of gasoline engines for automobiles on an extensive scale. The greater part of the production has been contracted for by the Warren Motor Car Co., of Detroit. Angelo R. Clark has assumed a large interest in the company and at the reorganization meeting was elected secretary. Gustav Huette was elected president, the other officers being: vice-president, Albert Leicht; treasurer, Walter Koehn. Additions and improvements necessary for the increased production are about to be made.

Business men of Janesville, Wis., have started to raise the stock subscription fund required by the Monitor Motor Car Co., of Chicago, as a condition of removal to Janesville. A block of $50,000 of stock will be distributed in Janesville by a committee consisting of M. O. Mouat, Sanford Soverhill and Frederick Beilhart. Options have been taken on the Green & Sons warehouses as a factory for the manufacture of commercial vehicles in anticipation of success in producing the necessary bonus. A committee visited Chicago last week and was favorably impressed with the Monitor concern.

The first automobile to be produced by the Racine-Sattley Co., of Racine, Wis., well known carriage builders, is being exhibited at the National show in Chicago this week. It had been decided to exhibit only automobile bodies, a recent product of the company, because it was not believed possible for the entire car to be completed. The Holbrook-Armstrong Co., of Racine, delivered the first engine under its contract with the Sattley concern in time for the show.

George Stephenson, of the Stephenson Motor Car Co., Milwaukee, and F. A. Groves, of Chicago, made a trying run from Chicago to Milwaukee, ninety miles, last week. Mr. Stephenson drove a Speedwell and Mr. Groves a Staver. At times the roads seemed impassable and the cars were hidden from sight by drifts. The run was made to test the Staver, which acquitted itself admirably.

Barney Oldfield, in the Cleveland, O., *Press*, recently paid a very high compliment to Mrs. K. R. Otis, Cleveland, noted woman driver. He states that Mrs. Otis beat his record between Cleveland and Buffalo in a Stearns roadster. It is said that during the trip she made the drive from Cleveland to Toledo in three hours and five minutes.

The Mitchell-Lewis Motor Co., of Racine, Wis., has started work on the Special Model S, six-cylinder, cross-country car, to be used by William T. Lewis, chairman of its executive board, in his tour of Europe and Asia with Mrs. Lewis. It will be ready May 1 and will be shipped to the Continent in advance.

The Buick Company recently shipped 40 carloads of automobiles from its Flint factory to Dallas, Texas. This shipment, said to be a record-breaker, went South as a solid train, with a tonnage of 450,200 pounds. One hundred and twenty-seven machines made up the consignment.

The Standard Automobile Company, Kansas City, Mo., is expanding. It has recently taken over a part of the factory at Wabash, Ind., and, in addition, operates two other factories in St. Louis. It is said that all of these plants are now being worked in full capacity.

The Seagrave Manufacturing Co., of Columbus, O., has completed a modern two-story fireproof addition to its plant, which will increase the floor space more than 16,000 square feet. The addition will be used to build the motors of the motor-propelled fire apparatus.

The firm known as the W. N. Best American Calorific Company has retired from business, and Mr. Best now personally manufactures and sells the oil and tar furnaces, of which he is the inventor, at his office at 11 Broadway, New York City.

Col. Charles Clifton, president of the Pierce-Arrow Motor Company, and of the A. L. A. M.

The Decatur Motor Car Company, of Decatur, Ill., formerly the Coppock Motor Car Company, will turn out a line of runabouts in the near future. It is stated that H. W. Meyer will be the manager of the concern.

The Standard Brass & Iron Works, 1820 St. Paul avenue, Milwaukee, Wis., has started the manufacture of a line of tire irons in addition to the extensive repair shop business.

NEWS IN GENERAL

A battery of Cartercars which were placed at the disposal of the "press" when the intelligence department gathered from Detroit and Cleveland honored Buffalo by its presence

Arrangements for the second annual motor show under management of the Milwaukee Automobile Club, in the new $500,000 Auditorium, February 22 to 27, inclusive, are progressing nicely, and General Manager Clarke S. Drake, president of the club, believes that Eastern and Western manufacturers will be pleasantly surprised at the magnitude of the exposition. This year the club will make the show an elaborate social function, and Milwaukee society leaders are taking a deep interest. The Governor and State officials have promised to be present on the opening night, "Society Night," on Washington's Birthday, and will arrive in time for the private view at 2 o'clock in the afternoon. The club will tender a banquet to visiting manufacturing interests, the press, State and municipal officials in the afternoon. This week President Drake and about one hundred members of the club are visiting the Chicago show to get ideas and to solicit further displays.

Senator Timothy Burke, of Green Bay, Wis., member of the special joint legislative committee on good roads, which recently made its report to the Governor, has issued the following announcement, which is welcomed by owners in northeastern Wisconsin:

"While we are waiting for the enactment of our State-aid highway law, let us not forget that we are in a position to mprove the highways of the State, particularly those on heavy clay soils, very materially. I refer to the use of the 'split log drag' used so successfully in this and other States. Chapter 101 of the Laws of 1909 provides that a town board is authorized to have its earth roads smoothed over by the use of such drag, at a cost of not more than 75 cents per mile, a preference to such work to be given to the adjoining landowner or tenant. By the use of the drag the worst kind of clay road can be put in excellent condition at a cost not to exceed $10 per mile. Thereafter the maintenance is a small matter. A split log drag can be constructed by any one at a cost of about $6 or $8."

Thomas B. Jeffery, head of the Thomas B. Jeffery Company, whose fighting ability has rendered him immune

The Wisconsin Secretary of State says there is much confusion relative to the Wisconsin registration law, not a few owners believing it, like the Michigan law, requires annual license fees. The Wisconsin law provides that all who registered prior to June 19, 1909, when it went into effect, must pay an additional fee of $1, and owners registering thereafter must pay $2. About three-fourths of the owners who registered prior to June 19 have paid the additional fee, although the time limit has long since expired. The secretary is giving them plenty of time.

Representatives of the Standard Oil Co. have been visiting several cities of Wisconsin during the last few weeks to interest the common councils in the plan of using crude petroleum for street sprinkling. Figures based on tests in Milwaukee are being used to good advantage, although it is doubtful if the plan will be practicable in cities without asphalt, brick and cement pavement. Milwaukee has contracted for 500,000 gallons of oil for next year's extensive street sprinkling scheme. The city of Oconomowoc, one of the best known summer resorts in the West, has practically decided to follow the plan.

Alfred Johnson, of Menominee, Wis., conducting a large machine and motor car repair shop, has invented a motor sled that has been successful under strenuous tests in deep snows of Northern Wisconsin. The sled is propelled by a pronged driving wheel, under power of a 2 1-2-horsepower engine. It travels from 12 to 25 miles an hour, depending upon condition of the surface.

The Point Spark Plug Co. has just filed papers of incorporation with the Secretary of State at Pierre, S. D. They incorporate for $15,000. The officers are Fred W. Smith, president; Arthur E. Sweet, vice-president, and Guy H. McClain, treasurer. Their new factory is completed and their machinery all installed.

The Milwaukee Common Council, which spent $25,000 for municipal motor cars during 1909, may purchase a motor ambulance for the Johnston Emergency Hospital, if Alderman Joseph P. Carney's resolution is passed. The city now owns a motor police patrol and eight other cars.

At the National Exhibit of Motor Boats, which will open in New York February 19 to February 26, inclusive, there will in all probability be more exhibitors than ever before. It is said that space has been provided for 150 exhibits, and that more applications have been received than can possibly be accommodated.

The Columbia, S. C., automobilists will shortly have an endurance run to Pinehurst. Information indicates that great interest is being taken in this event. Among others, E. W. Robertson, Frank R. Gibbes, G. M. Berry, E. A. Jenkins, W. L. Blanchard, F. S. Terry and Dr. Whaley have promised to enter cars.

In the construction of the new board automobile track at Los Angeles, Southern California, three million feet of Oregon pine planks and beams are used; to hold these together not less than 200,000 pounds of nails and spikes and a few tons of bolts will also be necessary.

The Ohio State Automobile Department has made a ruling which requires all applications for 1910 registration to contain the manufacturer's serial number. This ruling is made for the better protection of automobile owners in case the car is stolen.

The Campbell Automobile Company has moved its home office from Ft. Dodge, Ia., to Des Moines. An amendment to the articles of incorporation, covering this change, has been filed and the move will be complete in time for the Spring rush.

The Tower Grove Motor Car Company, of St. Louis, Mo., has been incorporated, with a capital stock of $5,600, and is to manufacture and deal in automobiles. Incorporators: Thomas W. and H. B. Wiley and F. L. Schleicher.

The Wisconsin Auto Top Company, of Racine, Wis., has started operations in its new plant at Racine Junction. The concern was organized several weeks ago to succeed McAvoy Bros.

The Strawffer-Atterburn Motorcar Company, Louisville, Ky., has been incorporated with a capital stock of $4,000.

Prominent Accessories

Mention of several different parts and accessories is made in these columns which are likely to fill the wants of automobilists, whether recognized or only in the shape of impressions lying dormant. It is often the case that on reading the description of some novel accessory, it will be found to just fit an idea long neglected under the impression that there was nothing to be had to satisfy it. As some makers of automobiles persist in putting nuts in places where it is impossible to reach them with an ordinary wrench, many people will find of great service a special wrench set which can reach into the most remote corners of the mechanism.

The "Stickit" wrench set, a "Bay State" product sold by G. A. Cutter, of Taunton, Mass., is alliteratively described as "seven strong stamped steel sockets strung on a square steel shank." The square steel bar or shank forms the backbone of the set. The sockets when not in use are strung on it; any one desired for use can be placed on the end, where it is held by a spring catch. A ratchet wrench is provided, the hole in which fits the steel shank, and by means of this the shank and the socket on the end are turned. The other end of the wrench will fit the sockets separately without the bar as an intermediary. The upper end of the bar has a knob which may be held in one hand to steady it while the other hand works the wrench.

In application the sets may be used in more ways than might be supposed. The wrench alone fits four sizes of nuts and the sockets will take eleven sizes of nuts and cap screws. The wrench is fastened to the shank full of sockets when not in use by a strong leather strap and shield. This, together with the use of a leather washer on the shank, entirely prevents rattling. The complete set takes up no more room than a large screwdriver, and can be rolled up with the other tools.

The Baldwin Chain & Manufacturing Company, of Worcester, Mass., is now offering to the trade a new and improved steering gear, known as the "Brown." This is a considerable departure from customary types of steering gears, the principal idea in its design having been the correction of the tendency to develop back-lash. In the usual construction the thrusts are taken on the teeth of a worm and sector, or of a pinion and gear, or by other means in which only a line contact is available. In the Brown gear these line contacts are replaced by contact between surfaces, and the surfaces are so broad that the wear on them is practically negligible.

The gear has a bevel pinion mounted on the lower end of the steering column, meshing with a gear; so far the arrangement is conventional. The novelty lies in the method of taking the road shocks off of this gear. To this end the gear is eccentrically mounted on a crank; the crankshaft, which also is eccentric to the gear, carries the swinging arm which connects with the front wheels. The crank referred to has, instead of a pin, a square, or, rather, rectangular lug projecting from its cheek. This projection fits between two segments which with it form a complete circle, and the whole nests in a circular depression in the flange of the gear.

For the gear to move the crankshaft, or for the crankshaft to move the gear, it is plain that as the centers of the two do not coincide, there must be a sliding movement somewhere in the connection; this takes place between the lug on the crank cheek and the segments between which it rests. The leverage, however, is in favor of the gear, as against the crank; thus it will be harder for the front wheels to turn the steering wheel through the crank acting against the gear, than for the steering wheel to turn the front wheels, through the gear acting against the crank. The degree of resistance is regulated by the relative position of the centers.

D. M. Parry, president of the Parry Automobile Company, who is a big fish among the new independents

The parts subjected to the severe shocks coming from the road wheels are only the crank projection, the segments between which it rests, and the walls of the circular depression in the gear flange; all have very wide surfaces constantly in contact. The wear, distributed over such a wide area, becomes negligible at any one point, and, furthermore, the severity of the shocks is taken off the more delicate gear teeth. Thus the appearance of backlash is put off indefinitely.

In addition to its line of automobile tires the Diamond Rubber Company, of Akron, Ohio, has now a complete line of ignition wire and cable. Anyone who has ever had anything to do with automobiles knows how much trouble poor cable can give, and the worst of it is that such trouble is usually hard to find and assign to a definite source. The Diamond 3-8-inch secondary cable has been used successfully for several years by a number of prominent manufacturers with good satisfaction. It has the regular strand of 37 wires of 30 B. & S. gauge, insulated with a high-grade rubber compound and covered with a black glazed braid. The Diamond company bases its claims on its thorough knowledge of rubber chemistry and the ways of applying it.

Among the patents recently granted to manufacturers of automobile accessories is one to the Graves & Congdon Company, of Amesbury, Mass., on its "Luxury" auxiliary seats. The claims allowed are sufficient to cover all of the best points of the seat. Two of the features are the dovetail socket which supports the seat and the feature of construction which makes it easy to swing the seats around while in use. These seats fold back into an extremely small space, the skeleton back models having a thickness of but a few inches when folded. Thus they are desirable for use in cars where space is limited, although it may be necessary to carry extra passengers occasionally. When the seats are taken down they leave no protruding brackets or supports. They are held in the car by means of a dovetail socket and bracket; when the seat is taken down the socket remains, but is practically invisible. Once this socket is in position on the car no tools are required either in the setting up or the taking down of the seats.

"Luxury" seats are made in three different models, one with full padded back and the other two with skeleton backs. All are made in any color leather to match samples, and are stuffed with the best grade of curled hair. The full back model is deep and luxurious; the skeleton back models, although not taking up so much room, have well padded back rests and are very comfortable. The framework is of steel, forgings being used wherever desirable. Each seat may be swung through half a circle.

Despite the recent general improvement in electrical construction, the ignition apparatus of the car is as a rule by no means as immune to injury by water as might be expected. A few magneto makers have seen fit to enclose the mechanism of their product in such a manner as to make it water and dust-proof; there are, however, a considerable number of magnetos in service, most of them, let us hope, of early models, which are put out of business by a good drenching, such as may be experienced in fording a creek, or even by running on a rainy day. For such magnetos one of the best remedies known is the Mesinger magneto cover, made by the H. & F. Mesinger Mfg. Co., 1801 First avenue, New York City.

This is a well-put-together leather casing that fits accurately over the standard sizes of magnetos in such a manner as to form a waterproof protection; in fact, the fitting of the cover is such as to make it almost dust and dirt-proof. The article is made to order, and special sizes of magnetos can be fitted if dimensions are furnished.

Among the windshields which are gaining favor is the "Model," which is the product of the Model Iron & Wire Works, Milwaukee, Wis. This is one of the "universal" persuasion, and has the lower half set back at a permanent angle, especially suitable for runabouts on which there is considerable footroom between the dash and the seat. It has been found that on cars of this type, which are deservedly popular, a shield which stands straight up on the dash affords little or no protection to the occupants of the front seat. On the contrary, the wind currents rush around the shield and often those from the two sides meet directly on the occupants instead of behind them, as they would were the seats set closer. As it is not likely that anyone who has ridden in a car with plenty of legroom would care to go back to the old style cramped position, the problem seemed to be up to the windshield makers, and they evolved the inclined shield.

The "Model" shield has a rather neat locking device, consisting in brief of a crescent or circular sector rigidly attached to the lower half frame, with its center on the hinge line, and a lever on the upper half swinging over the sector and clamped to it in the desired position by a setscrew.

Patents and Processes

The patent law of Denmark is brief and to the point. It provides, among other things, that a patent can be obtained only by the inventor or his assignee. In the case of more than one application the preference is given to the first applicant. Every applicant for a patent not a resident of Denmark must appoint a resident representative. Inventions capable of being utilized in industry or capable of industrial exploitation are considered patentable inventions. Like many other European countries, the law of Denmark provides for three kinds of patents. The first is for patents of invention, the duration of which is 15 years, dating from the date of issue. The second classification is for "dependent patents," for improvements made on inventions patented by a person other than the applicant. The duration of this class of patents is also 15 years. "Patents of addition" comprise the third class, and they expire with the principal patent.

The filing tax is $5.36, while the fee for issuing a patent is $2.68. The annual taxes are as follows: The first three years, $6.70 each; the following 3, $13.40 each; the following 3, $26.80 each; the following 3, $53.60 each; the last 3 years $80.40 each. Applications for a patent must be addressed to the patent commission, at Copenhagen, and must be in duplicate. Together with the application must be filed a description of the invention, which must also be in duplicate. When it is necessary for understanding the description, a drawing, in duplicate, is required, and, according to circumstances, a model, sample, etc. When the applicant is not a resident of Denmark, he must file, in addition to the above papers, a statement showing the appointment of a general representative residing in Denmark, which must be accompanied by the acceptance of the representative. The application, on stamped paper, must indicate the name, profession, and the residence of the applicant, as well as the title of the invention. It must indicate the name of the inventor, and, if it is filed by another, contain proof of the assignment. The description must be sufficiently complete to permit the invention to be carried out. It must indicate exactly what constitutes the claims of the invention. The application and description must be on paper of official size.

One of the copies of the drawings must be on white cardboard of 33 centimeters in height by 21, 42, or 63 in width. All the figures and writings of the drawing must be executed in India ink, in very black and clear lines, without colors, within a line traced at 2 centimeters from the edge, a clear space of 3 centimeters being left at the top. The signature must be placed in the lower right-hand corner. The second copy must be a tracing on muslin. All documents must be in Danish.

The grant is as follows: Preliminary examination as to formalities prescribed and as to the patentability of the invention; publication of the application will call for opposition. The time allowed for opposition is 8 weeks. In case of rejection the applicant may appeal to the patent commission itself, afterward to a special commission to be appointed by the Minister of the Interior. Patented inventions must be worked in Denmark within 3 years from the date of the patent and must not be discontinued for more than 1 year.

The patent law of Switzerland provides that a patent is valid only when granted to the inventor or to his assignee. Persons not living in Switzerland must appoint a representative in that country.

Patentable inventions are new inventions which may be applied in the arts and are capable of being represented by models. Inventions are not considered new which at the time of application for a patent are sufficiently well known in Switzerland to enable a person skilled in the art to execute them. Inventions excluded from protection are those which cannot be represented by models. Methods or processes cannot be patented under the Swiss law.

All applications for patents must be addressed to the federal bureau of intellectual property, at Berne. There must be joined to each application a description of the invention, the drawings necessary for the understanding of the description; the proof that a model of the object invented exists or that the invention itself exists; the sum of $7.72, representing the fee for filing and the first annuity; a power of attorney if the application is filed by a representative of the inventor; a declaration having the signature of the inventor, certified to by a competent authority or by a notary, establishing the right of the holders of the interest, if the patent is not applied for in the name of the inventor; a memorandum of the documents and articles filed.

The application must be written upon a form furnished by the Swiss administration. The description of the invention and the drawings must be filed in duplicate. The application and the documents which are joined thereto must be written in one of the three languages, French, German or Italian. All parts of the application must be in the same language. The title under which the application is presented must designate in a precise manner the subject of the invention.

The applicant for a patent who desires to enjoy the benefit of a time allowance of priority established by international treaty may file the documents which establish the rights which inure to him from an anterior filing. He may also confine himself to mentioning upon the application form the facts serving as the basis for these rights. The description of the invention must make known clearly its import and be so written that one skilled in the art may therefrom carry out the invention. It must terminate with a résumé of the features of the invention which are of special importance. By this is meant the claims of the invention.

The drawings, in duplicate, one copy on bristol board and the other on tracing cloth, must be executed under the following form: Thirty-three centimeters high by 21 wide, 33 centimeters high by 42 wide, or 33 centimeters high by 63 wide. As far as possible the small or medium form should be used. Each sheet of the drawing must be surrounded with a single line drawn 2 centimeters from the edge. It must have at the left, at the top, the name of the applicant and the date of the application, at the right, at the top, the number of sheets filed and the number of each sheet, and at the right, at the bottom, the signature of the person filing the documents of the application. One of the duplicates, intended for photographic reproduction, must be executed upon strong, smooth, and white drawing paper. It must be neither colored nor painted with a wash. The lines must be in good black ink. The hatchings must be separated. The second duplicate must be a reproduction of the first upon tracing cloth and it may be colored. The drawings must not be folded or rolled. They must be sent perfectly flat and not creased. Close attention should be paid to these details, as the law is very strict about compliance with the rules laid down.

There are two classes of patents in Switzerland. The first is known as patents of invention, the duration of which is 15 years, starting from the date of the application. The second class embraces patents of addition, which have the same duration as the principal patent to which they refer. A complete patent of invention is granted only upon proof of the existence of the model. In default of this proof a provisional patent is granted, which can be changed into a complete patent within a limit of 3 years, to date from the day of the application, by furnishing proof of the point in question.

The filing fee is $3.86; the first annuity, $3.86; second annuity, $5.79, etc., increasing $1.93 each year. Patents of addition are subject only to the payment of the fee for filing.

Regarding models: The proof of the existence of the model is shown—models of which are forwarded, the filing being obligatory. These consist of inventions which are essentially composed of substances difficult of identification, inventions which are characterized by properties which ordinary means of investigation do not admit of establishing. Or there may be a permanent deposit of photographs representing the invention in a precise and complete manner or a temporary deposit of models or satisfactory photographs, not to be permanently filed but only for the purpose of comparison. The fee for comparison in the federal bureau is $1.93.

Patents are granted upon proof that the documents and fees prescribed have been filed in the manner indicated by law. In case of the refusal of a patent the interested party may have recourse to the Federal Department of Justice and police within four weeks. Further than this the applicant has no recourse.

Carl G. Fisher, president of the Indianapolis Speedway, on which automobiles are tried out

Some Gooa Reasons for Double Ignition

By W. A. Stiles

COINCIDENT with the development of the modern automobile there has appeared each year a demand for increased reliability and greater efficiency. Slipshod parts, needing constant attention and replacement, no longer meet the requirements for a high-priced, first-class car, or, for that matter, for the cheaper cars of to-day. Among the things which have received a tremendous impetus from this demand in the past few years is the manufacture of the ignition apparatus which is used in this kind of work.

It was not so very long ago that the vibrator coil was in great demand and in almost universal use. Then came the magneto, which developed possibilities not obtainable with the older system, and with the great advantage of producing its own current, thus eliminating the necessity for carrying dry or storage batteries. The high-tension magneto is to-day the result of this development, and is, without question, one of the most satisfactory means of ignition which we have to-day, as its widespread use indicates.

There is, however, the inevitable "fly in the ointment" which is generally found in things humanly constructed, and which, in this case, makes the magneto far from ideal for most cars as a sole means of ignition. This is the fact that the spark generated by the magneto at low speeds is, as often as not, very unsatisfactory for running on high gear in crowded streets, and it also makes cranking rather hard, spinning the engine being the only method in most cases to get a satisfactory spark.

There are, of course, some manufacturers who use a single set, either a magneto or a single spark system in most cases, and, provided the system be a good one and well made, it will give excellent satisfaction without the aid of any other second system. It cannot be said, however, that this represents popular high-grade practice of to-day, even though three or four first-class manufacturers may be using it, since the tendency is decidedly toward the use of the two systems.

Several Dual Ignition Systems in Use

Considering, then, the question of dual ignition, or double ignition, we find that there are different means for securing the same result. There is the one method consisting of a high-tension magneto and a battery set for starting, the latter system distributing the high-tension current through the magneto distributor and using but one set of secondary wires and plugs.

This necessarily tends toward an extremely simple set of wiring and one which takes up very little room, the circuit of which is easily traced out by a novice. The battery part of one of these systems generally works with two to five ordinary dry cells in series, although it is possible to get a fairly good starting spark on even one cell if the primary winding be of low resistance and wound especially to admit the passage of the current under this low voltage.

For this purpose mentioned above, a button or spring switch is usually placed on the dash, by pressing which the current from the battery is sent through the primary winding in the coil. Removing the pressure ruptures the current and, of course, induces an extremely high-tension current in the secondary winding, which is carried to the right cylinder by the distributor.

This starts the engine, when the magneto immediately begins to generate its own current, and the battery may then be shut off. Owing to the short space of time per day in which the battery is in use, its life is greatly lengthened, and even though the starting spark fails to work, owing to poor mixture or other defects, the battery spark is still extremely useful in cranking the car, as it saves the annoyance, as stated before, of spinning the engine to generate magneto current.

In many cases a storage battery is substituted for the dry cell (as the latter is apt to deteriorate whether used or not), and, having so little service put upon it, the former should last for an indefinite time. It will be seen, therefore, that this system is in reality one and one-half systems; that is, while there are two sources of current, there is but one transformer and distributor.

Two Separate Systems Better Known

The other kind of system is, probably, more well known than the one which has just been described, and consists of two separate and distinct ignition outfits. A system of this sort is supplied to-day on practically every high-grade car in the country, and almost invariably consists of a high-tension magneto on one side, and a vibrator coil, unit distributor coil with one vibrator, or a single spark system for the other set.

Some of the most prominent manufacturers give a vibrator coil set with a storage battery, evidently preferring a separate coil for each cylinder, in spite of the greatly increased complication. There is no question, however, that the single unit coil presents many advantages over the multiple coil, and this in every way is efficient. The only point in favor of the former is that by the use of four coils it is unnecessary to have a distributor, but modern design on distributors is so good in the majority of cases that they have become even more reliable than a commutator, owing to the very slight wear which they have in operation, there being no rolling or moving contacts.

It has been objected that a coil is simetimes overtaxed in building up and breaking down the magnetism of the core at high engine speeds while doing duty for all cylinders; but while this may be true for a poorly designed coil, a good one generously proportioned will not limit the engine speed as much as the vibrator or even contact maker will.

As against these slight objections, the decreased bulk, improved appearance of the dash, smaller cost and simplicity would seem to indicate that the more conservative manufacturers will sooner or later fall into line and adopt the latter system as a part of their standard equipment in double ignition.

More Advantages in Two Sets of Apparatus

Considering the respective advantages of these different systems further, it would seem that the equipment embodying two distinct systems would present more desirable features than the single distributor and plug system. In the first place, with the former, it has two contact making and breaking devices, which are absolutely separate and are driven by separate shafts. With the latter system there is but one contact maker, and should it give out both batteries and magneto are useless.

The same thing would happen should the timing gears on the half-time shaft give out; although this is not a very frequent occurrence, nor is it likely to happen. The above objection applies to the distributor as well, which may become short-circuited by water, mud or oil. Now, one of the useful things about a double ignition system is the fact that should the spark plugs foul on one or a part of the mechanism give out the engine may be shifted to the other set.

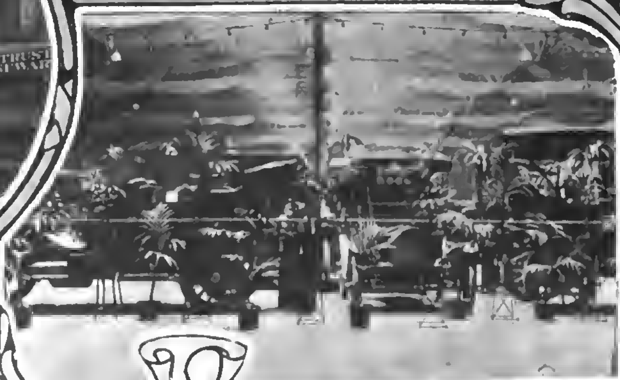
Excellent Features in Every System

We find, then, as with many other things, that each system has certain excellent features and certain limitations, and in this case the following points will influence the buyer. The single coil-distributor set is simpler, has less wiring, and is less expensive. The other method of equipment, which provides two of all the necessary working parts of two systems, undoubtedly offers greater protection against ignition troubles. The question which must be settled is that of expense vs. returns. Without doubt, the ultimate goal is that of a single system which needs no backbone to give reliable results, and this is the sort of apparatus which we will probably see in a short time on all cars, high or low priced.

THE AUTOMOBILE

VIEW LOOKING TOWARDS THE REAR OF THE ARMORY

EXTERIOR OF ESSEX TROOP ARMORY, ROSEVILLE AVE., NEWARK.



ENTRANCE TO THE SHOW

NEWARK, N. J., Feb. 21—Brilliant in dress, comprehensive in detail and with a larger number of exhibits and exhibitors than in the two previous years, Newark's third annual automobile show opened Saturday night. When Colonel Austen Colgate, aide to Governor Fort, and legislative champion of the automobile, declared the exhibition officially under way, 95 cars and chassis, representing more than two-score manufacturers, were in place and 23 accessory exhibits were ready for view. In all, 55 distinct exhibitors occupy spaces on the floor or in the gallery.

As heretofore, the show is being conducted by the New Jersey Automobile Exhibition Company, affiliated with the New Jersey

Top—Packard Exhibit, in Charge of the Newark Branch Office
Middle—Peerless and Locomobile Stands to the Left; on the Right, Mercer, a Native of New Jersey
Bottom—Spalding Showed Both Stevens-Duryea and E-M-F

Automobile Trade Association and the New Jersey Automobile and Motor Club, and is held in the armory of the First Troop—better known as Essex Troop—of the State National Guard, on Roseville avenue.

Profiting by experience, the management left no stone unturned in its effort to make this year's show successful from every standpoint. They were rewarded with unusual interest on the part of the prospective exhibitors and the spaces were soon leased. Later, indeed, it was found necessary to utilize corners, which in the original plan were to have been left open.

Twenty-two of the exhibits are of automobiles exclusively; 23 are devoted to accessories and there is a motorcycle adjunct to the main exhibition. There is a separate section for commercial vehicles and also an aviation department. Fifteen types of cars are shown for the first time in Newark. Additions to the show are expected to-day and to-morrow, so that the total before the coming Saturday, the last day of the show, will reach considerably above 100.

Clothed in orange and blue bunting with palms and other potted plants banked here and there in cases of green, the erstwhile barn-like armory presents a brilliant spectacle. Between each festoon of bunting that covers the girders and brace rods of the structure, is a string of incandescent lights, and shields, painted wheels and groupings of flags lend added attractiveness to the decorative scheme. The tan bark of the floor has, of course, been covered with planking and over all is green carpet. On the opening night the show was crowded.

Finding the demand from auto exhibitors too large to admit of quartering them all on the main floor, the management devoted one side of the gallery to the overflow. Opposite, across the building, is stationed the band, which gives concerts daily, assisted by vocalists. The balance of the gallery is occupied by the accessory exhibits.

In the number of cars displayed, the Maxwell, Pierce-Arrow, Peerless, Locomobile, Buick, Rambler and Packard lead. The majority shown throughout the entire exhibition are stock cars, but there are, of course, exceptions. Only one foreign make is included in the list—the Isotta.

Upon H. A. Bonnell, general manager of the show, and G. H. Raddin, his assistant, fell the chief burden of working out the plans, with the advice of George Paddock, president of the Exhibition Company, and Dr. James R English, its vice-president. Mr. Bonnell is also secretary-treasurer of the company. In their work the officers were aided by the following committees: Space, Mr. Paddock, J. W. Mason, W. H. Ellis, F. L. C. Martin and G. H.

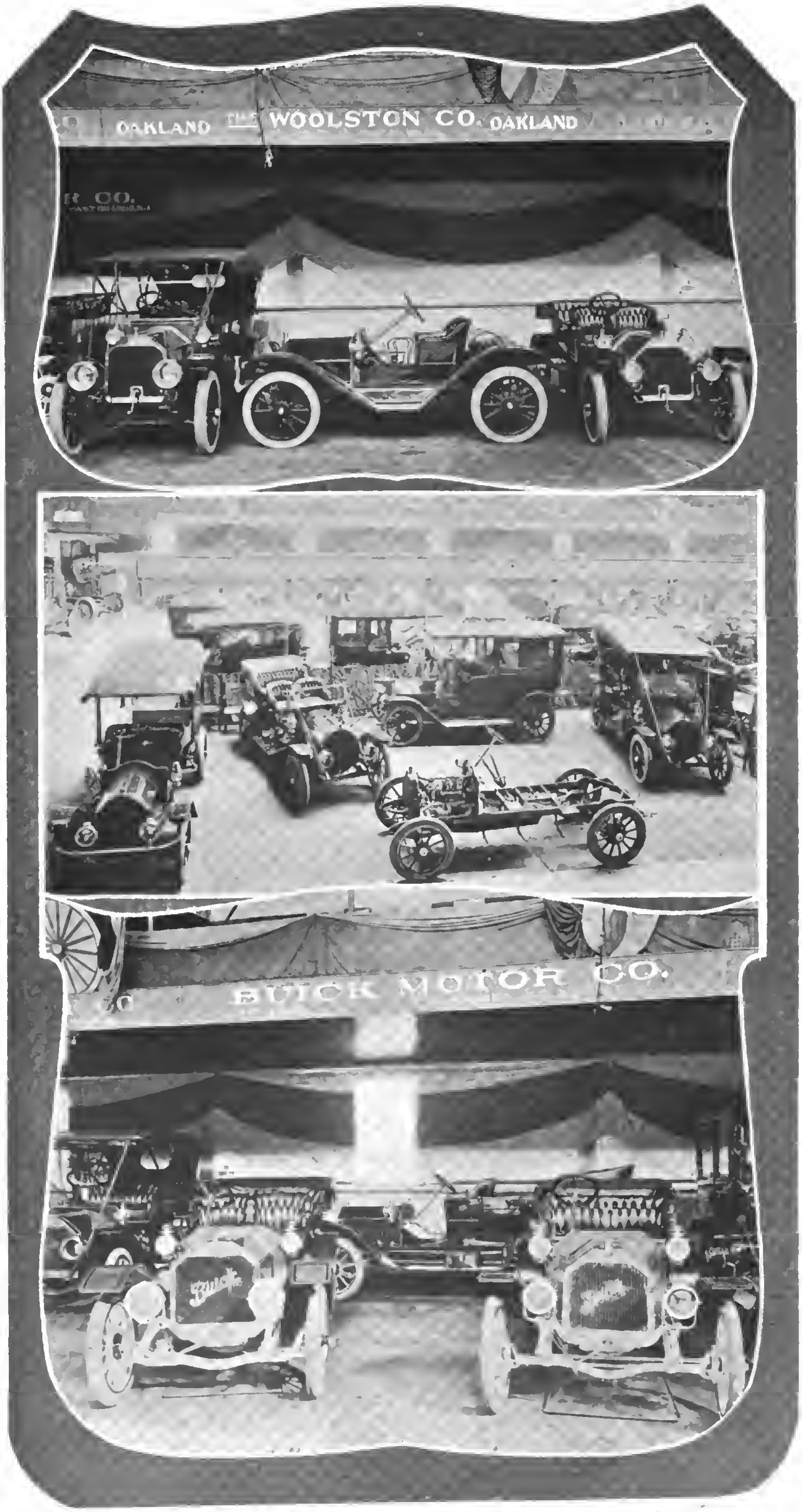
Smith; finance, R. A. Greene, I. M. Uppercu and Mr. Ellis; press, program and advertising, Mr. Bonnell, Mr. Mason, L. B. Zusi and Norris W. Brown; decorations, Messrs. Greene. Zusi and Upperca; entertainment, J. H. Wood, F. A. Croselmire, D. C. Reynolds and Dr. English; aviation, C. E. Fisher. A. B. Le Massena, F. E. Boland and J. F. Lanier.

Not all of the exhibitors are Newarkers. There is a smattering from New York, Jersey City and towns in this section of the State.

Of the manufacturers whose cars are exhibited for the first time in Newark not all are represented locally. Those of the exhibitors who are not Newarkers, however, came from near-by towns. The list of them follows:

Alexander Bruner, Newark, model 4-24 Kline Kar; the Gray Motor Car Company, Summit, N. J., Schacht delivery wagon and runabout; R. D. Norton, Hightstown, N. J., De Tamble runabout and Pickard touring car; Crescent Automobile Company, Newark, Mack (Manhattan) five-ton truck; Terry Automobile Company, Newark, Palmer-Singer 6-60, with gunboat body; H. J. Koehler & Company, Newark, Koehler 40, with torpedo body, and Rider-Lewis type X tonneauette; Woolston Company Newark, Oakland, in three models; Union Motor Car Company, East Orange, Krit runabout; A. Elliott Ranney Company, Newark, Hudson roadster and touring car, and roadster chassis; Green Motor Car Company, Newark. Mercer touring car and baby tonneau; O'Neill Motor Car Company, Newark Paterson touring car and tourabout; J. J. Meyer, Orange, N. J., Auburn model X touring car, and G. F. Little, West Hoboken, N. J., G. J. G. touring car with gunboat body.

Other exhibitors, more familiar to the Newark show-goers, together with their lines, are as follows: Essex Automobile Company, Newark, Ford model T touring car and roadster, Jackson 40 and 50, and Brush Runabout; Detroit-Cadillac Motor Company, Newark, Cadillac demi-tonneau, limousine and touring car: Essex County Overland Company, Overland models 38, 40 and 41, and Marion touring car, roadster and chassis: F. L. C. Martin, Newark and Plainfield, Mitchell models R, S and T, and Hupmobile; Autocar Company, Ardmore, Pa., Autocar touring car; Newark Auto & Engineering Company, Newark, Rambler models 53 and 55, and 55 chassis; Rickey Machine Company, East Orange, Pullman and Marmon; A. G. Spalding & Brothers, Newark, Stevens-Duryea and E-M-F 30; Union Motor Car Company, East Orange, Reo models R and S, touring car and roadster, and Premier, models "Four-Forty" and "Six-Sixty"; Peerless Motor Car Com-



Top—Oakland's Premier Newark Appearance, Staged by Woolston
Middle—More Comprehensive View of the Hall; Cadillac, in Several Models, Occupies the Foreground
Bottom—Buick Had a Good Exhibit of Medium-Priced Cars

Marmon and Pullman Exhibited Jointly Under Agent's Auspices

pany, of New York, Peerless limousine model 27, landaulette 27, toy tonneau 27, touring car 28 and chassis of 27; Greene Motor Car Company, Newark, Locomobile, type "L" touring car, baby tonneau, limousine, landaulette, type "I" touring car, baby tonneau and roadster, and type L chassis; J. W. Mason, Newark, Columbia roadster and Maxwell models E, G, Q, Q1, Q2, Q3 and A, with limousine body after design by Mr. Mason; Paddock-Zusi Motor Car Company, Newark, Chalmers models Forty-J touring car, Forty-J pony tonneau, Thirty-K touring car, Thirty limousine and Thirty chassis; Ellis Motor Car Company, Newark, Pierce-Arrow models "48" suburban limousine, "big-six" touring car, "36" landau, "36" miniature tonneau and "48" stock chassis; J. M. Quimby & Company, Isotta voiturette and Isotta 30 chassis and Pennsylvania model B; Packard Motor Car Company, New York, Packard "Thirty" limousine and "Thirty" touring car and "Eighteen" touring car and chassis; Welden & Bauer, Newark, National touring car, limousine and "Speedway"; Sultan Motor Company, New York, limousine model; New Jersey Automobile Company, Newark, Moline touring car and model M; Buick Motor Car Company, Newark, Buick models 17 and 19 touring car, model 10 toy tonneau and model 10 runabout; Linkroum Automobile Company, Newark, Lozier model H (Briarcliff) and model H limousine and Oldsmobile close-coupled "Forty" and "Limited" touring car; Midland New York Company, models L toy tonneau and roadster.

Eleven types, including two chassis, representing six manufacturers, are shown in the commercial vehicle division of the show, which has a separate part of the building. Of these four and one chassis are the products of the Rapid Motor Vehicle

Little Hupmobile Runabout Kept Company with the Mitchells

Company, of which F. L. C. Martin is the local and Plainfield agent. Newark is primarily an industrial community and the exhibit of these vehicles attracted a large share of attention Saturday. The commercial list follows:

Detroit-Cadillac Motor Company, Cadillac chassis with commercial body by Schildwachter, of New York, after design of C. E. Fisher, manager of the Newark branch; F. L. C. Martin, Rapid 5-7 ton truck; 3-ton chassis, 1 1-2 ton express, 12-passenger sightseeing and ambulance models; Gray Motor Car Company, model D Schacht delivery wagon: Autocar Company, type 21 truck and stock chassis of same; Crescent Automobile Company, Mack Brothers Motor Car Company 5-ton truck; Buick Motor Car Company, one-ton truck.

The accessory exhibits which occupy the entire gallery save for the space reserved for the band at the far end of the armory and that over the main entrance, where the automobile overflow and three motorcycle spaces are quartered, is complete in almost every essential. One can purchase anything from a gilt hood ornament to a fur coat, from a swinging flower vase for a limousine to an inordinately luxurious pair of goggles. Practically all of the exhibitors are Newarkers, many of them manufacturers of the goods they display.

Three makes of motorcycles are exhibited at the show. They are the Yale machine, shown by Frank C. Cornish, of Newark;

De Tamble Runabout and Pickard, an Air-Cooled Bay Stater

Excelsior, exhibited by Carl Bush, of Newark, and the Indian models, of which the H. J. Koehler Company is the local agent.

The aviation section of the show, which opens to-night, will be in the guard room of the armory. Among the exhibits is a monoplane model designed and constructed by Arthur Holland, an East Orange youth. It is 11 x 6 feet in dimensions and its distinguishing feature is a 6-foot spiral spring, with a center shaft of about 5 to 1 gear, which supplies the motive power.

A Witteman glider will also be shown, together with an 8-cylinder monoplane from F. E. Boland, of Rahway, N. J. The former is 20 x 4 1-2 feet. A 44-foot Wright type will also be included in the exhibit, with more than a dozen models furnished by the West Side Y. M. C. A., of New York. Accessory exhibits will include a display by the Hartford Rubber Company and a propeller by the Requa-Gibson Company, of New York.

The section will be officially opened by Wilbur R. Kimball, secretary of the Aeronautic Society, of New York, who will give an illustrated lecture. C. E. Fisher planned and has charge of the exhibit.

Members of the New Jersey Automobile and Motor Club have appointed a committee to organize an aviation section to be known as the Aeronautic Society of New Jersey. It is proposed that the affiliated organization shall be a regularly incorporated body, with complete management of its own affairs, funds and property and elect its own officers and directors from its membership. The objects of the proposed society are the promotion of aviation in general and the fostering of aeronautic meets and other matters connected with the sport.

Membership will not be limited to persons belonging to the Motor Club, but the dues will be larger. The committee consists of W. Clive Crosby, president of the automobile club, chairman; C. E. Fisher, F. E. Boland, W. R. Kimball, A. B. LeMassena and J. F. Lanier.

BINGHAMTON'S AUTO SHOW NOTABLE

BINGHAMTON, N. Y., Feb. 22—Nobody looking in upon the first annual automobile show held under the auspices of the Binghamton Automobile Club and the Chamber of Commerce would ever dream that Binghamton was a town of merely 50,000 souls. That information is about the most surprising imaginable especially after a detailed examination of this splendid exhibition in the State Armory which was thrown open to the public for one week, beginning last night.

Paterson "30," Another to Make Initial Newark Appearance

To be specific there are nearly sixty completed cars shown on the floor, 59 exactly, with about eight or ten demonstrators in attendance at the front door. Then there are seven ancient monarchs illustrative of the progress of the industry since 1899, and an aeroplane in the riding hall of the basement.

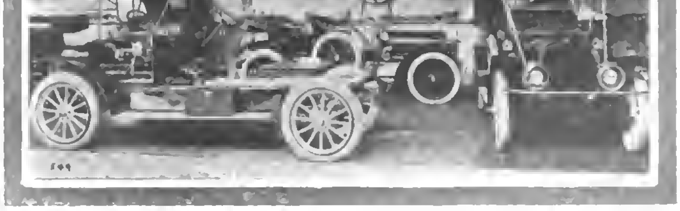
The first surprise is occasioned by the electric sign stretched across the street in front of the armory. This is a gorgeous changeable electric device that puts to shame many of the famed Broadway signs. Inside the decorations are military in design in keeping with the surroundings. The profusion of bunting and flags is well arranged without being overdone and the lighting is great. On the main drill floor, nothing but completed cars are to be found, except that the official headquarters of the club are located right at the entrance. There are 32 makes of cars, one of the newcomers of which is the Imperial, made in Jackson, Mich. This is shown by F. E. Spawn Co. for the first time at any of the local New York shows. The Binghamton Cadillac Co., unable to get a stripped sectional chassis from Detroit cut away one of their own stock cars and mounted it.

A. E. Wheeler, Syracuse district manager of the Franklin Co., has sprung the real novelty of the show in the demonstra-

National Fours Were Featured by Weldon & Bauer Company

tion line. He is driving about the streets, the glass hood electric-lighted Franklin six the same as furnished to each district manager, but in addition to that phase evolved about the cleverest scheme to show the air circulation that could well be imagined. Standing at the front end of the hood is a boy with a bee smudge bellows in which is burning punk, such as is used in handling honey bees. The boy works this smudge so that it flows constantly into the hood of the car, where its movement can be easily traced as the suction fan in the rear of the cooling case draws the air currents by the cylinders and expels them underneath the car. All during the show this car stands directly in front of the armory. The basement houses a varied and interesting line of accessories, motorcycles and bicycles. Here, indeed, is a novelty. Frank T. Abbott and the Waldron Drug Co. have large exhibits composed entirely of bicycles and they attracted lots of attention by their sheer novelty.

The Riding Academy, just to one side of the basement proper, proved a live magnet with its most interesting exhibits. First is shown a string of old cars starting with the motor from the first car ever seen in Binghamton. This was an old two-cylinder, two and a half horsepower car with gears directly attached to the connecting rods, which were concentrically attached to a shaft that held a big solid iron wheel upon which ran a rope belt. The affair without a name was owned by Joseph P. Noyes in 1898. Then, in succession, indicative of the years in which they were seen, are a steam locomobile roadster, Oldsmobile runabouts, three-wheel Knox, Pierce runabout, chain-driven Searchmont, Jones, Corbin, Packard, and a later Pierce. In the center of the Academy is the first aeroplane ever seen in Binghamton. It is a Curtiss, with an American-British four-cylinder engine.

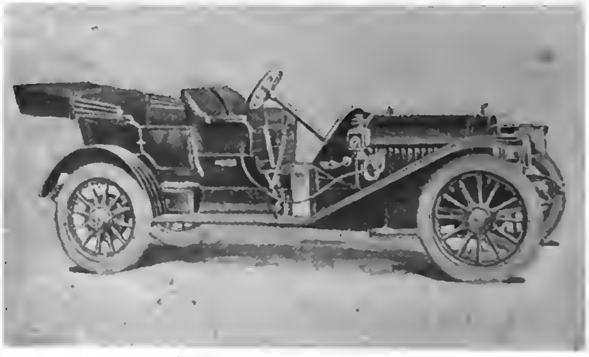


Chassis and Several Rambler Touring Models Appeared

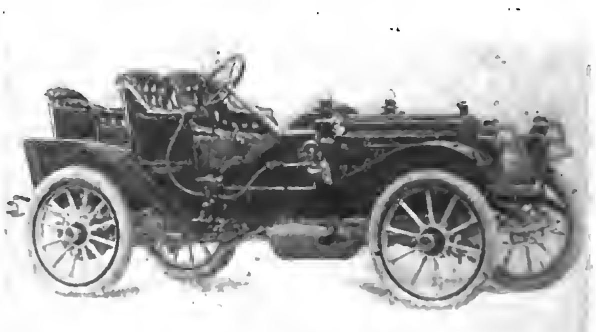
E-M-F "30" Four-Cylinder Touring

MANY AUTOMOBILES

Many makers of automobiles now look upon the rural districts as representative of a considerable portion of the conditions which lead to stability, and at the Chicago Show, just closed, it was a well-recognized fact that a large percentage of the actual buyers of automobiles came from the farms and the many small towns which are scattered through rural districts. These buyers prove to be a little troublesome to the salesman who is incapable of tersely stating the facts in relation to his product. The farmer is quite unfamiliar with machinery, and he knows perfectly well that it is a considerable distance from a farm to a



Locomobile Model L Baby Tonneau



Packard "18" Four-Cylinder Runabout

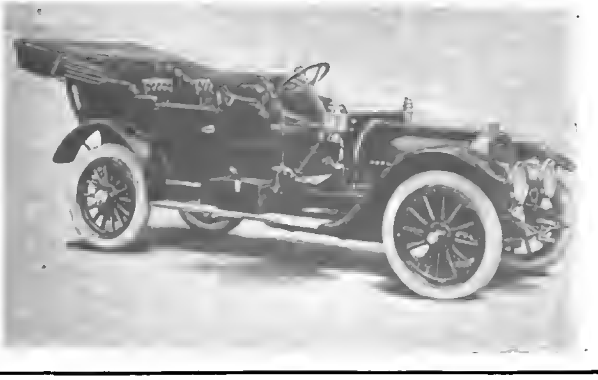
Peerless Model 27 Four-Cylinder

LOCAL makers of automobiles are all at the Cleveland Show with the exception of one, there being 21 different makes of automobiles exhibiting 104 separate models of cars. The Central Armory, which is dressed for the occasion, was taken in hand by the Cleveland Automobile Show Company, under the direction of Frank W. Philips, President; Harry S. Moore, Vice-President; Hobart M. Adams, Secretary, and Clarence M. Brockway, Treasurer. In addition to the exhibition of the automobiles, the accessory makers are there in force, among which will be found 26 firms of local fame, displaying their wares under the most advantageous conditions, and presenting a spirit of unusual enterprise.

The committee in charge endeavored to make this last effort the equal in all respects to the other shows of the year, and the decorations, which included rich and splendidly arranged trimmings, were merely as drapings for banks of cut flowers, which were displayed to the best advantage through the lavish use of electric lights.

For the convenience of patrons a neatly decorated Tea Garden was located on the main floor, and adequate provision is made in the form of rest rooms and refreshment quarters adjoining. The Aeronautical division, which now seems to be a regular thing in connection with the display of automobiles, comprised an aeroplane which hung in the center of the Armory, and since it is the first equipment of this character displayed at a show in Cleveland, it is attracting notice.

The outlook, based on the conditions which led up to the show, and considering the initial attendance, is extremely promising, and among the important phases which are distinctly noticeable is the presence of out-of-town (rural) purchasers in force. There never was a time before in the history of Cleveland automobile exhibits when the attendance was sufficiently peppered with out-of-town purchasers to be noticeable. These prospectives are well in hand with funds; they have yet to enjoy a great familiarity with the automobile situation, taking it as a whole, although it is easily discovered by salesmen that each one of them is fairly keen about some one or two makes of automobiles, and is in hand with book lore to a marked extent.

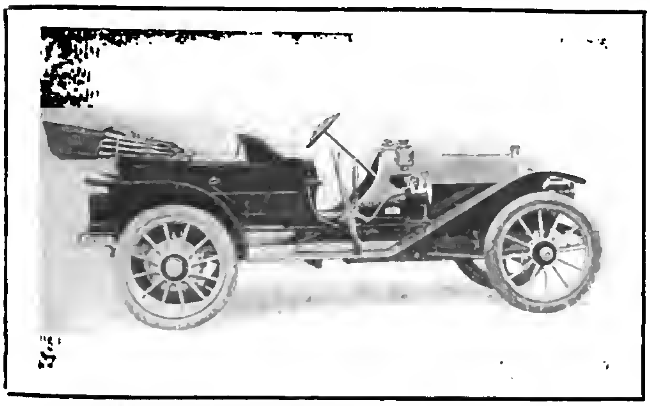


Royal Tourist Four-Cylinder Touring

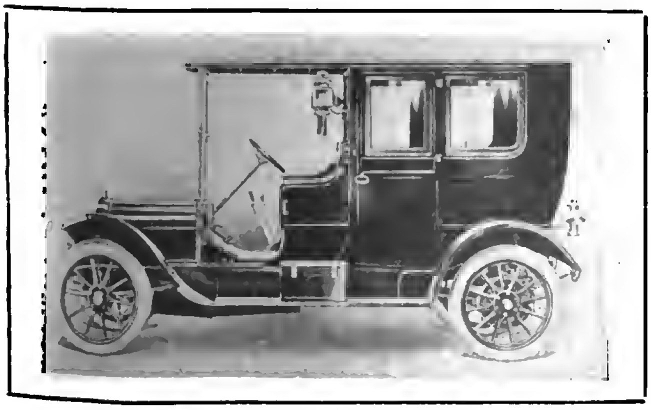
SHOWN AT CLEVELAND

repair shop, and he relies upon his own little forge for even his permanent repairs.

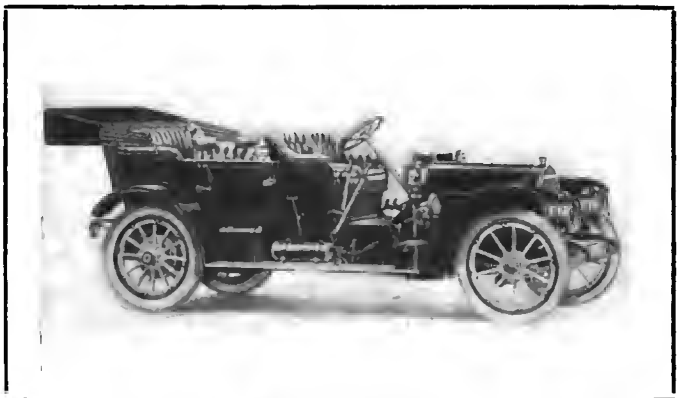
To convince this class of buyer that he can afford to indulge in a given make of automobile is to show him that it is free


Stevens-Duryea Model XXX Four-cylinder


Studebaker-Garford Model G-7 Limousine


White Model G-B Gasoline Limousine

from that class of complications which puts it beyond the pale of repairers, considering a simple forge, a machinist's kit and the materials as bar stock, which are likely to abound the country over. Simplicity of design, ample clearance and straight line work will naturally appeal to this class of customers, and if the surplus of automobiles are to go to the farm and the small


Stearns 30-60 Four-Cylinder Touring Car

country village, it is safe to conclude that the design features must appeal to the men who must maintain the cars, rather than to have them towed to a garage repair shop.

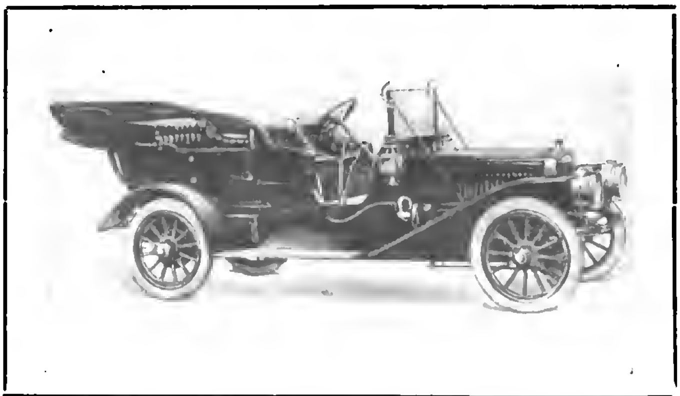
The Cleveland Show is bringing this class of purchasers to the surface, just as they were in evidence at Chicago, and probably as they appeared to some extent, at least, in all the shows of the year. This condition is the best evidence of the healthy growth of the automobile, and the extension of its use into the zone of practical application which is the highway to the greatest measure of stability. Until this condition could be measured, there were a great many autoists who labored under the impression that the automobile took on some of the phases of the bicycle, which proved to be a mere fad, and the life of a fad being limited, there were some who persisted in maintaing that this characteristic followed the automobile much as a spectre.

The automobile exhibitors are made up as follows:

EXHIBITORS OF AUTOMOBILES AT CLEVELAND SHOW

Applebaum Brothers	Detroit Electric
Auto Bug Company	Auto Bug
Baker Motor Vehicle Company	Baker Electric
Chisholm & Phillips	Stevens-Duryea
Cleveland E-M-F Company	E-M-F
Chadwick Company	Chadwick
Derain Motor Car Company	Derain
Ford Motor Car Company	Ford
Gaeth Automobile Company	Gaeth
Hoffman Auto Company	Locomobile
Moore, H. S.	
Peerless Motor Car Company	Peerless
Rauch & Lang Carriage Company	Rauch & Lang
Royal Tourist Car Company	Royal Tourist
L. S. & M. S. R. R.	
Studebaker Auto Company	Studebaker-Garford
Standard Automobile Company	Standard
F. B. Stearns Company	Stearns
Sterling Motor Sales Company	Sterling
White Company	White
Winton Motor Carriage Co.	Winton
Simplex Motor Car Company	Simplex (Americsn)

This show, despite the number of its exhibits, and the fact that it includes so many of the important makes of automobiles. is but one of the important events which will go to Cleveland for this year. The Eighth Annual Show of the Cleveland Automobile Club is yet to come. It is scheduled to open on March 5 and to run for seven days. It is commonly expected that the second show will be a record breaker, and if expectations in this connection are realized, Cleveland will take high rank.


Winton Model 48 Six-Cylinder Touring

General View of the Grand Rapids, Mich., Show, Illustrating the Decorative Scheme; Reo Occupies the Foreground

Furniture City Exhibition Attracts Attention

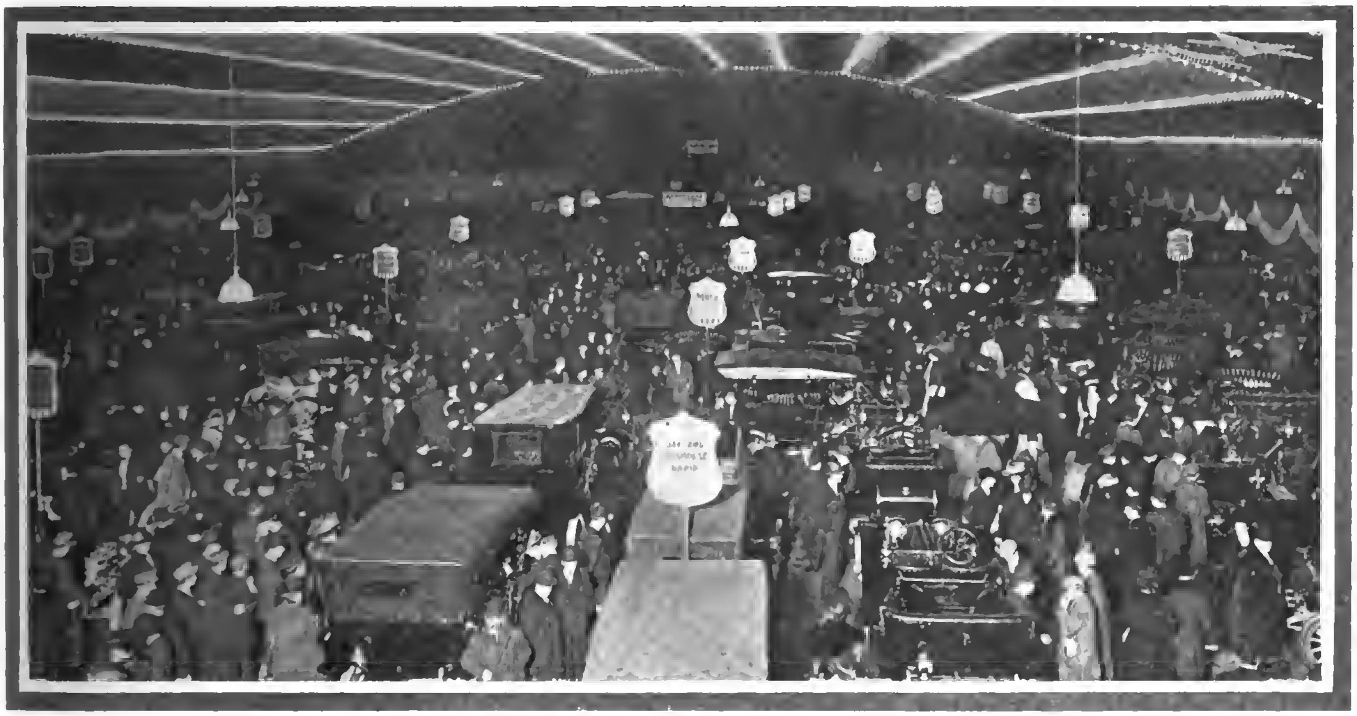
GRAND RAPIDS, MICH., Feb. 19—One of the largest buildings of Grand Rapids, devoted usually to the exhibition of the furniture for which the "Furniture City" is famous, is now devoted to the exposition of another of the country's great industries, namely, the automobile, and it is apparently attracting more attention than the finest products of the furniture field ever did. In short, Grand Rapids is having its first automobile show, and that it is an overwhelming success, is evidenced by the fact that ever since the opening night, when the aisles were literally packed, several thousand people have visited the show daily.

Although this was the first local show, the management seems to have learned the art, by the use of electric lights, bunting and flowers, of producing a beautiful spectacle. Festoons of electric lights and miles of pale green bunting outline the various exhibits, forming a pleasing color effect. Various arc lights, tastefully decorated with green leaves, add to the brilliancy of the scene, and in the center of the hall a large dome of electric lights has been placed. Palms and high bay trees have been used at intervals throughout the building to good effect, and the gallery set apart for the bands and orchestras is literally hidden from view with green stuff.

There are 31 exhibits in place, comprising 80 cars and requiring 30,000 feet of floor space. Pleasure cars predominate—in fact only four commercial cars were shown, these being light delivery wagons made by the Duplex Power Company, of Charlotte, the International Harvester Co., Buick Motor Car Co., and Angus Auto. Co., which makes the Fuller.

It was gratifying to see the large representation of Michigan-made machines. Especially prominent were the six-cylinder Austins, a native Grand Rapids product.

Left: Exhibit of Austin Six-Cylinders; Middle: Building in Which Show Was Held; Right: Pierce-Arrow Exhibit



Immense American Flag, Covering the Entire Ceiling, Was the Central Feature of the Buffalo Show

Buffalo Show Breaks All Attendance Records

BUFFALO, Feb. 19—All previous records in attendance and gate receipts were broken by the "Old Glory" Automobile Show, which closed to-night with the band playing "The Star-Spangled Banner." At the close, the 8,000 lights were turned out in the Stars and Stripes which gained the eighth annual automobile show of the Automobile Trade Ass'n its distinctive appellation.

The total attendance for the week is estimated at 50,000. This is pronounced to be about 32,000 more than for the show of 1909. The attendance for the closing night was greater than that of any of the preceding nights, and a new record was set of a larger patronage on every succeeding night since Wednesday, instead of diminishing at the close as in former years.

It has been the consensus of opinion among exhibitors that there was never held here before so remarkable a show in point of sales. President Charles F. Monroe, of the Trade Association, and Secretary J. J. Gibson stated that upon a careful canvass it was learned that the number of cars actually sold and which could be attributed solely to the show was 152.

Buffalo Show Seen from the Gallery; Direction of View Is Opposite from that of Upper Photograph

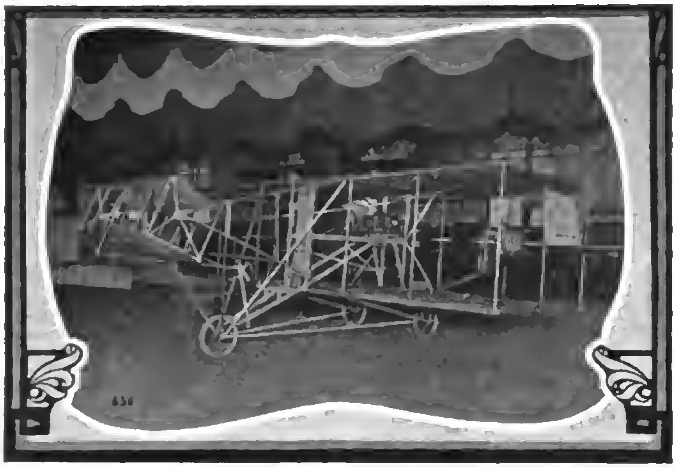
Chauvière Propeller, a Popular French Construction

BOSTON, Feb. 19—The first aeronautic show in America, with the possible exception of a small affair held in New York last Fall in connection with the Business Show, is now in progress in Mechanics' Building, completely filling the main hall. There are some fifteen full-size aeroplanes on exhibition, besides several gliders and any number of models and parts.

Exceptional among the other machines because of its perfect workmanlike finish was the biplane built for A. M. Herring, the former partner of Glenn Curtiss, by W. Starling Burgess, the yacht builder. Although following the lines of the biplane made familiar by Curtiss, this is said to differ in some important features, notably the apparatus for securing lateral stability. This, unfortunately, was not exhibited, the reason assigned being that it is not yet covered by patents. The landing gear of this machine consists of a single long central runner with two short spurs, one on either side, just under the main planes. Another unusual feature is its equipment with a four-bladed propeller, a type which few aviators believe in.

In its general construction the Herring-Burgess machine showed the effects of careful labor. The design of the framework is well worked out, attention being called to the manner in which two bars, starting from the front tip of the machine, extend backward to carry the aviator's seat and then support the motor on their rear ends. The vertical struts between the planes are well shaped, tapering at the ends where not so much stiffness is required.

Herring-Burgess Biplane, of Neat and Workmanlike Design



Ericka Biplane, a Recent Springfield, Mass., Product

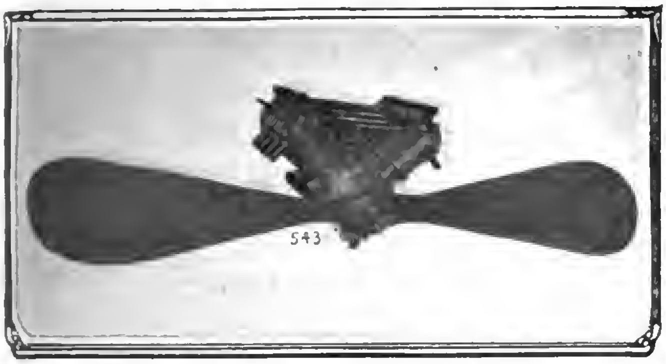
Near View of Herring-Burgess Machine, Showing Details

One of the few monoplanes shown is the "Morok," made by a New York concern and offered for sale at a reasonable price. It is equipped with a four-cylinder 30-horsepower Harriman motor, weighing 315 pounds. The frame is of wood and tubing. Lateral stability is secured by a device often advocated in print, but never before, as far as is know, seen on a full-sized machine; that is, by sliding wing tips. These are two small planes, one at either end of the main plane; normally they do not project over the main surface, but they can be made to project at will, thus increasing the supporting surface on either side desired.

The only drawback to this method seems to be in the distribution of weight. Sliding out the plane on either side certainly increases the supporting surface on that side, but it also increases the leverage distance of the weight of the sliding plane itself; thus the efficiency of the surface must be considerably reduced.

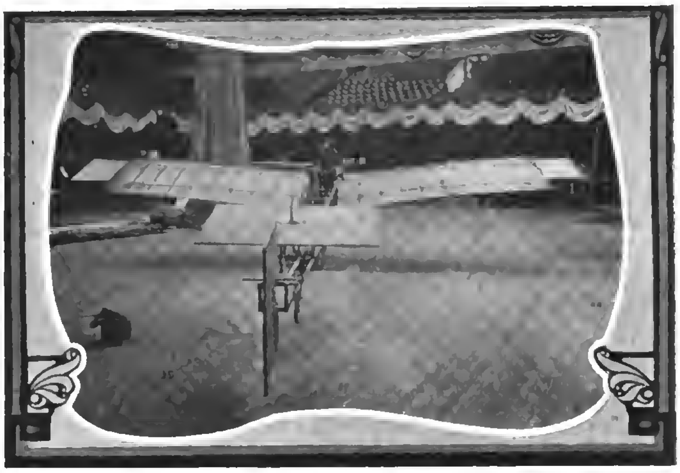
The "Morok" follows standard monoplane design in having the propeller in front and the horizontal and vertical rudders in the rear. The planes are carefully trussed both above and below. The control resembles somewhat the Antoinette design, with two hand wheels; one controls the extension planes, and the other the horizontal and vertical rudders.

L. C. Erickson, of Springfield, Mass., shows the "Ericka" biplane, following rather closely the lines of the Curtiss machines. It has a triangular running gear, with three wheels, the single one being in front. The planes are 20 by 7 feet, very flat, with rocking auxiliary planes for the lateral control. These are actuated by the sidewise movement of the back of the operator's seat, following the natural swaying of his body. There is a double horizontal rudder in front, and a vertical rudder in rear, in connection with a rigid tail plane for stability. The framework is of bamboo and tubing. The motor is a standard auto-



Easton Eight-Cylinder Aeronautic Motor and Propellor

Biplane Following Wright Lines, Shown by F. P. Shneider



Morok Monoplane, with Sliding Auxiliary Balance Planes

L. A. W. Aero Motor and Propeller, Mounted on a Pivot

mobile design, of the Buick make, apparently taken bodily from a 22-horsepower Buick runabout; it drives a two-bladed wooden propeller at the rear.

The L. A. W. Motors Company, of Providence, R. I., shows a biplane equipped with a "L.A.W." motor, the initials, it is said, signifying the possibilities of the motor's use on land, air and water. This motor is a six-cylinder, two-cycle rotary, air-cooled. The cylinders are mounted radially about a central hub, with their heads to the center. The piston pins, instead of connecting rods, are provided with ball bearings of large size, forming rollers; these run around in a circular ring set eccentric to the cylinder hub. This eccentricity causes the pistons to move in and out of their cylinders as they rotate about their hub.

The inlet for the fresh gas is through the central stationary hub, which has a port which registers in turn with ports in the cylinder heads. Ignition is accomplished without any electrical apparatus, except for starting. In operation, each cylinder fires the one next to it by means of a by-pass through the central hub, which admits some of the burning gas into the cylinder just ahead. A single spark plug may be fitted into this port.

The biplane on exhibition at the L. A. W. stand has one of these motors mounted on pivots, in such a manner that its shaft, with the propellor attached, can be made to point upward or downward at will, and thus guide the machine.

F. P. Shneider, of New York, has two craft on exhibition, one a 35 by 40-foot biplane after the Wright model, and the other a 30 by 35-foot Curtiss model. Stanley Y. Beach, also of New York, has two monoplanes, one on the Antoinette model and the other following Blériot lines. Other exhibitors of complete machines are the Aerial Exhibit Company, of New York; Elmer Burlingame, of Boston; Southworth & Merz, Brooklyn, N. Y.; Mr. Caines, of Boston; the Easton Cordage Company, Easton, Pa., and G. S. Haywood, of Hyde Park, Mass.

The lighter-than-air division is rather scantily represented. The spherical balloon "Boston," the property of the Aero Club of New England, is shown inflated. It is two years old, and during its life has made 45 ascensions, carrying 95 passengers; it has been in the air a total of 85 hours, covering 1,251 miles. Its capacity rating is 35,000 cubic feet. A. Leo Stevens, of New York, and the Boston Balloon Company also exhibited.

Among the parts and accessories most interesting is the Chauvière propeller, the make used by many French aviators. It is of laminated wood in six layers, very scientifically constructed, to secure great efficiency in air displacement. The Easton Cordage Company exhibited a special aero motor, eight-cylinder in V-shape, with a two-bladed wooden propeller directly mounted. The motor is of good design, departing from the automobile standard in but few respects. Valves are all in the cylinder heads with a single cam and rocker for each cylinder.

Models are almost innumerable, but those of the Harvard Aeronautical Society deserve mention. This body, composed of students and instructors at Harvard University, had on exhibition the planes of the biplane "Harvard I," which it is constructing, the glider "Naiad," and models of the Wright biplane and the Blériot monoplane. The Technology Aero Club, the Boston Y. M. C. A. and the International School of Aeronautics, of New York, also exhibited.

GASOLINE	**ALONE IS NON-EXPLOSIVE** **LIQUID WILL QUENCH A FIRE** **CONTAINS NO OXYGEN AT ALL**
WATER	**FORMS AN EXPLOSIVE GAS** **MAY ADD MORE FUEL TO A FIRE** **CARRIES SUFFICIENT OXYGEN**

STARTLING as these statements seem to those who accept the common prejudices against gasoline, they are nevertheless well substantiated. This unfortunate fuel is the most maligned and mistreated substance known to chemistry. It is commonly regarded as akin to nitroglycerin in its explosive qualities, to the extent that some people refuse to ride over a tank of it; at the same time it is splashed about carelessly in filling tanks, and allowed to run into drains and saturate wooden floors, and then blamed when it follows its natural tendencies.

Taking up these statements in order, first may be considered the explosiveness, or non-explosiveness, of gasoline. It is unfortunate that the engines in which gasoline is used should be so commonly miscalled "explosion" engines; their true name is "internal combustion." As this distinction indicates, gasoline never explodes, although it may burn with great rapidity and violence.

Properly speaking, an explosive is a substance which, without the help or presence of any other substance, may, by heat or concussion, be caused to undergo chemical changes which result in the production of gases of much greater volume than the original substance. The violent expansion of these resulting gases forms what is known as an explosion. The chemical change which results in the formation of these gases is oxidation, or burning; but if this is to be accomplished without the interposition of any other substance, as specified in the definition, the oxygen must be contained in the explosive substance itself.

The presence of oxygen in true explosives, such as gunpowder, nitroglycerin and its derivatives, the various forms of dynamite, may be seen from their chemical formulas appended herewith. (Oxygen is represented by O, hydrogen by H, carbon by C, potassium by K, nitrogen by N, mercury by Hg, sulphur by S, etc.) It is to be regretted that the formulas of nitroglycerin, guncotton, etc., are too complex to be of much use in this connection; but the explosion in all cases is the result of self-contained oxygen.

Gunpowder, a familiar explosive, may be taken as the example. It is a mixture of charcoal (carbon), sulphur and saltpeter; the latter, which contains the oxygen, forming about three-quarters of the whole. The chemical changes which form the explosion are the oxidation of the carbon, sulphur and potassium, and the liberation of free nitrogen; all the products, with unimportant exceptions, being in gaseous form. These gases occupy from 1,000 to 1,500 times the space of the original gunpowder, and consequently exert an enormous pressure on any vessel which contains them.

Now it remains to be seen whether gasoline should be classed with these explosives. In the first place, gasoline is not a definite chemical compound; it is the trade name for a mixture of various liquids known as hydrocarbons. In the United States these components are practically always of the methane or paraffin series, and hexane and heptane form the greater proportion. As a rule, the higher the "degree" of the gasoline, the larger the proportion of hexane and pentane; the lower the "degree," the larger the porportion of the heavier constituents. Commercial paraffin is composed of still heavier members of the series, which are solids; the lighter members, as methane and ethane, are gases. In England and on the Continent, where "petrol" and *essence* are sold in specially compounded brands, there is often an admixture of other hydrocarbons, given below under the heading "Suggested Fuels."

No great knowledge of chemistry is required to see that these hydrocarbons contain no dangerous amount of oxygen. In the case of ether and the alcohols the lone atom of oxygen is quite harmless among the greater number of atoms of carbon and hydrogen. It is obvious that for any oxidation of these fuels to take place, there must be some admixture of a second substance, in this case, of course, air, which is a mixture of oxygen and nitrogen. In the presence of air, these various hydrocarbons may oxidize into gases. The exhaust of a gasoline engine is composed of some 80 per cent. of nitrogen, taken in as air and left unchanged by the combustion; some 10 per cent. of carbon dioxide; and some 5 per cent. of oxygen and a residue of carbon monoxide, hydrogen, methane and miscellaneous hydrocarbon vapors, left by the incomplete combustion. These changes, although resulting in the formation of gases at high pressure, are quite distinct from the phenomenon known as explosion.

Gasoline in itself, therefore, is quite harmless; it is incapable of any chemical change except in the presence of oxygen, or some oxidizing agent. It is unfortunate, in one way, that air, the most common oxidizer, is quite universal in its presence; but even here the possibilities of combination of the two are not so great as might as supposed.

The operation of a gasoline engine depends on the evaporation of gasoline, the quality which causes it to break up into minute particles and mix with the surrounding air; and this evaporation takes place constantly at all ordinary temperatures. However, when evaporation ceases after it has proceeded to such an extent that the gasoline vapor (that is, the liquid particles) are 15 per cent. of the air which carries them (at a temperature of 60 degrees Fahrenheit). Air in this condition is said to be saturated. This is the condition which normally exists in a tank of gasoline, as carried on an automobile, or in a stationary tank in which air is used to force the gasoline out. Now it is an important fact that gasoline vapor in the saturated condition will not burn.

Neither will gasoline vapor considerably below the saturation point burn, nor again vapor extremely thin. The range of combustible proportions is very limited. From the saturation point, at which the volume of vapor is 15 per cent. of the volume of air, the proportion must be reduced to 5.5 per cent. of vapor, corresponding to one volume of liquid gasoline to 3,500 volumes of air, before the mixture will burn; and when the proportion falls below 2 per cent. of vapor, or one volume of liquid gasoline to 10,000 of air, the mixture again becomes non-combustible. The narrowness of these limits has been impressed on many an automobilist who has striven long and anxiously to make his carbureter provide a combustible mixture. A large number of the stalled automobiles formerly so common a sight were mute witnesses to the harmlessness of gasoline.

A body of gasoline open to the air will be covered by strata of air in various stages of permeation with gasoline vapor. A layer immediately over the gasoline will be in a state of saturation; and from this the proportion of gasoline vapor will diminish gradually in all directions. There must, therefore, be somewhere in the vicinity of the gasoline a layer of air carrying the right proportions of vapor for combustion. A flame, or other sufficient source of heat, introduced into this layer will ignite it, with more or less disastrous results.

This layer of combustible vapor is the sole source of danger in connection with gasoline. The fact remains that the liquid itself and most proportions of its vapor positively will not burn. If poured on a fire gasoline will extinguish it just as surely as water will; the conditions to be observed are, of course, that the gasoline must be in sufficient quantity and applied quickly enough to reduce the temperature below the point of ignition of gasoline vapor, before that vapor has a chance to form. It has been proved by actual experiment that a lighted cigarette dropped into a can of gasoline will simply be extinguished.

Naturally, it is not recommended that gasoline be used to the exclusion of water for extinguishing fires, nor even that readers try for their own edification the experiment with the lighted cigarette. The "No Smoking" sign in garages should always be observed and rigorously enforced. The point to be made is that gasoline is dangerous only when the victim of rank carelessness and abuse.

Having now proved the three contentions made in behalf of gasoline, it may be edifying to consider the results of a careless use of water, apparently the most innocent of substances. In the first place, water is an ingredient in the manufacture of a combustible gas as dangerous as the vapor of gasoline, namely, water gas. When suitably enriched with hydrocarbon vapors, this is frequently used as illuminating gas, in place of coal gas, as it is cheaper to manufacture. The process consists, in brief, of forcing water, or steam, through a red-hot mass of coal. The water is broken down and partially unites with the carbon of the coal, forming a mixture of carbon monoxide and free hydrogen. When ignited, this oxidizes into carbon dioxide and water vapor.

A gas plant is by no means necessary for the formation of this gas, as any municipal fire department will witness. Any form of carbon will do to replace the coal, and water, if the temperature is sufficiently high, will quickly furnish the steam. In the case of burning buildings, dangerous "back flares" frequently result.

Newspaper accounts of garage fires and burning cars usually contain some line to the effect that "the gasoline tank exploded with frightful violence, scattering the flaming liquid in every direction." Here the distinction has been neglected between the explosion of the tank and the explosion of the gasoline. If the above arguments have been followed the reader should have no remaining doubts as to the impossibility of the latter. A tank of gasoline, however, can explode in the same manner that a steam boiler can. The heat of the surrounding fire, in the case of a burning car or building, will vaporize and expand the gasoline in the tank, and unless the means of escape are sufficient, the pressure thus generated will cause the tank to burst with considerable force. The dispersed vapor is then in a favorable form to mix with the suitable proportion of air and catch fire.

In the handling of gasoline the cardinal principle to be observed is to prevent vaporization if possible, or at any rate to keep the vapor in the saturated condition. Standard forms of gasoline storage tanks keep the part of the tank not occupied by gasoline full of water. As the two do not mix, the gasoline, which is the lighter, remains in the upper portion of the tank, and cannot form vapor. Pumping in more water forces the gasoline out, as required.

For automobile tanks this idea has not been found practical. In the gravity-feed type of tanks a vent-hole is provided which admits air as the gasoline is used up; in pressure-feed tanks air, or exhaust gas, is forced in to force the gasoline out. Whenever air fills the part of the tank not occupied by gasoline, it becomes saturated with gasoline vapor, and so is harmless. The danger comes in the filling of the tank, when a quantity of this saturated vapor must be ejected from the tank and allowed to mix with the outer air. This is the time when the match and the cigarette get in their best work.

Methods of extinguishing gasoline fires are quite commonly known. Water must never be used; in the first place, it does not put out the fire, and in the second place it makes it worse. The latter is because gasoline floats on water, and so is spread out in a more favorable form for vaporization. Sand and earth, on the other hand, absorb the gasoline and prevent its vaporization. Wood-pulp is one of the best materials for absorbing gasoline, and has been recommended as a filling for all storage tanks. It will absorb 55 per cent. of its own volume of gasoline, and thus absorbed, the gasoline is absolutely harmless.

In laying down rules on any subject it is always better to have the reasons well understood; when chauffeurs and garage men thoroughly understand the nature and properties of gasoline, rules for its handling will be less needed. In some directions improvement in the construction of automobiles will be of avail. When the carbureter that needs no priming is invented, and all dust pans may easily be taken off for cleaning, one considerable source of danger will be removed. The custom of drawing off gasoline from the tank for cleaning purposes should also be discouraged; not only is it expensive, but it usually results in the scattering about of gasoline-soaked pieces of waste. Non-explosive though gasoline may be, care in its handling is never wasted.

CONSTITUENTS OF GASOLINE

Liquids of the Methane Series

General Formula	C_nH_{2n+2}
Butane	C_4H_{10}
Pentane	C_5H_{12}
Hexane	C_6H_{14}
Heptane	C_7H_{16}
Octane	C_8H_{18}
Nonane	C_9H_{20}
Decane	$C_{10}H_{22}$

OTHER SUGGESTED FUELS

Various Hydrocarbons

Ethyl Alcohol	$C_2H_5.OH$
Methyl Alcohol	$CH_3.OH$
Benzene	C_6H_6
Toluene	C_7H_7
Hexahydrobenzene	C_6H_{12}
Hexahydrotoluene	C_7H_{12}
Ether	$(C_2H_5)_2O$
Acetylene	C_2H_2

SOME EXPLOSIVE SUBSTANCES

Various Compounds and Mixtures

Black Gunpowder $C+S+KNO_3$ (10 to 15 per cent each carbon and sulphur, 70 to 75 per cent saltpeter).

Picric Acid $C_6H_2(NO_2)_3.OH$.

Ammonium Nitrate NH_4NO_3.

Nitroform $CH.(NO_2)_3$.

Mercuric Fulminate $Hg_2C_2N_2O_2$ (used with KNO_3).

Nitroglycerin, Guncotton, Celluloid, Collodion and other explosives are similarly formed, all containing their own oxygen.

STANDARD FOUND BY AVERAGING 1910 CARS

CONCERNING the advanced mechanical features which prevail, and those which are not advanced but of interest, it will serve well the purpose to tabulate and average the differing features, basing a keen analysis upon such tabulation. Taking as a basis of this tabulation and analysis the three big shows, namely, the Palace and Garden in New York and the Chicago Show, will have the merit of arriving at a result at once. This process, on the other hand, will have the disadvantage of counting in some cars twice and thus accentuating their mechanical features. But, to look at it otherwise, the total number of exhibitors at these three shows tallies almost exactly with the total number of builders now existing in this country, so that at the risk of a slight—a very slight—amount of accuracy this method at once arrives at an equivalent average for all cars built in the country. In other words, the exhibitors showing for the second time just exactly balance those who did not exhibit at any one of the three shows.

The appended table, then, gives what might be called, for want of a better name, the four standard American cars. Four are obtained by following the price classification which has hitherto been followed in similar tabulations. That is to say, the cars as a whole have been divided into four great price classes, namely, all cars below $1,000 in price; all cars listing at approximately $1,500; all cars above this, but not exceeding in price $2,500, and, finally, all cars above this figure, which latter selection has been labeled the $4,000 class because of the close approximation to this figure in the average.

FOUR AVERAGE CARS OF 1910 TAKEN COLLECTIVELY.

Classes	$1,000	$1,500	$2,500	$4,000
Wheelbase In.	96	109	114	124
Wheels, Front	31.0	33.3	33.8	35.6
Wheels, Rear	31.0	33.3	34.2	35.7
Price of Car	$867	$1,412	$2,161	$3,849
Motor				
Cylinders—One	2.8			
Two	29.4	4.8	1.3	
Three				
Four	67.8	93.5	89.1	61.1
Five				2.6
Six		1.6	9.5	36.2
Average Bore	3.92	4.17	4.32	4.77
Stroke	4.19	4.46	4.76	5.13
Ratio	1.070	1.070	1.101	1.075
Formula Horsepower	20.4	26.8	31.1	45.4
T type Cylinders	7.7	9.8	18.7	41.4
L type Cylinders	87.0	82.2	57.7	35.6
Overhead valves	5.3	8.0	11.0	21.6
Cyls. Cast—Indiv.	56.9	54.9	36.6	34.2
Pairs	7.7	24.3	56.6	65.1
Block	35.6	20.7	6.6	0.6
Water Cooled	91.8	93.4	95.3	95.1
Thermo	67.2	34.6	20.6	4.9
Pump	24.9	57.9	74.4	90.2
Air Cooled	8.2	6.6	4.7	4.9
Ignition—H. T. Single	63.0	22.5	27.6	10.4
Dual	26.5	42.1	32.4	46.1
Double	10.0	35.3	38.5	39.0
Make and Break				3.5
L. T. Single			1.4	1.5
Carbureter—Gravity	100.0	87.3	90.3	60.2
Pressure		12.7	9.6	39.7
Lubrication—				
Compression Oiler	2.6	1.6		
Pump	62.4	75.6	66.5	64.4
Gravity Pump	8.2	6.6	1.5	
Mech. Oiler	16.1	11.2	26.6	35.6
Flywheel Circ.	8.2	4.9	5.3	
Clutch-Mult. Disc.	53.6	47.9	45.4	48.2
Cone	38.3	47.1	33.0	40.8
Exp. Band	2.6	1.6	12.2	3.8
Contr. Band			8.1	4.6
No Clutch	5.0	3.3	1.3	2.6
Transmission—Sel. 2	13.2		1.3	
Sel. 3	19.3	64.0	87.8	51.9
Sel. 4		1.6	3.3	41.6
Prog. 2	19.3	3.3		
Prog. 3	2.6	3.3	4.7	3.9
Plan 2	44.3	21.0	1.4	
Plan 3		3.3		
Friction	5.0	3.3	1.3	2.6
Drive-Shaft	81.7	88.5	97.3	91.8
Chain	18.3	11.5	2.6	8.1
Weight	1,229	1,939	2,283	3,192
Weight per Horsepower	60.2	72.3	73.4	70.3
Horsepower per 100 Lbs.	1.66	1.38	1.36	1.51
Price per pound	$.705	.728	.946	1.205
Price per horsepower	$42.50	52.69	69.48	84.78
Pounds per dollar	1.49	1.37	1.06	.83
Power per dollar	.0235	.0190	.0144	.0118

American cars as a whole, then, would be divided into four groups, and their mechanical features would average up to the figures given in the table, these being expressed in percentages of the whole number in the group where possible, and otherwise in exact averages.

It will also be pertinent to the discussion of the features of American cars as a whole to consider the exhibits at the three shows as three separate groups, each with its own average. Considered in this light, it will be possible to sketch out wherein each one of these three groups of cars has influenced the final average, and wherein it has been influenced by the other groups to make up the final average.

That this is pertinent to the subject is shown by a single instance. Thus, in the oft-discussed matter of ratio of bore to stroke: At the Palace show the cars in the $2,500 class had an average bore of 4.41 and an average stroke of 4.89, giving an average ratio of bore to stroke of 1 to 1.108, thus showing that this class of makers does not incline very forcibly to the lengthened stroke. Then at the Garden show, in the same price class, the makers average up to 4.2 bore and 4.6 stroke, a ratio of 1 to 1.095, showing that this group of master builders inclines even less to the long stroke than does the previously mentioned class. At the Western show the averages were 4.35 bore and 4.80 stroke, a ratio of 1 to 1.103. This is neither the largest ratio nor the smallest, and when all three are compared with the one given in the all-American table, 4.32 bore by 4.76 stroke, a ratio of 1 to 1.101, it is seen that the Palace show brought the average up, while the tendency of the Garden show exhibitors was to bring it down. The Chicago show, on the other hand, simply served as a balance, neither raising nor lowering it.

After this brief excursion into the probity of this method of classification of the cars, it will be well to examine into the results which the method gives.

The crying need of the country to-day—that is, in the automobile business—is for standardization, not alone of the little things, some of which have already been slightly investigated, but also of the big things, such as cylinder sizes, wheelbase, tires per effective power or per given weight of complete cars, size of shafts to carry a given power when a specified material is used, size of axles, and a number of others. These have as yet not even been dreamed of by automobile builders, and when this is brought to their notice they will doubtless say that such a move will take away all originality. In reply to that unspoken argument, it will suffice to call attention to the electrical standardization methods, which have penetrated even farther than this in a business of equal or greater bigness. More than that, now that it is done, every electrical manufacturer in this broad land is glad of it; his worries are lessened, his supplies are minimized in number, he carries a lessened number of parts in stock. In these and many other ways, which lack of space prevents mention of, the business as a whole, although it resisted the work at first, is now bigger, better, healthier for the change. So it would be, and in fact must be, with the automobile business, and that, too, at a time now not very far distant.

As for the accompanying table, and the matter to follow, these simply represent what might be called the existing attempts at a standard, representing as they do an average of all the cars now made in this country. Viewed from that slant, it will be well to look into the details. Four standard cars, so-called, are given. These were selected according to price classification, the four divisions being made up to $1,000, from $1,000 to $1,500, from $1,500 to $2,500, and all above the latter figure.

In the first or $1,000 class the wheelbase is 90 in., the wheels are 31 in. in diameter all around, and the average tire size, not given in the table, is 3.2 in., or approximately 3 1-4. The price of this car averages to $867.

Passing next to the so-called $1,500 car, the wheelbase is 109 in., the tires are 33.3 in. in size all around, or approximately 33 1-2 in. In price the average strikes $1,412. Next above this, the wheels are 33.8 in. in front, and here is seen the first difference, the first appreciation of the differing work of the two sets of wheels, the rears being 34.2 in. These two are taking the nearest even fractional figure 34 in. fronts and 34 1-4 in. in the rear. The price average is $2,161.

The last or highest class has a wheelbase of 124, in which respect attention is called to the fact that the increment of wheelbase in the four classes is very close to 10 in. per class, the closeness of price of the two middle classes being the cause of the only wide divergence from this. Here the wheel sizes again show a difference, fronts being 35.6 in., roughly 35 1-2, while rears are 35.7, roughly 35 3-4 or 36.

Passing on to the motor details, the number of cylinders is given the preference as to position, since this represents the real thing for which the money is paid—that is, other things being equal, no man would pay the same money for a one-cylinder car as for a four-cylinder machine, choosing the multi-cylinder every time. In the fact that other things are not equal lies the claim for business of the makers of a lesser number of cylinders than six, the greatest number now in daily and constant use.

The good old single-cylinder horizontal is a thing of the past. the Cadillac, Reo, Buick and others which have made this type world-famous having been discontinued. In their place, but few single-cylinder automobiles are now built, foremost among which may be mentioned Brush, with a single cylinder engine, but set vertically. To compare with the many excellent, fast and durable French, German and English single-cylinder runabouts, there is not an American motor car on the market to-day. While Brush and the others, taken collectively, make up but 2.8 per cent of the whole number of makers, Brush alone on the basis of this year's production will amount to nearly 5 per cent of the estimated total production, this Detroit maker having figured on an output of 10,000 cars for the year 1910.

Passing on to the two-cylinder engine, it is found that this type of prime mover is comparatively popular in the lowest priced class, amounting as it does to the comfortable total of 29.4 per cent of the whole number. It would be interesting to find out just how much of this figure is given over to the two-cylinder vertical and how much to the two-cylinder opposed. It is doubtful if any of these cars uses a two-cylinder inclined motor, a type which has met with little favor on this side, although comparatively popular abroad for low-priced cars. The rest of this class is made up of four-cylinder engines, the exact figure being 67.8 per cent. When the price is considered, averaging $867, this really is an astonishing fact, for the rate of value per dollar expended is so much greater than was the case but two years ago as to cause wonderment. That quantity production has had much to do with this is self-evident, as is also the machine tool builder's part in it. Without many of the very latest up-to-date machines, fully automatic in their action, this sort of a thing would be impossible. This figure shows, too, that the man who is waiting to buy an automobile "when they get cheaper," basing this on the ratio of value in the bicycle, is badly off, for there will never be a time when the actual value per dollar invested will be greater than to-day, considering the manufacturer's profit at a fair and equable rate. In the connection of value with result, it might be called to the attention of the reader that the aforementioned car, which sells very much below the average, has done much to pull the aforesaid average down to this low level.

Power always interests, as does the source of it, so the cylinder sizes interest, too. In this low-priced standard car the average bore, considering all engines, one, two and four cylinders, on an equal basis, is 3.92 in., while the bore is slightly larger, 4.19 in. The nearest fractional sizes come in sixteenths, but expressed in millimeters, this engine would be 100 by 106. The formula power would amount to 20.4, or in even numbers 20 horsepower. Attention is called to the ratio of bore to stroke, this being but 1 to 1.070, or very little more than an even bore and stroke. In this again we find little or nothing to compare with the long stroke voiturettes of abroad, with the stroke running from 1 1-2 up to 2 times the bore.

Passing along to the points of design, the L type of head is preferred by no less than 87 per cent of the makers, while the T head and the overhead-valve type divide the rest, these being nearly on a par as far as numbers are concerned. This landslide to the valves-all-on-one-side engine is explained in part by the lower cost of foundry work and the decreased cost of the final engine, due to the elimination of one camshaft and the lessened machine work on both cylinders and crankcase in this type.

Of vital interest to the foundry, although having a big bearing upon the design as a whole, is the shape and size of the cylinder casting. That is to say, whether it is of a number of individual castings, one for each cylinder, a smaller number of pairs, that is, two cylinders cast as one, cylinders in threes, or cast in a block. The smallest car shows a predominance of the single cylinder castings, although in this, the matter of cost, as exemplified by the type of cylinders is reversed, the mostly used individual castings costing more per engine in both the foundry and machine shop than the cylinders in pairs. Next in order, numerically, comes the block casting. Evidently the swing of the pendulum has been away from the single casting of late, the large number in the older class represents the older makers, while the newer form of construction attaches itself to the newcomers. At any rate, it is a surprising fact that next to the single castings in order of popularity comes the cylinders cast in a block. The percentages of the two are respectively, 56.9 and 35.6, leaving but 7.7 per cent for the paired castings, or as they were once called, siamesed.

Air versus water for cooling purposes is settled by the percentages, which are 91.8 for water and 8.2 for air. Excepting only gravity feed to the carbureter, there is the biggest percentage given to any one feature in the whole list, with the single exception of the higher priced cars, on which this same percentage is increased slightly. As for the water cooling, itself, this is separated into the two schools, those favoring the natural or thermo-siphon method of circulating the water, and those who stick to the pump for driving the water. In this priced car, where first cost, simplicity, and small number of parts are all large and weighty points upon which to hang a selling argument, it is to be expected that the simpler system would predominate, which it does by the large percentage of 67.2. The other method has many followers, however, as is shown by the number, 24.9 per cent.

When it comes to ignition, there is no such unanimity, three systems of wide divergence dividing the total number of makes. These with their percentages are: high tension single, 63.0; high tension dual, that is, magneto used as a timer for the battery current, some one feature thus being utilized in both systems, 26.6, and finally, double or two separate and distinct systems, 10.0. Considering the price of the cars in question, the latter is a source of wonderment, that is, from the viewpoint of how the manufacturer is able to do it.

One might reasonably expect that none of the cars in this class would have pressure feed from a rear gasoline tank to the carbureter, this being both expensive and complicated. Such is the case, the gravity feed being set down at 100 per cent, or on all cars in the class.

In the matter of lubrication, the makers begin to show less of standardization than has been shown in previously discussed features. Five methods of lubrication are listed, and each one of these has a following, somewhat limited in some cases, it is true, but nevertheless, adherents. To mention the five and their respective percentages: compression oiler, 2.6; circulating pump, 62.4 by far the largest, and also, the only close approximation to a standard; gravity feed from a container, which is kept filled by a pump, 8.2; mechanical oiler with numerous leads, 16.1; and flywheel circulation of the oil, that is to say, splash, 8.2.

Under the heading of clutches, while five different kinds are mentioned, but four have friends among the very small car makers. These show considerable unanimity, in that two types together make up 92 per cent of the whole. These are: the multiple disc with 53.6 per cent and the cone clutch with a following of 38.3 per cent. The rest is divided into: expanding band, 2.6 per cent, and no clutch at all (friction transmissions) 5.0, while the contracting band is not used.

One might expect—and with good reason—that the cheaper to build planetary transmission would be found strongly intrenched in this class, yet such is not the case, emphasizing the "value for money" previously spoken of. Two and three-speed selective gears together total 32.5, while the four-speed gear is not used. Then the two and three-speed progressives add their quota of 21.9, making about 55 per cent. This with the 44.3 planetary and 5.0 friction makes up the whole.

Shaft drive is very much in the majority, which is all that can be said, the chain-driven variety having the handsome total of 18.3 per cent. Coming down to the weight, this is somewhat difficult to ascertain with accuracy, but a figure is given. This is but slightly over 1,200 pounds, which amounts to the very low figure of 60 pounds per horsepower, or put otherwise, 1.66 horsepower per every hundred pounds of dead weight. As to cost of power, and weight, the former works out to $42.50 per horsepower, while $.705 seems to be fair per pound.

Passing to the next larger model, the more popular $1.500 machine, the opinion as to number of cylinders has increased, nearly all makers fitting four, to be exact, 93.5 per cent. In the still larger model, an increasing loss to the sixes is noted, so that the number of fours falls to 89.1, this increasing along the same lines to 61.1 fours and 36.2 sixes, in the largest car. The same gradual but noticeable increase in bore and stroke is noticed, the ratio of the two remaining practically near 1.1.

Cylinder shapes show a gain in T heads and overhead valves, both at the expense of the L head, so that the latter becomes in the three larger models: 82.2 per cent, 57.7, and 35.6, losing the lead in the latter case to the T head. Similarly paired cylinders gain at the expense of both block and individual cylinders, the former in fact practically disappearing in the highest priced car. Cooling as to air versus water stands in about the same ratio, with a very slight gain in favor of water. As to the method, however, the simpler thermo system loses ground constantly. Ignition is mostly by the systems which permit of a choice of two, dual and double together amounting to nearly 90 per cent. In this, the more expensive cars show a few, a very few evidences of the low-tension system. Some increase in pressure feeds for the fuel is noted, but this is a variable, rising only to drop again, going on up the scale. Lubrication, too, shows a peculiar variation, but the mechanical oiler of multiple leads, and the pump circulating scheme, as more satisfactory and positive, show a continuous increase. In clutches, the diversification, which gives the advocate of standardization much to talk about, is very noticeable, the two leaders in the small car class both losing in favor of the expanding band, contracting band and friction transmission.

Transmission trend is shown in the overwhelming number of selectives as against all others combined, this figure being nearly 94 per cent. Strange to relate, chain driving loses ground rather than gains, the percentage dropping from 18.3 for the smallest car to but 8.1 for the most expensive, reaching a still lower point of 2.6 for the $2,500 car.

Weight, of course, increases, but slightly faster than does the power, as shown in the figures of weight per horsepower, and horsepower per hundred pounds, the latter in particular showing the high relative power of the very small, extra light cars and the very large and heavy cars. Price goes steadily upward, whether it be total, price per pound, or price per horsepower. It would seem, at first thought, that the two latter would be quantities which would remain fairly stationary, but such is far from the case, the price per pound going steadily up to over one dollar in the big cars, while for the same class the price per horse-power reaches the top-notch figure of nearly $85.

While not actually presenting the four standard American cars, because there are no such things to be presented, this table and the remarks upon it give some food for reflection, incidentally pointing out more strongly then ever the need for standardization, the universal standardization which will give a similar weight, power and ability for the same amount of money.

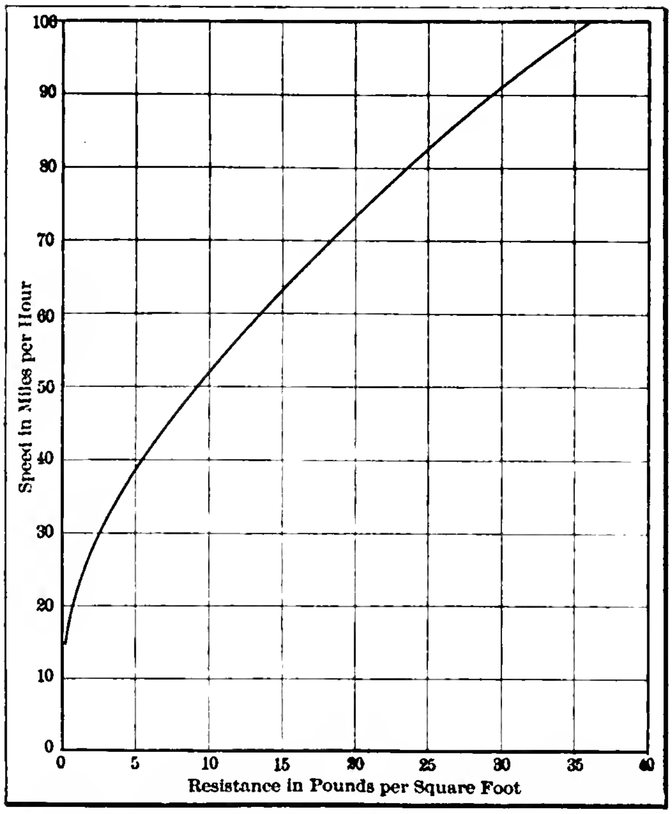


Chart Plotted to Show the Increase in Wind Resistance with Speed

EFFECT OF WIND AND AREA ON SPEED

At speeds below twenty miles per hour the effect of wind resistance, so called, is below the noticeable point when an attempt is made to measure its magnitude. Considering surfaces at right angles to the normal plane of travel of the automobile, the wind resistance, as measured in pounds per square foot, while it begins to show at about fifteen miles per hour, raises slowly, reaching about 2½ pounds per square foot when this speed is doubled. Further increases in speed result in a rapidly increasing rate of resistance to travel as measured in pounds per square foot, and at 60 miles per hour this effect is slightly over 13 pounds. Increasing the speed again up to ninety miles per hour increases the effect of wind resistance so that it is represented by the considerable figure of 29 pounds per square foot, approximately. The curve here given shows the results of tabulation involving these factors and illustrates the necessity of treating with this question of front area.

There are two possible remedies in an attempt to reduce the ills of wind resistance, one of which lies in the greatest possible reduction of front area, and the other involves wedge shapes and a smooth exterior. If cooling depends upon a radiator in front, the area of the radiator exposed is, of course, regulated by the cooling requirement. A certain amount of air must brush against the cooling surfaces, so that the air molecules will sponge heat out of the cooling water as fast as it is enabled to penetrate the walls. The ability of the radiator is increased with the speed of the car up to about twenty miles per hour, but beyond this point front area, from the cooling point of view, is not a factor. The front area, as regulated by the radiator, therefore, must be such as to permit a sufficient weight of air to brush over the cooling surfaces at a speed of twenty miles per hour.

EFFECT OF HEAVY CHARGING ON PASTED LEAD PLATES*

By HUGH RODMAN

SUCH plates, in service, and not subjected to abuse, fail by reason of the active mass softening and silting from the face of the plates to the bottom of the jar. This disintegration is probably due to one of three main causes:

First. An untangling of the set, crystalline mass due to the cycle of changes from peroxide to sulphate and back to peroxide, to which a portion of the active material is subjected with each charge and discharge.

Second. To solution of the set, crystalline lead compounds and precipitation thereof as loose pulverulent compounds. This follows from the formation of concentrated sulphuric acid in the pores of the plates during charge, this dense acid dissolving lead sulphate and reprecipitating it upon contact with the diluted acid at the surface of the plates.

Third. The solution of crystalline lead compounds and reprecipitation as non-crystalline compounds, due to the formation of persulphuric acid at the surface of the positive plates during the gassing period.

The first source of trouble may be helped in two ways, by less frequent charging and by starting with more thoroughly set or crystallized plates. It is obvious that with a battery capacity of forty miles and a ten-mile run on two successive days, if the charge is deferred until the end of the second run the active mass will have been subjected to one cycle of change of crystallization instead of two cycles, which would have followed recharging after each partial discharge.

*Paper read at the semi-annual meeting of the Society of Automobile Engineers, New York City, January 4 and 14, 1910.

The solution of lead compounds by dense sulphuric acid may be partially overcome by the use of thin and porous, rather than thick and dense plates, thus giving the sulphuric acid formed during the charge a chance to mix more easily with the dilute, free acid outside the plates. Slow charging will, obviously, serve the same purpose.

The disintegration, due to persulphuric acid, may be lessened by infrequent, complete gassing charges. It is generally believed that the gassing charge must be given occasionally, but there seems to be no necessity for doing so more than once in, say, two weeks. Certainly it is harmful to gas the plates freely at the end of each charge.

Altogether the best scheme of charging, suggested by theory, is: First, to charge at a moderate rate; second, to recharge only after several partial discharges; third, to give the gassing charge only occasionally.

These conclusions are fully borne out in practice. The life of batteries is increased by moderate charging, say, the four-hour rate to begin with, and half that rate at the end of the charge. Longer service is secured by infrequent charging. It is not difficult in most installations to defer charging until after several partial discharges, provided these discharges have not stretched over too long a time. A charge following two or three partial discharges on successive days is far better than a charge following each partial discharge.

Fairly complete charges, say, up to 2.4 volts per cell with the current equal to about half the four-hour rate of discharge, gives longer life to plates than where gassing follows each charge.

MAXWELL SAND BLAST CLEANING PROCESS IN DETAIL

THE refinement of the old-time sand bellows, the modern compressed-air sand blower, is used by the Maxwell-Briscoe Motor Company in cleaning and smoothing various machine parts and particularly in preparing the steel bodies of Maxwell cars for the painter's brush.

In order to free the surfaces from all traces of oil, rust, etc., they are subjected to a blast of fine sand, which is driven against the hard metal with great force. The abrasive action thus set up removes all slight inequalities and results in a surface of ideal smoothness. In order to make it impossible for sand to enter the workman's lungs he is attired in an air-tight helmet into which air is pumped from an outside reservoir.

In the illustration the workman may be seen sanding one of the transmission gears, the tank for the air, with its pipes and gauges being clearly visible behind him, in the corner of the room. The latter, it will be noted, is of very cheap construction, as it would not be advisable to have it otherwise, the sand not being particular about automobile parts, but attacking buildings when properly directed toward them just as readily.

The sand blast is the invention of B. F. Tilghman, of Philadelphia, and made its first appearance at the American Institute Fair, in New York City, 1871. The material used may be common sand, powdered quartz, emery, or any similar substance composed of hard and sharp particles, and may be blown by a blast either of air or of steam. A jet of sand impelled by even the blast of an ordinary fan will give glass a "frosted" finish in a few seconds and will cut wood quite rapidly. With a jet issuing under 300 pounds pressure a hole can be cut through a piece of corundum, the material used in grinding wheels, 1 1-2 inches thick, in 25 minutes.

With the expenditure of 2 horsepower in compressing air, 2 square feet of scale on the surface of ordinary steel plates can be removed per minute, the surface being then ready for galvanizing or painting. A hundred pounds of castings can be cleaned in 10 or 15 minutes with a 2-horsepower jet.

Maxwell Sand Blast Operator At Work on Small Castings

INCRUSTATION DEFEATS COOLING

RADIATORS, however efficient they may be when they are new, become fouled by foreign matter which is suspended in the water when it is put into them, and, if the radiators are not large enough properly to cool the motors without evaporating water, it is but a matter of a short while when the accumulation of foreign matter will be sufficient to defeat efficient cooling,

Elimination of Impurities from Water

(A) For sediment; filter or blow off.
(B) Bicarbonates; add caustic soda and boil water before use.
(C) Sulphates; add barium chloride and settle.
(D) Grease; add slacked lime and filter.
(E) Organic matter; precipitate with alum and filter.
(F) Carbonate of Magnesia.
(G) Carbonates; add barium chloride and settle.
(H) Chlorides; add carbonate of soda.
Note.—The proper time to take advantage of any of these processes is before the water is placed in the cooling system; once the surfaces are coated over with a hard crust, they will be beyond cure. Chemicals will damage the radiator.

even assuming that the trouble may not extend to the point which will induce knocking and pre-ignition.

If a radiator is so efficient for its purpose that water will not have to be added to make up for that which boils away, the quantity of impurity which will accumulate in the system will scarcely be enough to notice, even after several years. If, on the other hand, the system must be replenished daily, the amount

Temperature of Calcareous Precipitations

(A) Carbonate of lime; minimum temperature 176 degrees F.
(B) Sulphate of lime; minimum temperature 284 degrees F.
(C) Chloride of magnesium; minimum temperature 212 degrees F.
(D) Chloride of sodium; minimum 324 degrees F.
(E) Carbonate of lime is held in solution of bicarbonic acid.
(F) Heating drives off the carbonic acid and the salts will then precipitate.
(G) Sulphate of lime is most soluble in water at 95 degrees F.
Note.—If a radiator is large enough to properly cool a motor, it is highly improbable that the temperature will increase sufficiently to deposit any but carbonate of lime.

of foreign matter which will accumulate will soon result in trouble, and, contrary to some of the preachings, the type of radiator employed will have little or no influence on the result.

Since a little sediment will accumulate over the surfaces of the system in the course of time no matter how commodious the radiator is, it stands to reason that it should be liberally proportioned for the work it will have to do, in order that it will be large enough to properly serve the purpose when the surfaces become slightly coated.

The effect of incrustation is most marked; if the scale is 1-16 inch thick it will diminish the efficiency to 7-8 of that which will obtain when the surfaces are perfectly clean. From this point on, if the crust thickens, the diminished efficiency will be proportional to the square of the thickness of the scale.

It has been repeatedly stated by the most competent authorities that scale, once it is deposited, cannot be removed excepting by scraping. Whether it can or not will not alter the fact that radiators, as they are made, cannot be mechanically gone over with a scraper. If, in the attempt to remove scale by means of chemicals, the surfaces are attacked, the damage, as measured in dollars, will be equal to the cost of a new radiator sooner or later.

Under the circumstances, if a radiator is not large enough to do the work without evaporating water, it is a moral certainty that the time will arrive when the motor will fail to do its best work, even if it does not indicate trouble of a more serious nature. If the radiator is large enough to accomplish the cooling purpose without boiling the water, the question of eliminating the foreign matter will not have to be coped with, but if the reverse is true, the one safe measure lies in removing the foreign matter before the water is placed in the radiator.

The temperature of precipitation, as shown in the table of precipitations, will obtain under conditions of a heated radiator to a degree high enough to induce serious trouble, and, the vegetable matter, which is a crust former of no mean ability, will precipitate in the presence of iron at any temperature.

One very good way to filter water is to allow it to settle in a barrel in which a quantity of pig iron is placed; the foreign matter will adhere to the pig iron, and, from time to time the same may be removed and washed. This process will not eliminate the salts of sodium, calcium and magnesium—they must be treated under proper conditions of temperature in the presence of substances given in the table of elimination of impurities.

Distilled water is the one right answer; it will be so free from all scaling substances that no further trouble needs be anticipated, and the cost of the same is far less than the repair account which will fall to the lot of the owner who is keeping company with a car which is fitted out with a steaming radiator.

ELECTROLYTIC ACTION IS MUCH TO BE FEARED

Any metallic salts, or acidity, in the presence of any two or more metals submerged in water will constitute an electric couple, and local action will follow. The metals, differing from each other, will form the poles of a battery and the water, charged with salts or acid, will compose the electrolyte. It will be impossible to state with any degree of certainty as to the extent of the electrolytic action which will be set up in a radiator when acid or salts is present, due to lack of data of the degrees of concentration of the electrolyte, and the nature of the chemicals.

Electrolytic metallurgy, which is the heading under which all such matters are dealt with, consists of the very process by which metals are dissolved, deposited, and separated under the electrolytic action which is sure to follow if two or more differing metals are submerged in an electrolyte.

It is for this reason that calcium chloride, if it is employed in solution to prevent freezing, is so very dangerous; this danger is particularly noticeable when the chloride is of the brand designated as "commercial"; this form of the material is sufficiently impure to hasten the electrolytic action. Heat, as it is bound to be a condition in radiator work, hastens the electrolytic action; the extent of this action being intensified as the temperature increases up to a certain point.

Sodium chloride (common salt) would be an excellent material to add to water for the purpose of preventing freezing were it not for the electrolytic action which would surely follow its use. Grease, on the other hand, is not good for the purpose. The grease will coat over all the surfaces of the radiating system and retard the transfer of heat just as a crust of foreign substance will. The grease coat, if it forms, will pick up foreign matter and form a hard crust which is a very perfect insulator of heat, which is exactly what is not wanted in a cooling system.

Mineral oil, after it has been filtered a number of times by passing it through fuller's earth, if it is very lacking in viscosity, will do cooling work, but, unfortunately, it is necessary to design the radiator in view of the use of this cooling medium. A considerably greater area of cooling surface is required than when water is used.

Alcohol in water will do very well for a freezing mixture, especially if the alcohol is pure, and the water is distilled. About one-quarter of the whole solution should be alcohol. Care must be exercised to maintain the strength of the solution; the alcohol will evaporate more rapidly than the water; it is not a very good solution to use in a steaming system. As a matter of fact there seems to be no good way of keeping entirely out of trouble if the radiator is not large enough for the work which will have to be done, and, when all is said, it is probably cheaper to purchase a new and better radiator in a case of this sort.

Glycerine, in the proportion of 1:4, the major portion being water, is much used and it seems to be very good excepting that it becomes foul after a time and a new supply must then be used; it is rather high priced, and it attacks the hose connections which are placed in the piping system to form flexible joints.

In winter (cold) weather, if autoists do not care to risk the use of cooling solutions with which they have no experience, it is necessary for them to empty the water system out every time the automobile is stopped if the time of interruption is more than that which will allow of the water being cooled off. The very fact that a radiator is efficient is the reason why it will ice up in a little while.

CARBON FORMATIONS IN CYLINDERS MAKE TROUBLE

It is not in the cooling system alone that trouble is to be expected from incrustation. If a coating forms over the combustion surfaces, it will have just the same effect as if it grows on the surfaces of the radiator. This crust, while it is attributed to free carbon in the lubricating oil, may come out of the gasoline, due to the use of an excess. It may also be due to silicon and other foreign matter, which will be sucked in through the air intakes of the carbureter. The inner surfaces of the combustion chamber, unless they are kept free from incrustation, will materially reduce the good performance of a motor, nor is the usual theory in relation to this action in full accord with the facts.

Knocking will follow if the pressure wave increases at a very rapid rate to a very high point, and this condition will be induced if a coat of carbon or other heat retarding substances is formed over the internal surfaces of the cylinders. The amount of the formation will not have to be so great as to increase the compression as is so generally believed, but just enough to prevent the heat to pass to the water jacket, at the time when the excess will induce a sudden increase in the pressure wave.

Carbon will coke out of the gasoline if the same is in excess and the heat is applied at such a rapid rate, at the high temperature required, to break down the gasoline structure; all the carbon in the fuel, under these conditions, which does not pick up oxygen, will coke out. The excess gasoline will not find oxygen sufficient to produce carbonic acid, carbonic oxide, or water, and, all that can be formed, under such conditions, will be coke.

This trouble is mostly charged up to lubricating oil, but it is now fairly well established that much of it is caused by the presence of an excess of gasoline, or, what amounts to the same thing from this point of view, lack of air. It is to be seen, considering this idea, that the questions of the carbureter are included in a sense, and in coping with the problems of the cooling system it is necessary to be sure that the fuel relation is within manageable bounds. For that matter, ignition troubles must be eliminated when the radiator question is being investigated.

There is nothing in this article which should be very consoling to the autoist who has picked the wrong cooling system, nor is there any statement to the effect that a motor will not run if the radiator is not big enough for the purpose, but there are strong grounds for suspecting that it is economy in the long run to purchase a sufficiently large radiator to do the work without steaming. It is even a question if there is much danger of being able to use a radiator which will be too large for the purpose—room is much restricted in automobiles. Here, as in most cases, it is better to err on the right side.

Causes of Incrustation in Radiators

Deposition of:
(A) Lime soap.
(B) Iron soap.
(C) Grease saponification with other substances.
(D) Sulphate of lime.
(E) Carbonate of magnesium.
(F) Carbonate of magnesia.
(G) Other magnesium salts.
(H) Suspended vegetable matter.

Note.—If the radiator is not of a good design, it is likely that all these troubles will be experienced the sooner; fins, projections, and places of lodgement are bound to attract precipitations, and, if the location of the accumulations is that which will stop circulation, trouble must follow.

Preventives of Incrustation in Radiators

(A) The use of distilled water.
(B) By filtering and boiling the water.
(C) By maintaining a low temperature of the water.
(D) Removal of carbonic acid from water and settling.
(E) By chemical treatment of the water.
(F) By removing the water from the radiator frequently.
(G) By blowing out the radiator with steam.
(H) By the use of some chemical medium besides water.

Note.—In some geographical localities the troubles which are due to precipitations and the resultant incrustation, are very noticeable as compared with others, and it is for this reason that complaints from some autoists are not verified by others.

Electrolytic Action Used in the Arts

(A) In electrotyping.
(B) Electroplating.
(C) Electrolytic reduction of metals.
(D) Electrolytic refining of metals.
(E) As a destructive process in steam boilers.
(F) As a destructive process in automobile radiators.

Note.—If a process is so pronounced that it may be used in the arts to advantage, this is proof of the fact that the same process, if it is used under damaging conditions, will be rapid, and, success, if it is to attend the plan demands that this action be eliminated entirely.

The way to avoid such action is to maintain a pure state of the cooling medium—chemically pure if possible.

GOOD ROADS, CUSHION TIRES

Editor THE AUTOMOBILE:

[2,175]—I wish to ask your advice as to tire trouble. I have a Pope-Tribune, one seat single-cylinder car, with wheels 28 by 2 1-2. Now, I live five miles from town on a good smooth pike, and when my wife and I ride in it, we go for pleasure and not for a speed record. I do not care to go more than 10 miles per hour, but I want to go with a certainty of no tire trouble, as I am too old for that kind of trouble or monkeying. Could I put on a good solid tire or cushion tire and get good results with it at a moderate speed, and at about the same expense as I am now having with pneumatics, or would it shake up my engine too much? It is a vertical engine, well braced and fastened to the frame. Last year my car was the second in the county, now there are no less than thirteen.

Cynthiana, Ky. J. P. HODSON.

At the very modest speed, to which this gentleman is partial, solid tires would do very well, the slow speed reducing the bouncing and bumping to a minimum quantity, if not to a negligible amount. As was pointed out in last week's paper, the influence of speed upon the stresses and strains of the car is just twice that due to weight. At this very low speed, ten miles, the factor, V^2, becomes very small. The change to solids would be a safe one under these circumstances.

TIMING OF THE INLET VALVE

Editor THE AUTOMOBILE:

[2,176]—Will you please answer the following in your "Letters Answered and Discussed": At what time should the intake of a two-cylinder engine open after the piston leaves dead center? That is, we want to know at what time it should begin to open.

Roachdale, Ind. LOCKRIDGE & ASHBY.

If the exhaust valves of your engine are working properly, you can time the inlet valves from them; the inlets should open just as soon as the exhausts are firmly closed. In any case, the timing of the inlets must depend on that of the exhausts, as they must not open before the exhausts have closed. If you are sure of the exhaust, then, you will need no further information. The timing for a two-cylinder motor is no different from that of any other motor, except in the fine points raised by the different speed conditions under which the engines are run.

Customary practice in regard to opening the inlet valve varies between 10 and 20 degrees travel of the crank after the dead center, depending, as stated above, on the closing of the exhaust valve. Practice also varies as to whether the inlet valve should open immediately after the closing of the exhaust, or whether there should be more or less of an interval between.

If your exhaust timing is wrong, too, the best thing for you to do is to write to the makers and find out how it was intended to be. Most modern motors have the timing marked on the flywheel. The inlet valve should hold open about as much after the lower as it delays opening after the upper center.

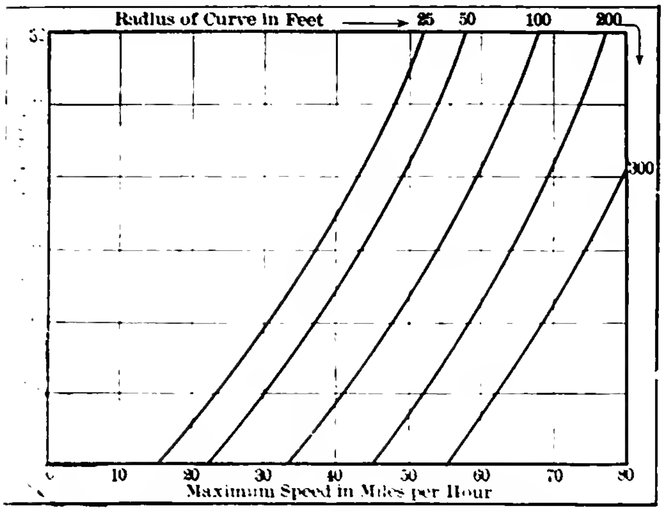


Chart of Relation of Speed to Curvature

LETTERS INTERESTING

HEATING GARAGES BY STOVES

Editor THE AUTOMOBILE:

[2,177]—Referring to the inquiry number 2,139, appearing in the January twentieth issue of "The Automobile," in which you speak of some simple heating contrivance to be used in heating a barn, do you think such a stove safe for a private garage owner of a small barn? Can such a one be used with perfect safety and no fear of explosion? I keep my tank in the car filled with gasoline, and often in the mornings, when opening the garage doors, I detect a perceptible odor of gasoline, making me fearful of installing a stove.

New York City. E. N. W.

If you keep gasoline other than that in the tank of your car in the garage it certainly would be dangerous to keep a stove there for heating purposes. If not, however, the tank in the car should not entail any danger, and if, as is stated above, a perceptible smell of fuel is noticed every morning, without any fuel being spilled, it must be that there is a leak in the present tank. Look to this point very carefully, as it not only means a high consumption, and consequently expensive fuel bill, but some fine day your car, garage and other belongings will suddenly start in to emulate the Wright brothers and other human birds. This sort of thing makes people peevish, so it is well to provide against it.

BANKING, CURVES AND SPEEDS

Editor THE AUTOMOBILE:

[2,178]—I have been somewhat confused with the various references to the relation of the curvature and banking of racing tracks to the possible speeds. Will you please explain this in some detail, through your column of "Letters" and help out a number of interested subscribers?

New Rochelle, N. Y. INTERESTED SUBSCRIBER.

To give the exact relation of these three quantities would entail much mathematics, but the crux of the situation is given in the appended curve, which shows this interrelation. The vertical quantities or ordinates are the inclination of the road or track to a horizontal in degrees. At the top the abcissæ are the feet radius of the curve, while at the bottom the abcissæ are speeds in miles per hour. It is here seen that the three quantities are so closely related that it is impossible to change any one without altering the others. Thus, to obtain a speed of 50 miles per hour on a curve of 100 feet radius, follow the curve from 100 radius down to the intersection with the vertical line representing the speed desired (50 miles). Thence proceed across the horizontal line to the left-hand scale to find the banking necessary to allow this speed without overturning, in this case 13 degrees. Similarly, knowing the banking and radius, the possible speed may be found as follows: Suppose there is a radius of 200 feet and that the banking is 15 degrees. Then, proceed from the 15-degree line at the left across to the intersection with the curve for 200 feet radius, drop down vertically to the base line from this intersection and find the desired speed, 64 miles per hour. Similarly given any two quantities the third can be found using this curve, or given but one, an assumption may be made for a second, and the third thus found, approximately. This may be repeated, using higher and lower value for the assumption, until the desired combination is found.

The banking of automobile tracks, so-called "motordromes," is rarely sufficient. A few extra inches of dirt on the outside allows the promoters to claim that it is "scientifically banked."

ANSWERED AND DISCUSSED

STUDENTS' SIDE OF EMPLOYMENT

Editor THE AUTOMOBILE:

[2,179]—I note in one of the back numbers of "The Automobile" of which I am now a constant reader, on page 1067 of Dec. 16, 1909, Robert Jardine, superintendent of the Royal Tourist Car Company's plant at Cleveland, states that the greatest need of the automobile industry is a supply of intelligent machinists, and also says that all around men are badly needed. Again he says: "The trouble seems to be that young men who have passed through high school will not enter a plant as apprentices." He may be right when he says they will not enter, but there's a reason. It is not because they are not interested, for where I attended high school last year in Connecticut, there were some who were studying automobiles nights. I was one of the interested ones. One of our number obtained a position in a New England factory, and the agreement was this: He must work six weeks for absolutely nothing, after which he would receive a dollar a day. Take a lad living away from home, how can he do it? It appears that the manufacturers want the lads and the lads want the positions (and I am one of those lads) but the trouble is that these lads cannot afford to start. If any real opportunity arrives I would like to obtain one of these positions myself, and would gladly receive any direct communications from the manufacturers. I have spoken in behalf of the high school student and its graduates.

Greenfield, Mass. CLINTON J. CONVERSE.

MAGNETO AND OTHER DIAGRAMS

Editor THE AUTOMOBILE:

[2,180]—Will you please explain through the excellent and very enjoyable "Letters Interesting, Answered and Discussed" what is the difference between the various electrical windings, that is, how does the magneto winding differ from dynamo winding. Also, what is the difference between shunt, series, compound, and other windings, often spoken of? Please illustrate by diagrams.

Buffalo, N. Y. R. E. P.

Magneto winding differs from other winding in that the former is wound to produce a spark at a given time when the circuit is ruptured, which is done frequently. The latter, on the other hand, considering dynamos, motors and the like, are wound so as never to produce sparks, and the current output is a steady discharge or continuous input, with no interruptions.

In the sketch below this is depicted graphically, the magneto winding being shown first; separately excited field, second; series winding, third, and in the lower row, in order, shunt, compound, and differential windings. Each one of these has a different use requiring the difference in the winding.

In the first, separately excited, it is seen that the current which passes through the field is supplied from an outside source, the two wires leading off at the side indicating this. In the second, series winding, it is seen that one of the leads from the rotating armature is wound around and through the field, while the other armature lead is direct. Shunt winding consists of a winding from one of the armature leads, around through the field, then back onto the other armature lead; that is, it forms a loop around the armature windings. Compound winding is, as will be seen in the figure, a combination of the shunt and series windings, its name indicating that it is a compounding of some other methods. Lastly, differential winding is shown. In this an armature lead is utilized for the lower layer of the field, being wound upon itself for the second layer of the field. It forms a shunt upon the armature circuit, this having been previously described as nothing more than a loop. Magnetos, properly speaking, have no field winding at all.

CHANCES FOR YOUNG DRIVERS

Editor THE AUTOMOBILE:

[2,181]—Would you kindly answer the following questions: (1) Are there any automobile companies looking for men to drive cars?

(2) Could a young man having one season's experience driving and taking care of a car, and having no bad habits, easily obtain a position as a chauffeur? Are these young men much in demand?

(3) In what States do chauffeurs require a separate license?

Anita, Ia. A SUBSCRIBER.

All of the automobile companies are now looking for men of experience, particularly in Detroit, where there is said to be a famine of men. The Chamber of Commerce of that city is said to have imported some 16,000 men in the past year from other cities, but still there is not enough to go around.

Yes, a young man such as is described could easily obtain a position as a chauffeur, and, as we understand it, such drivers are in demand at all times.

Nearly every State in the Union requires a license, but in a great many of the States the license is taken out for the car, no matter who drives. In such States, of which we are now unable to give you a list, the chauffeur would not need a license.

METHODS OF STARTING THE CAR

Editor THE AUTOMOBILE:

[2,182]—In your issue of January 20, 1910, E. J. Montgomery, of Clinton, Mo., complains of difficulty in starting his motor in zero weather.

Your solution of the difficulty was to install a heating plant which is no doubt the very best advice under the circumstances.

My car is housed in a cold stable, and although generally speaking, our winter has been very mild so far, we have had to turn on the "juice."

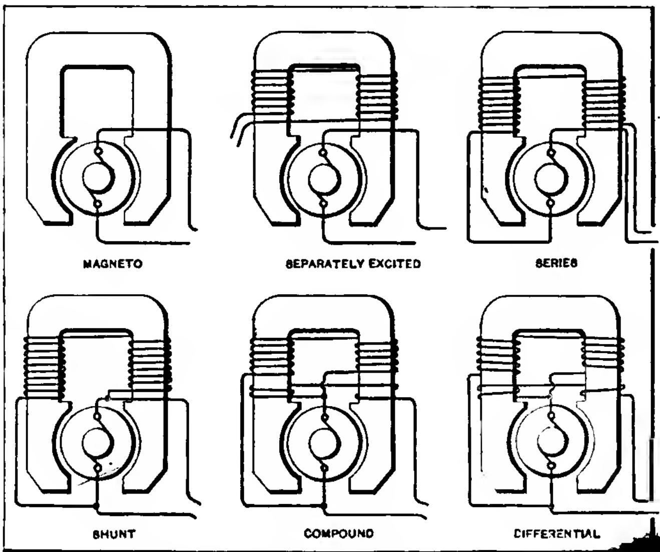
While I am eating breakfast the lamp warms up enough to make cranking comparatively easy, so that by using a little ether on a piece of cloth stuffed in the air intake of the carburetor "she is off" after being turned over a couple of times.

The idea of using ether to help start was given in the columns of your paper some time ago, and I have found it very helpful a few mornings when the temperature was from 6 to 10 degrees below.

Now when I get up in the morning and find it so very cold I go out in the garage and take a thirty-two candlepower electric lamp attached to a flexible cord, and lifting the hood put the lamp inside next to the carburetor and crankcase. Then I put the hood down and cover the radiator and hood all over with my large fur robe, and I hope the above suggestions may prove helpful to your correspondent and possibly others.

Concord, N. H. CHARLES H. COOK, JR.

This is a very good method, but we should think it very expensive. Not only is electricity expensive, but the very large lamp used consumes much current. The whole should put the electric light method of warming garages out of the question for the little fellow, who must perforce economize on garage charges.



Wiring Diagrams of Magnetos and Dynamos

Clutch Repairs and Maintenance

By Oliver Light

CLUTCHES are of many forms, in fact, one might say that there are as many clutches as there are automobiles. The various constructions may be divided into groups, each one varying from the others only in the matter of minor detail, according to the individual preferences of the designer responsible for the car to which it is applied. The forms to be considered as typical of standard practice are the cone, three-plate, expanding band, and multiple disc clutching devices.

Troubles evidenced in one form may be found in others, though as a rule the same conditions cannot apply to those of different types. The cone and expanding-band forms will require about the same degree of care and attention, and will be subject to the same derangements, while the multiple-disc construction will deteriorate in an entirely different manner.

Perhaps the most common form is the cone, which consists of male and female members and a spring to maintain contact between them. The female portion is often formed directly in the flywheel rim, while the other member is a casting or stamping faced with some friction material. Next in order of importance are the multiple-disc clutches, designed with a view of eliminating some of the troubles present with other forms, but which at the same time introduce others in their application and operation. The expanding band and three-plate share the honors as to popularity, but as they are fitted to cars of reputable make, demand some consideration, though one rarely sees a clutch of the external constricting-band type.

Speaking as a repairman who has had experience with each and every form, and is able to expose their various weaknesses, at the same time suggesting differences in construction which might be of use to any skilful designer, willing to use them, but who also can see disadvantages which are not so evident to their creators, the writer will analyze some of the successful forms and expose their weaknesses, at the same time suggesting methods of repairing them which have proven practical.

Failure to Engage Properly, the Biggest Trouble—The troubles which most often develop are failure to engage properly, which may be either slipping or failure to transmit power, or harsh and too rapid engagement, or imperfect release. Those clutches faced with frictional material will deteriorate because of loss of this facing through natural wear, while other forms will prove unsatisfactory in operation due to other conditions. In overhauling a car, even if the clutch mechanism has not given trouble it will be well to take it apart and carefully examine the components to detect wear that may cause trouble in time, and which can best be prevented by proper restoration.

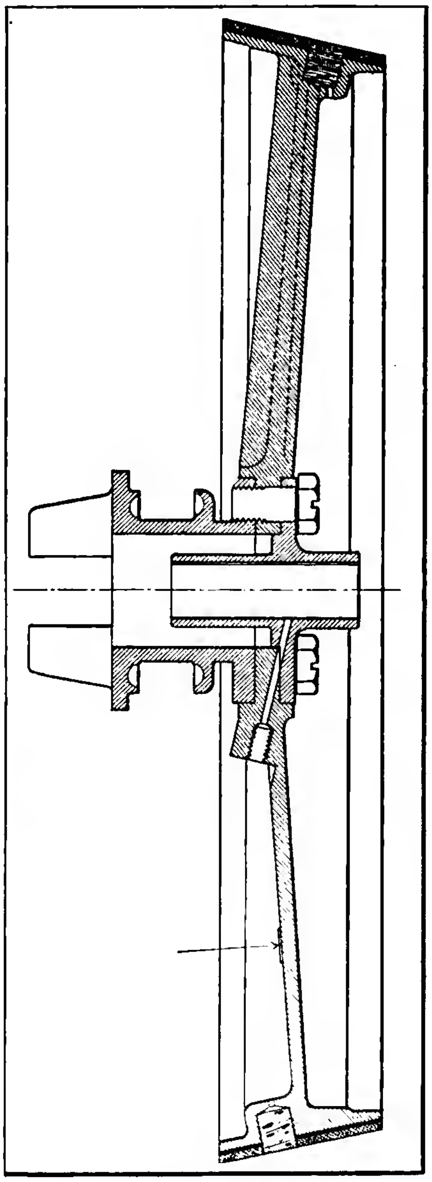


Fig. 1—Illustrating a leather-faced cone clutch with cork inserts

Deterioration, Considering Cone Clutches—If a clutch of the cone type has been properly designed the only points where deterioration will be manifest will be at the leather facing and at the bearing surfaces of the male member where it revolves on the shaft. The leather may have become hard or charred because of slipping that has caused the facing to heat. The spring that holds the parts into engagement may be broken or weakened and this will be sufficient to cause trouble even if the facing is in perfect condition.

Any wear at the bearings will cause the cone to sag when the spring pressure is released and will cause dragging as the parts are still in partial contact. If the leather wears so that the rivets holding it to the cone bear against the frictional surface of the other member, the clutch will slip and the surface may become cut or roughened by the abrading action of unlubricated metals in contact. Two of the most common clutch troubles are harsh engagement as one extreme and slipping as the other, and if the facing appears to be in the proper condition, that is, not charred or worn too much, it will be a comparatively easy matter to make a remedy. Slipping is caused by the frictional material becoming coated with lubricant, reducing the coefficient of friction to a low point.

Under these circumstances, the pressure of the spring may not be sufficient to maintain the parts in proper contact. This surplus of oil may be observed by various substances, the most efficient being fuller's earth, well rubbed into the surface. If the clutch cone is in place this material may be inserted with a small bellows such as used for injecting insect powder in inaccessible places.

It is sometimes possible to place enough of this material on a card or piece of paper to apply it to the surface through the space left between the cone and the outer member when the former has been fully disengaged. Borax has been used with good results but never use rosin, which is often advised by the armchair expert, for while it may work very satisfactory for a time, should the clutch slip it will melt, and rosin in liquid form acts as a lubricant, and the effect is worse than before it was applied, acting the same as though the leather had been oiled.

Causes of Harsh Engagement—If a clutch of the leather-faced type is engaging too harshly it is due generally to the leather becoming hard and dry, and not yielding when brought into frictional contact with the co-acting metal surface. To secure gradual acceleration the clutch leather should be soft, that is, it should

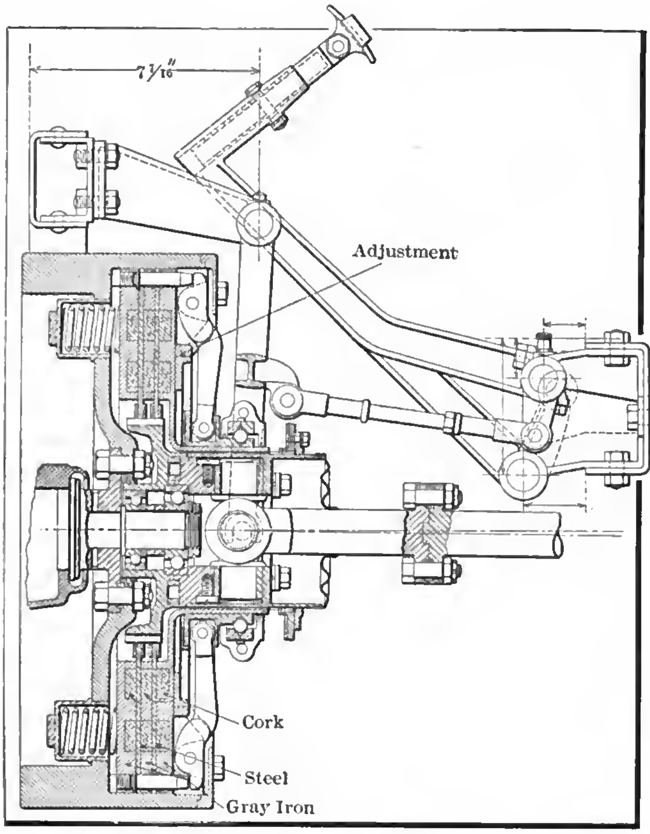


Fig. 2—A five-plate clutch of steel and iron, with cork inserts in the iron plates

have sufficient elasticity to yield slightly before becoming fully engaged. If the leather facing is not charred or worn unduly, being merely hard, it may be restored by rubbing a small amount of either neatsfoot or castor oil into it, which will soften it and make it more elastic if hard because of the natural oils drying out.

Kerosene oil may be used in a pinch, and the writer has often had occasion to use this material on the road when the others were not available, taking this from the lamps. Never allow a clutch to slip, as a slightly harsh member is to be preferred to one that will not drive properly. If slipping is evidenced and allowed to continue, the frictional facing of the male member, especially if of leather, will harden or the surface become glazed over, or so heated that charring and resulting destruction will follow and involve more or less costly repairs.

In the event of the surface becoming glazed, it can be roughened up with a piece of coarse sandpaper or a rasp. Among the good features of kerosene may be mentioned that it acts satisfactorily as a clutch-leather dressing, as it has very little lubricating qualities and while it will keep the leather pliable it will not increase the coefficient of friction existing between the surfaces as will either of the lubricants or heavier oils mentioned previously.

This liquid has the additional advantage of penetrating the surface quicker than the heavier oils, and is not so liable to gum or hold other oil. Many authorities advise the motorist to clean out the clutch leather with gasoline in event of slipping, but this practice cannot be too strongly deprecated. This treatment will harden the leather, and will induce the opposite condition to slipping, which is equally undesirable. If the slipping is due to lubricant, absorb it with fuller's earth.

How to Cure Slipping Due to Weak Springs—Slipping, due to weakening of the springs, may be remedied by the substitution of members of greater strength or by increasing the degree of tension of the weak spring if some method of compensation or adjustment is provided. Where the leather or other frictional facing is worn too much, the member may engage so deeply as to bottom against the flywheel, in which event slipping is inevitable. The only remedy is fitting a new leather, and while mechanical skill is required to properly fit a new facing, it is not difficult or beyond the ability of the average individual.

If the old leather is not broken or torn it may be removed intact and used as a pattern to cut the new one by, though when it is necessary to reline the cone, the old leather is often removed in fragments. Should this be the case the correct shape for the new facing may be determined by cutting a pattern from stiff wrapping paper, or a simple process of laying out will save much time and stock in cutting the material to the proper size before fitting.

An old dodge often used by the experienced repairman is to take a large sheet of paper and lay out the clutch-cone section to exact size, being sure that the faces are at proper angle and a proper distance from the center line. Draw a long line through the center of the hub and continue the angle of the cone by straight lines meeting on this center line.

Use the point thus obtained as a center and the distances from the outer edge of the cone to this point as one radius and from the inner edge of the cone to the point as the other radius, then describe two arcs which will be of concentric circles and will be as far apart as the width of the cone along the angular face. The circumference of the cone at both the outer and inner edges is then obtained, and one-half thus ruled off on the arcs described at either side of the central line drawn through the clutch hub.

The amount ruled off the larger arc must equal a little more than the larger circumference of the cone, while that ruled on the inner arc must equal a little more than the smaller circumference. This is advisable because it is well to make the strip a little longer and allow for fitting. The pattern thus obtained my be used to cut the new leather.

Opinions Differ as to Oiling Leather—Before riveting in place the leather should be made as pliable as possible with oil, though there exists some difference of opinion among repairmen regarding this practice. Some advocate soaking the leather in water and applying it wet, that when it dries it will shrink closer to the cone, while others apply it dry and oil it after it is in

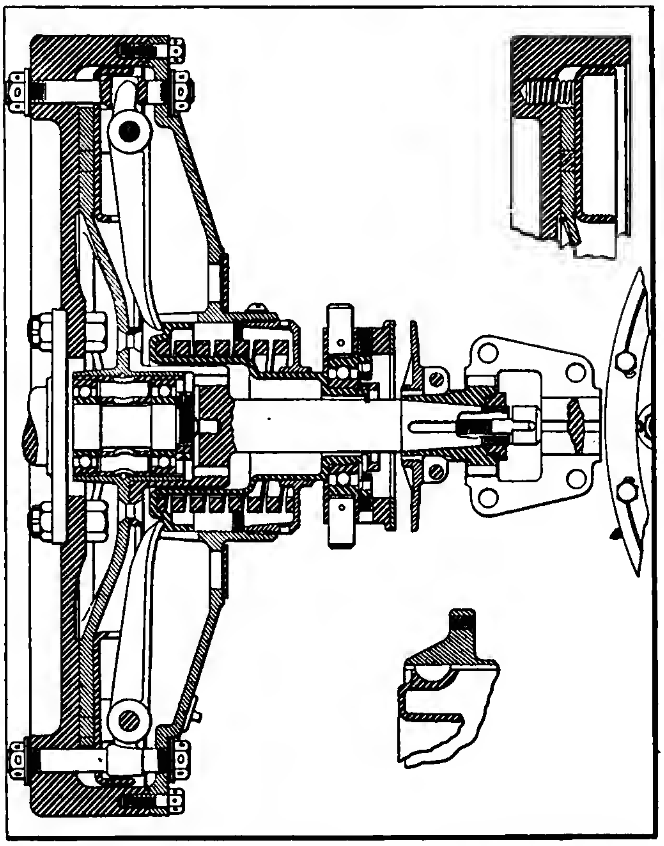


Fig. 3—High power three-disc clutch of unusual diameter and very simple

place. The writer does not favor wetting the leather, as after it is in place and shrinks it often pulls away from the rivets and when applied dry and oiled after the cone has been surfaced it will be liable to bunch between the rivets.

When the leather is oiled before application with either neatsfoot, castor oil or even kerosene, it is soft, pliable and elastic and if properly fitted there will be no trouble in the leather either becoming too loose or so closely engaged around the cone that it may burst from its fastenings.

The actual process of fitting will vary with the ideas of the mechanic doing the work, though as good a method as any consists of placing the leather in position at one end, holding it in position by small clamps. The holes may be then drilled and the leather riveted in place, care being taken that the rivet holes have a countersink deep enough so that the head of the rivet will come well below the surface of the leather.

After one end is firmly secured, the leather is pulled around the cone to the next point of fastening, the facing being kept in a taut condition by a clamp while the holes are being drilled for the second set of rivets. This operation is repeated from one point to the other all around the circumference of the cone. Fitting the facing in this manner insures that it will hug the cone closely instead of bunching up between the rivets as is the case when all the holes are drilled into the leather at the same time.

When the facing is applied the cone should be swung in a lathe and the surface of the leather trued by taking a light cut of its surface with a cutting tool, or the high spots may be rubbed off by hand with coarse sandpaper, glass or a coarse file. The best material for cone facing is good oaktanned leather, such as used for belting, though hemlocktanned has often been used. The writer has found that the former material possesses most of the qualities of elasticity, durability, and frictional adhesion required.

Sometimes a clutch will engage harshly and if the leather face seems to be in good condition, it may be well to see if the small spring members, often placed under the leather facing, are in proper condition and that the surface is raised at spots, as it should be to secure gradual engagement.

Old Clutches May Be Improved, Using Surface Springs—Many cars of old pattern do not have these springs and the clutch action may be improved by fitting appliances of this character. The small flat springs inserted directly under the leather surface are not satisfactory in general application, the preferred method being to use small plungers or member that will depress flush with the surface of the cone when the pressure is applied. The small flat springs under the surface are liable to break or lose their elasticity after continued use.

There has been considerable interest in the application of cork inserts in clutch members to eliminate harshness, as well as increasing the power transmission qualities without increasing the dimensions of the friction surface. They are of obvious value and the writer does not hesitate to commend their use wherever practical. There are instances where this material has worn, however, and the good qualities lost. In such an event replacement is the only remedy and as new corks are inexpensive, there is not much excuse for failure to apply them at once.

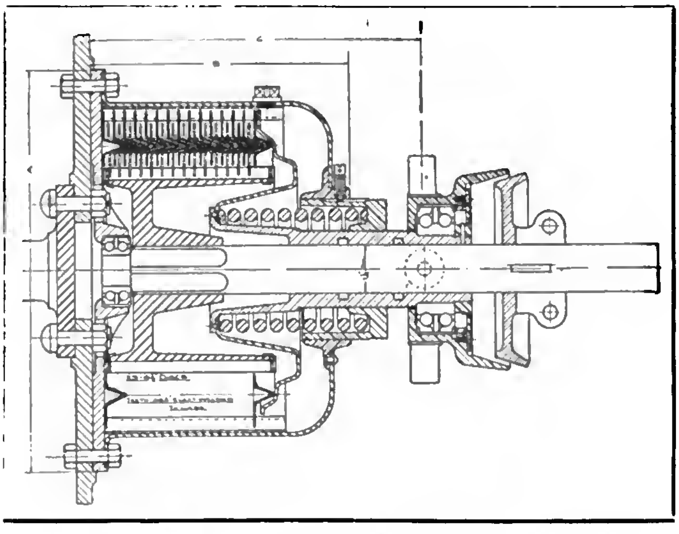


Fig. 4—Multiple disc clutch of the Hele-Shaw type, readily accessible

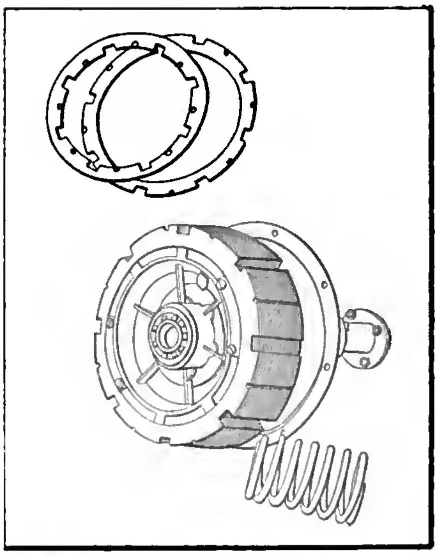


Fig. 5—Another multiple disc clutch but of the flat plate type

Some Common Causes of "Spinning"—The writer knows of no more annoying condition than continued rotation of the clutch parts when the spring tension is released, this being known as spinning. This may be due to natural causes, such as inertia due to the use of clutch members of considerable weight and diameter, but it is often caused by derangement of the parts.

If the bearing in which the transmission shaft telescopes runs dry, or that on which the cone revolves when disengaged is not properly oiled or seizes, the male member will continue to spin, even when disengaged. When the clutch is dismembered it will be well to examine the shaft for any roughness, see that the oil holes are clean and allow the lubricant to reach the bearing parts.

A sudden road strain often produces enough distortion of the frame to cause a slight disalignment between the members of the clutch, especially if joined to the gear box by a mere telescopic or sliding joint which does not permit of universal action. Again, if the bearing or bushing in the cone hub is worn unduly the member may sag and remain in contact with the female portion. A ball-thrust bearing may become tightly bound because of a broken ball or particles of foreign matter which will cause the motion of the engine to be transmitted to the male member by the clutch spring. If the trouble is produced by natural causes it is not difficult to fit small brakes which will be interacting with the clutch pedal and act as a retarding medium to resist continued rotation due to inertia.

For relining the cone the suggestions given will apply as well to any other form of clutch which uses leather as a frictional material. An example of clutches of this class are the internal-band clutch, which has been fitted to a number of prominent cars in the past. In most cases, the leather facing wears more rapidly than on the cone and is more susceptible to the effects of lubricant on the surface.

A feature of these is that means are provided for compensating for wear of the frictional material, though adjustments must be made with care or they will drag. In event of slipping because of surplus oil, the same attention should be given as in the cone. As is true of the form previously discussed, harsh engagement is due to the leather surface being hard, and slipping will cause heating and deterioration of the drum facing.

If necessary to reline the steel band, it is removed from the aluminum cylinder and the leather applied in the conventional manner, and as the surface is parallel with the shaft there should be no difficulty in fitting a new strip when needed. After this is riveted to the band the latter is replaced on the drum and the leverage coupled so that the steel band will hug the outer periphery, and the entire assembly is then placed in a lathe on

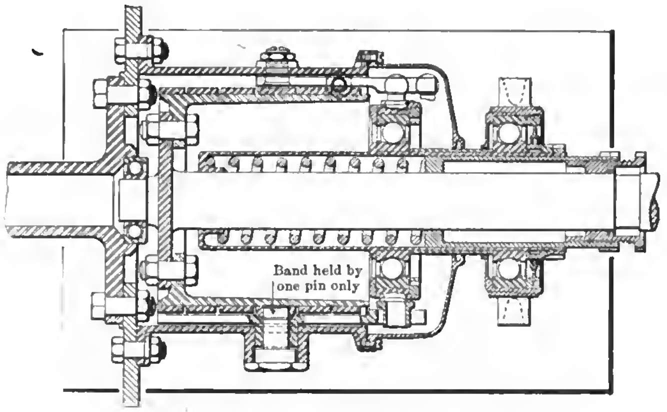


Fig. 6—Wrapping band clutch on a hardened steel drum with means for take-up

centers and the outer surface of the leather is trued and smoothed. Special care should be taken in applying the rivets, as in the form previously considered. The leather should be pliable and soft.

Multiple Disc Much Used Nowadays—Many modern cars are fitted with multiple-disc clutches, the plates in some cases being entirely of saw-blade steel; in others of a combination of different metals, such as steel to bronze, etc. It is well to take a construction of this kind apart and carefully examine the condition of the plates. These should be perfectly smooth and clean and the co-acting surfaces free from roughness, cuts or scratches. A most common cause of slipping with this form is caused by distortion of the thin plates because of becoming heated by continual slipping, which may be caused by abuse of the driver or to weakness of the spring maintaining contact between the parts.

Too harsh engagement is caused by lack of lubricant, excessive spring pressure, presence of carbon or roughness of the surfaces. Spinning is promoted by seizing between the plates due to either the burnt or gummed lubricant between them, the weakening of the small springs designed to hold the plates apart when the spring pressure is released, or the attraction or adhesion of the plates to each other because of too thick oil between them.

In many cases, distortion of the plates is caused by internal stresses in the material because of the rolling, which can only be removed by annealing the discs and straightening them on a surface plate. If on examination it is found that the interior of the clutch is blackened, there is not oil present and the plates have seized because of lack of lubricant, the clutch should be disassembled, the plates separated and the scored or cut surfaces smoothed with a surface grinder or by hand, using fine emery cloth.

More Care in Selecting Oil for Multiple Disc—It is imperative that only a good grade of medium or light cylinder oil be used in any multiple-disc clutch, as the inferior oils or those of too great viscosity will gum and carbonize because of the heat, and in either case they are valueless. If a multiple flat-plate clutch drags, one may suspect the use of unsuitable oil. In types where the pressure is maintained by a spring acting against a ball-thrust bearing it is imperative that this component be maintained in condition and well oiled at all times. In many cases, faulty clutch action has been due to conditions existing outside of the clutch, such as wear at the various points of the operating mechanism and defective adjustment of the linkage.

As the type of control differs with every car it is not possible to suggest other than general instructions. Many cases of failure of clutch to release have been traced to poor adjustment of the interlocking levers and rods, for instance, a worn shifting collar or yoke often hinders disengagement, as the clutch pedal may be fully depressed without materially releasing the spring pressure maintaining the members in contact.

Small pins are often worn to half their diameter and the holes in which they are designed to fit are worn oval, considerable play being evident. If this exists at several points it may amount to considerable and the lost motion not only produces rattle, but makes proper operation of the clutching mechanism impossible.

Failure of clutches to engage properly has been caused by faulty adjustment of the interlocking leverage, where the emergency brake lever acts upon the clutch, disengaging it when it is applied. Often an incompetent person will compensate for wear by shortening or lengthening the brake-operating rods, and this may have the effect of throwing out the clutch mechanism slightly, and an unexplainable slipping will be caused because the interlocking connection holds the clutch partly out and does not permit of the full spring pressure being exerted.

This is a small but important point, which amateur drivers should bear in mind when having clutch trouble, which seems to need an explanation, or in cases of inexplainable trouble which cannot be traced to any other source. Remember this point.

Notes on Alloy Steels Used in Automobiles

WONDERFUL stimulus has been given the metallurgy of special steels by the demands of automobile construction and constructors. The extent of this demand, and the ready response of the steel makers, together with some notes of the resulting product, were all given space in an English article on this subject which appeared some months ago. This is given herewith, or, rather, extracts from it are given, in the hope of being useful to some members of the automobile profession on this side.

The heavy moral responsibility which rests upon both the maker and user of alloy steels and the tremendous duty expected of these materials of construction—lightness without sacrifice of toughness or strength—tend to make the requirements of the motor trade most exacting. It is inconceivable to the mind how any firm can conscientiously put out a car and not know intimately the materials used in every essential part. Yet such is frequently the case. For example, nickel steel is asked for. Now, nickel steel is a delightfully variable and uncertain quantity as ordinarily made. There are of nickel steels at least fifty-seven varieties, and the user should know what kind of nickel steel goes into his gears and who makes the steel, as well as the gears.

Dr. Guillet, the distinguished French metallurgist, has pointed out that the constitution and mechanical properties of nickel steel depend essentially upon the sum of the carbon and nickel. From past experiences should be added to this sum the manganese. One hears continually in the trade nickel steel referred to solely by its percentage of nickel. Such expressions possess no real significance as a measure of quality or adaptability for various purposes. It is the skilful blending of the elements—carbon, nickel and manganese—that counts. The successful accomplishment of this is a fine art.

Almost as bad as not specifying at all is the tendency upon the part of many buyers to tell the maker how he ought to make his steel; to specify chemical analyses and physical tests which are a misfit, and to make the wording of the specification a place to show how much they know, as well as to display a mental attitude of favor or antagonism to any of the parties affected by it.

Without attempting any scientific classification of alloy steel, or enumerating all types that have been used at home and abroad, the principal types will be described as briefly as possible, utilizing only those which have been used freely in the automobile business in the last two or three years.

ANALYSIS OF NICKEL STEEL

Nickel steel is perhaps the most generally used of the alloy steels. The analysis usually desired, but not always attained, is: Carbon, 0.20 to 0.25; nickel, 3.50; manganese, 0.60 to 0.90; sulphur and phosphorous, not over 0.04. With the proportions of carbon and nickel stated, manganese ought never to exceed the limits mentioned. A slightly lower carbon is sometimes used for case-hardened purposes, and a higher carbon is much used for crankshafts. With higher carbon I should prefer lower manganese. A small quantity of 5 per cent nickel steel is used in about the same carbons. With reasonable care, nickel steel can be made uniform, physically sound, and free cutting.

It has remarkably good mechanical qualities when subjected to suitable heat treatment, and is an excellent steel for case-hardening.

In machining qualities it is usually accorded first place among the alloy steels. When extraordinary care is used in its manufacture, and it is not made in too large heats or ingots, and when piping and segregating are avoided by confining the finished product to that produced from the bottom two-thirds of the ingot, we have an admirable product for many purposes.

CHROME-VANADIUM STEEL ATTRACTS

Chrome-vanadium steel in a profusion of types has of late attracted the attention of automobile engineers. The chrome-vanadium alloys are preferably made in the crucible or electric furnace, although the open-hearth process is also much used for the purpose. The open-hearth product, I believe, is somewhat uncertain, and while, for example, an open-hearth chrome-vanadium spring steel may be better than plain carbon-crucible spring, it is not to be compared with genuine crucible chrome-vanadium steel when properly melted. For excellent quality, this product constitutes the highest attainment of the steelmakers' art.

These alloys are in general made in a high carbon type, suitable for oil-hardened gears and springs, and in several low-carbon types, such as a case-hardening type for gears and a type suitable for oil quenching, followed by annealing for axles, shafts and steering knuckles. By judicious blending of chromium and vanadium and adjustment of the manganese and carbon one cannot only obtain all static properties that can be obtained from nickel, chrome nickel or silico-manganese alloys, but in addition obtain dynamic or anti-fatigue qualities far in excess of those displayed by any other alloys.

From a wide experience with all types of alloys, it is my opinion that where a better material than the best nickel steel is needed, and especially when dynamic excellence is sought, the appropriate types of vanadium-chrome steels may be unreservedly commended. They forge well and machine more readily than chrome-nickel steels of corresponding carbon percentages.

CHROME-NICKEL STEEL PROPERTIES

Chrome-nickel steels are usually made in a high and a low carbon type. The former is used for the oil-hardened gears and springs, and the latter for general structural purposes, such as axles, shafts, forged parts, and for case-hardened gears. The high-carbon type carries about 1-2 per cent of carbon, and the low-carbon alloy 1-4 per cent; the nickel as supplied by various makers varies from 2 to 3 1-2 per cent, while chromium from 1 to 1 1-2 per cent is usual. A nickel-chrome tungsten steel is sometimes used for springs. In general, nickel-chrome steels possess excellent static qualities, but the difficultics in heat treatment, forging and machining lead one to prefer the other type of alloys mentioned. Equally good physical characteristics can be obtained more cheaply in first cost and in shop costs from nickel or chrome-vanadium alloys. I shall speak later of the relative merits of these steels for oil-hardened gears and springs.

Silico manganese and silico chrome in medium carbons have had considerable popularity abroad for springs and gears. They also are made in low carbons. Their relatively low cost favors their use but their feeble resistance to shock and sensitiveness to heat treatment limit their use. When handled with great care they give good results in works well equipped for obtaining accurate results in their heat-treating operations.

Chrome steels in high carbons are much used for balls and ball races.

TUNGSTEN STEEL FOR MAGNETOS

Tungsten steel of special analysis is universally used for making magneto magnets. All statements and opinions to the contrary notwithstanding, the magnet steel now made in this country is rarely equaled in quality by foreign products. If foreign magnetos are superior to domestic ones it is because of their mechanical construction, and not because they possess, in general, better magnets.

The best alloys are none too good for automobile construction. When one has secured the best the market affords, the first step only has been taken to produce good parts. Next come the forging and machining and the heat treatment, for better or worse. It is money wasted to buy good alloys unless one is willing to study them sufficiently to know how to treat them and then to supply adequate facilities for so doing. It is not to be expected that small users will install complete testing laboratories, but a few pounds invested in having occasional tests made will be well spent. There are, however, many large concerns that could, and should, spend, say, $5,000, for which it is believed the whole, or a large part, of the following equipment could be obtained: An (ordinary) tensile machine, a microscope, electrical or gas furnaces capable of fine regulation, and a good pyrometer, preferably self-recording. The tensile machine can also be used for making Brinnell hardness tests, spring-deflection tests, etc.

In addition to these, some form of drop-testing machine, such as the Fremont, will be found valuable; a vibratory or repetitive impact test is nowadays considered a necessity; while cold-bending and torsion apparatus is useful. This equipment will be of small use unless a careful, conscientious man of sound judgment be put in charge.

The pyrometer is too often supposed to take care of itself. Too frequently it is never questioned, never calibrated. The best pyrometer of the thermo-couple type should be looked over at stated intervals, especially if in constant use. Protecting tubes should be frequently examined and renewed, and electrical contacts looked over, and occasionally the milli-voltmeter also should be tested. If one cannot afford a good pyrometer let him stick to the trained eye of a skilled man, but if he has a good pyrometer let him employ a skilled man. With it one can at least give orders in temperatures rather than in heat colors, and the laboratory and works can meet on an intelligent basis. Heat-treatment operations depend upon a solid scientific basis. By this I do not mean that steel essentially of inferior quality should be made to pass muster by heat treatment. On the other hand, however, it might be said that alloy steel in its so-called natural state, as it comes from the rolls, hammer or drop forge, is almost unfit for motor chassis construction.

DYNAMICAL EFFECT OF ALLOYS ON STEEL

Steel which depends upon alloys for a high elastic limit in its natural condition will have much less elongation than the same steel oil-tempered and annealed. For example, a chrome steel gave in its rolled condition 158,000 pounds elastic limit and 5 per cent elongation, with 9.4 per cent reduction of area.

The same steel oil-tempered and annealed gave 153,000 pounds elastic limit, 14 per cent. elongation and 52 per cent, reduction of area. In other words, the material was transformed from brittle to tough, from treacherous to safe, without materially affecting its elastic limit. A nickel steel similarly treated had its elastic limit raised 20 per cent., with the reduction of area improved and its elongation unchanged.

CASE-HARDENING VS. OIL-HARDENING

In the automobile trade there have existed two schools, so to speak, one believing in the case-hardened type of gear, and the other in the oil-hardened type. As previously mentioned, the chrome-vanadium, chrome-nickel and silico-manganese alloys are made in both high and low carbons. The former contain about 0.45 to 0.60 per cent carbon and enough other hardening elements, so that by merely quenching in oil from a bright red heat a surface hardening is produced sufficient for ordinary wearing purposes, while the hardness does not penetrate deeply into the gear, but leaves a core that is tough and strong.

The low-carbon alloys, with about 0.20 per cent carbon, require to be carbonized or case-hardened in order to produce sufficient surface hardening for wearing purposes after hardening. Several years of observation and contact with the motor trade lead me to prefer the case-hardened gear.

CONCLUSIONS FROM TESTS DATA

The result of direct tests upon thousands of gears of both types leads me to the following conclusions:

(1) The static strength of a case-hardened gear is equal to that of an oil-hardened gear, assuming in both cases that steel of the same class and appropriate analysis has been used, and that the respective heat treatments have been equally well and properly conducted.

(2) Direct experiments proved that the case-hardened gear resists shock better than the oil-hardened.

(3) As regards resistance to wear, the same type is incomparably better, although perhaps not as silent in action.

One of the leading makers of gears has proved this to his own satisfaction of late by an arrangement of shafts and gears whereby energy is transmitted through two case-hardened gears, in mesh with each other, to two oil-hardened gears. The gears are of the same size. The conditions of the test were severe. Five sets of the oil-hardened gears have already been worn out, while the original case-hardened gears are still in service, and show the tool marks.

Many people have a strong objection to case hardening. In most cases this is doubtless due to the fact that the operation of case hardening has not been reduced to a science. The depth of the "case" and the relation of same to the core; the time and temperature to produce certain results and the exact control of these conditions, together with an accurate knowledge of the material to be treated, are factors that enter into successful case-hardening practice. Points in favor of this method are easier machining of the blanks, and at least equal static and dynamic properties with less chance of injury in hardening.

BILLET-CUT GEARS VS. DROP-FORGED BLANKS

Parts like spur gears, bevel pinions and many shafts may either be drop-forged or cut from bars in automatic machines. Contrary to general opinion, many parts can be machined out of bars as cheaply as they can be from forgings. Moreover, I am firmly of the opinion that no steel is improved physically by drop forging, some steels, however, being less susceptible to injury than others.

In good steel-mill practice great attention is paid to proper finishing heats, and steel is brought gradually to size. In drop-forging work, in order to give sufficient plasticity to assume various forms in dies, it must be heated very hot. It is then frequently formed with the fewest possible blows. An investigation of drop-forged and bar-cut gears, the former being the product of one of the foremost drop-forging companies, showed, as the average of many tests, that under static test the bar-cut gears were fully 25 per cent. stronger, and their resistance to shock test was also much better. The difference cannot be exactly stated in percentage.

CASE HARDENING A SCIENCE

In reference to the proper procedure in case hardening, Dr. Guillet says:

As is well known, the operation of case-hardening consists of placing a steel in some medium capable of imparting carbon to it, at a suitable temperature. After a sufficient interval a steel is obtained the interior of which possesses the same percentage of carbon as before case-hardening, but the exterior of which is much higher (0.80 to 1 per cent.).

On quenching such a steel an extremely high degree of mineralogical hardness is obtained on the surface, while the center of the piece is non-brittle—that is, if the operation has been properly carried out. One generally uses steels containing 0.10 to 0.25 per cent. of carbon for case-hardening.

In order to avoid all brittleness in the interior and exterior of the piece, and at the same time to obtain a high degree of superficial hardness and a very regular degree of carburization (in carbon steels) it is necessary:

(1) To use a steel containing less than 0.12 per cent. of carbon, and with a low percentage of manganese (less than 0.30 per cent.); and

(2) To case-harden with a chemically definite material such as a mixture of 60 parts of charcoal and 40 parts of barium carbonate at a temperature between 1,550 deg. and 1,900 deg. F.—the higher the temperature the more rapid the case-hardening—and allow it, after the operation, to cool down just below the transformation point (about 1,100 deg. F.).

(3) To reheat the piece and quench it at 1,650 deg. F. (just above the transformation point of the center), this operation having the effect of rendering the center fibrous.

This operation has the effect of toughening the center, but the outside will be coarse-grained and brittle. The next operation, according to Guillet is:

(4) To quench for a second time at 1,475 deg. F. (above the transformation point of the exterior), to render the skin non-brittle.

In any case, the methods by which it is possible to obtain, with low-carbon steel, case-hardened pieces which shall not be brittle, are exceedingly delicate.

How different this is from the operation one too often sees, where the pieces are dumped directly from the case-hardening boxes into water!

HARDENING OF NICKEL STEEL

If one uses a good grade of nickel steel, low in carbon, the "case" hardens at appropriate temperatures. If one then takes the precaution to cool off in the boxes before heating for quenching, and then hardens at about 1,475 degrees Fahr., the results will be fully as good as, or better than, can be got by the most careful handling and double quenching of carbon steels. The saving in cost of the operation can be applied toward the greater cost of nickel as compared with case-hardening steel.

Better still, however, if nickel steel be used, is to give it a double quenching, too; then one obtains a really admirable product of extraordinary toughness and wearing qualities.

An ideal way of making nickel-steel gear consists in first annealing the blank, then rough machining, approximately, to size, and giving a light reannealing before taking the last finishing cut. Then pack in suitable mixture and carbonize to a depth of 1-64 to 1-32 inch, according to requirements, at a temperature of about 1,625 to 1,650 degrees Fahr. Cool in the pots, heat to about 1,500 degrees Fahr., and quench in hot brine or a calcium-chloride solution. This will put the core into excellent physical condition. Finally, reheat to 1,375 to 1,400 degrees Fahr., and quench in oil. The last operation will refine the grain of the case and harden it with best results.

It will be noticed that the temperatures for treating nickel steels are considerably lower than those advocated by Dr. Guillet for carbon steels. If methods like these be followed it is not likely that a very great difference would be noted between bar-cut gears and gears cut from drop-forged blanks.

In the case of medium carbon gears not to be case-hardened, but oil-hardened only, one would probably find a greater difference, and in this case we have no opportunity to restore the overheated forged blank by scientific heat treatment.

This, in addition to the greater chance of overheating and the greater difficulty of machining, also favors the use of case-hardened gears, assuming the case hardening is to be skilfully done.

MANGANESE SULPHIDE IN STEEL

To settle the question whether the dark gray substance, identified by Arnold and others in broken steel rails, is really manganese sulphide, as believed, Fay (according to *La Metallurgie*) prepared the sulphide by precipitation and incorporated it with iron in an electric furnace in such proportion that the mixture contained 0.08 per cent of sulphur. Under the microscope the metal exhibited the compound observed by Arnold. The greater part of the sulphur is retained by the manganese, the small remainder combining with the iron being disseminated through the mass of metal in the form of small grains which are uninjurious, so that a steel may contain up to 0.55 per cent of sulphur, and still be forgeable. On the other hand manganese sulphide is particularly harmful. the small particles elongating when the metal is rolled and forming starting points of subsequent fissures.

RECENT CLUB ACTIVITIES

A.C.A. GOVERNORS AND LAW COMMITTEE MEET

At a meeting of the governors and the law committee of the Automobile Club of America, held on the 11th inst., Congressman Olcott's bill, H. R. No. 1066, providing for federal regulation of automobiles engaged in interstate commerce or the postal service, was approved and its adoption by Congress urged.

With reference to proposed New York State legislation, the club has adopted resolutions favoring propositions as follows:

(1) An amendment of the existing law is preferable to the enactment of an entirely new automobile statute.

(2) A reasonable tax, based on horsepower, A. L. A. M. rules, is the fairest way of supplying revenue to the State.

(3) A reciprocity provision is desirable whereby cars owned and licensed in other States may be operated in this State under the home license, provided the home State allows cars owned and licensed in New York State to operate therein under the New York license.

(4) Professional chauffeurs should be required to take out a license. Owners should not be required to do so.

(5) The examination of owners of machines, or of chauffeurs with respect to their ability to run a car, is not practicable in such a way as to be productive of any useful results, but

(6) All licenses to whomsoever granted should be subject to suspension or revocation by some State authority either upon the recommendation of any Magistrate before whom the offender has been tried or upon its own volition whenever, after examination, any holder of a license is found to habitually operate in a way to endanger the life and safety of others.

(7) All license fees and fines and penalties collected for any violation of the law should be transmitted to the State Treasury within a reasonable time, and the proceeds of all license fees and penalties should be used by the State for the maintenance of its improved highways.

(8) The identification of cars should be made easier by enlargement of the number, from 3 to 5 inches in height, and by a requirement that at night the tail light should be so adjusted as to illuminate the number plate.

(9) Reasonable speed in lieu of arbitrary limits is still the desideratum.

(10) Any charge for registration designed for revenue should be collected on the ownership of the car, and be independent of the license fee required of drivers, which should be retained in a figure sufficient to pay the cost of issuing the same.

(11) Penalties should be measured to some extent by the violation, and in trivial cases should be supersedable in the Magistrate's discretion by an admonition.

(12) The function of bail is not punishment of an offender, but solely to insure his attendance in court when required; except in cases of accident, bail should not exceed $100 in amount and should be a matter which the Magistrate may dispense with, and, except in cases of accident, the Magistrates in the city, as well as in the country, should dispose of the case forthwith and summarily either by the imposition of a fine or by acquittal.

(13) Arrests in trivial cases should be superseded by a provision for service of summons or notice.

PHILADELPHIA LADIES' CLUB INSTALLS OFFICERS

PHILADELPHIA, Feb. 21—This "City of Automobile Clubs" has just witnessed the installation of the officers recently elected to guide the destinies of the Quaker City Ladies' Motor Club during next twelvemonth. They are: Mrs. Joseph J. Martin, Jr., president; Mrs. William Ingram and Mrs. Charles Snyder, vice-presidents; Mrs. H. B. Finck, secretary and treasurer, and the following board of directors: Mrs. Mary Martin; Mrs. Charles Murtha, Dr. Chatharine Sweeney, Mrs. David Ward, Mrs. O. W. Schaum, Mrs. M. L. Wallace, Mrs. Richard Filbert, Mrs. C. Kugler, Mrs. Stoerr and Mrs. Herbert Reading. The club's cozy quarters at the Hotel Majestic were tastefully decorated for the occasion.

CAMDEN, S. C., WANTS AN AUTOMOBILE CLUB

CAMDEN, S. C., Feb. 21—Dr. John W. Corbett and a number of other autoists at Camden, S. C., are making an effort to organize an automobile club. Camden and the country around has a goodly following of autoists, and that the venture will turn out to be a success is now assured. The question of association with the A. A. A. is also to be taken up, and it is the intention of the autoists around Camden to make a progressive campaign for good roads, equitable laws, and such other conditions as will add materially to the benefits which the automobile is bringing to the South.

LOUISVILLE CLUB WANTS MEMBERS BADLY

LOUISVILLE, KY., Feb. 19—Four hundred members by May 1 is the slogan of the Louisville Automobile Club. At present there are 343 members, and it is not expected that any great difficulty will be experienced in securing the additional members.

Officials of the Louisville Automobile Club returned from Chicago with the assurance that Louisville is to be included in the itinerary of the Glidden tour this year. The whole South is looking forward eagerly to this event, and it is expected that it will cause a great boom in automobiling in this district.

LAW AND THE AUTOMOBILE

COLUMBUS WANTS STATE LAWS BEFORE NATIONAL

Columbus, O., Feb. 14—At a special meeting of the Columbus Automobile Club a strong sentiment developed against the enactment of a federal registration law, such as is asked for by many members of the A. A. A. Discussion was produced showing that a federal registration act would benefit a comparatively small number of autoists, but that more benefit could be gained by working for uniformity in State automobile laws. To that end the request of the A. A. A. was laid on the table.

Secretary of State Carmi A. Thompson of Ohio has been invited to make an address at the convention of the National Automobile Owners' Association, to be held in Washington, D. C., February 15 to 17. At that time he will express the views of auto owners of the State on a federal registration act.

A large number of the members of the club are strongly opposed to having a race meet this year, as all meets in the past have proven failures financially. Some will make an effort to arrange a 24-hour race, however.

The show committee reported that 12,598 people were admitted to the automobile show and that the receipts from admissions and show space were $10,049.71. The expenses were $9,110.51, leaving a balance of $939.20. It was decided to hold another show next Winter. Plans were laid for an orphans' day, and a larger number of cars than ever before has been offered, so that the outlook is very favorable.

WAYNE COUNTY LEADS MICHIGAN IN STATE ROADS

LANSING, MICH., Feb. 21—A total of $381,455 has been expended by the State as rewards for the construction of county roads since the establishment of the State Highway Commission in 1905. The commission states that a total of 522 miles of State road have been built in the past four and a half years.

Since July 1, 1909, 160 miles have been built, making a total of nearly 400 in the entire past year. The majority of roads are constructed of macadam, the most expensive material, and the remainder are of stone and gravel. The fact that this is so is encouraging to the commission and proves that the counties are decidedly in favor of the best roads. Sixty counties are on the State reward list. The remaining counties have not yet applied for the privilege, but there are numerous applications on file for the building of new roads next Summer from these counties.

In the past fiscal year $116,604 has been paid by the department in State rewards. The average cost of building one mile of macadam road is $3,800; of gravel roads, $1,700. The State reward for one mile of macadam road is $1,000. For one mile of stone and gravel $750 is paid, for one mile of gravel road $500. and for one mile of clay gravel road $250. Those counties building the most roads under the State reward law are: Wayne, Port Huron Township, in St. Clair County, Saginaw, Bay, Grand Traverse, Manistee, Mason, Muskegon, Oceana, Kalamazoo, and all through the upper peninsula. In Kalamazoo preparations are being made to build 32 miles of State road in the coming Summer. In these counties the roads are almost without exceptions constructed of macadam.

WASHINGTON STATE PLANS A LONG TRUNK ROAD

SPOKANE, WASH., Feb. 11—Eleven hundred miles is the total length of the State trunk road planned for Washington by Governor Marion E. Hay, who was at Spokane conferring with officers of the Spokane County Good Roads Association, January 19 to 21. The road is designed to serve 75 per cent. of the population of the State, now estimated to be near the 1,250,000 mark, and will touch 11 cities, also taking in a large number of smaller towns between Spokane and Puget Sound.

The legislature appropriated $640,000 for state roads in 1909, but the money was spent in various places in the State, where sections of the proposed State road do not join. This year a tax of one mill has been levied, and it is estimated, and with the assessed value of the State at approximately $900,000,000, this will bring in $850,000 at least for use in improving roads. With this amount on hand some definite plant for a continuous State road can be made.

The largest appropriation ever made before by this State for roads was $225,000. Seventeen appropriations were made for improvement of State roads in 1909, but in no instance were these roads connected. It is believed a route should be selected for a State road that would best accommodate the largest percentage of residents and then every effort be used in a continuous betterment of that routed road.

The route, as now planned, will pass through or near Bellingham, Everett, Seattle, Tacoma, Centralia, Chehalis, Vancouver, Walla Walla, Spokane, Wenatchee, Ellensburg and again to Seattle. A road following this route would accommodate 75 per cent. of the people of the State.

The Northern Pacific railroad has promised to give six miles of an old roadbed in the southern part of Lewis county for a State road which will be a considerable help.

ROAD BUILDING NEWS

LEGAL OBSTACLES TO ROAD BUILDING REMOVED

INDIANAPOLIS, Feb. 21—The indications throughout Indiana now are that there will be a general resumption of township road building under the township gravel road law. The law has just been declared constitutional by the Supreme Court, in a reconsideration of the case appealed from Hamilton County. Many contracts throughout the State were in progress when the former decision was handed down and these were stopped. County treasurers refused to pay money as interest on bonds issued in the past, and Boards of County Commissioners refused to consider further issuance of bonds under new contracts. The decision of the court removes all question of the validity of the act, and has the effect of placing the stamp of supreme legal approval on all acts performed under the law. According to the act an entire township may be taxed for the building of a free gravel road on petition of a majority of the land owners affected by a stretch of highway to be constructed or improved when petition is made according to law.

THOUSANDS OF FARMERS FAVOR ROADS

Representative of the remarkable progress in the campaign for better highways, 1,000 farmers and automobilists of western Kentucky are preparing to visit Mayfield, a thriving town in southwestern Kentucky, on Thursday, February 24, and march to the court house, where the fiscal court will be in session that day. The purpose is to ask the court to take immediate action in the way of building gravel roads in that section. The farmers offer to pay half the expense in work and subscription.

SHOW BREVITIES

LOUISVILLE SHOW SPACE ALL TAKEN NOW

Practically all of the space has been taken for the third annual automobile show of the Louisville Automobile Dealers' Association, and it is expected that more space will be applied for than is possible to furnish. The exhibition will be held in the First Regiment Armory, March 17, 18 and 19. The committee in charge of arrangements have many details yet to work out, but it is announced that the display of motor vehicles will rival those of larger cities. The displays will be so arranged that those seeking information about cars they propose to buy or even concerning machines they own can be gained without the least amount of trouble or delay.

The building committee has hit upon an unique plan for arranging the floor space, and one which is declared satisfactory to all prospective exhibitors. The main aisle instead of running through the middle of the big building will take the form of a rectangle and enclose 12 large spaces. This central division will run from the main entrance, on the south, to within 15 feet of the balcony line, on the north. To the east and west of the broad aisle surrounding these central spaces will be located all other spaces for the display of automobiles. This arrangement gives every exhibit equal prominence. The north end of the armory will be reserved for the exhibits of accessories. It is expected that more than 100 cars representing practically every important type of car will be represented.

EQUITABLE CONSTRUCTION OF LAW OF REISSUE

JUST at this time, when the atmosphere is clouded by many issues, and the patent situation is uppermost in the minds of the men who have to do with the automobile and its ramifications, legal issues will be exploited in the press and many of the ideas which will be advanced will apparently be in conflict with each other. In the long run, the law of common sense, which is the under strata of common law, will have much to do with the settlements which will have to be made and subterfuge, while it is frequently embellished with gay plumage, rambles around sad at heart, realizing the while that the cold hard facts will serve as a stone wall and arrest further effort.

At this time it is believed that the question of reissue will be of the greatest value, and while it has divers angles, each one of which may have to be considered, for the present it will be enough to quote Renwick on patentable invention, page 151, paragraph 106:

"From the considerations previously set forth it would appear to be but just to the inventor and patentee that the construction of the law of reissue should be substantially as follows:

"1. That a patentee who holds a patent that is inoperative by reason of a specification defective or insufficient to protect the full real invention made by him previous to the date of filing his application for the original patent, or who holds a patent that is invalid by reason of his claiming as his own invention or discovery more than he had a right to claim as new, may legally apply for a reissue thereof with either an enlarged claim (in the former case), or with a reduced claim (in the latter case), and at any time within the term of the patent, provided the error has arisen by either inadvertence, accident, or mistake and without any fraudulent or deceptive intention; and provided further that the delay in making the application for the reissue is not unreasonable under the circumstances of the particular case.

"2. That the invention described and claimed in the reissue of the original patent is not to be restricted to merely the same invention which is claimed in the original patent, or even to identically the same intention which is set forth in the descriptive text of that patent, because either or both may be defective or insufficient; but is to be the same invention which the patentee invented or discovered as provided in section 4886 of the patent law as the condition precedent to obtaining the original patent.

"3. That if the thing correctly described and claimed in the reissue patent is found described in the descriptive text of the original patent, or is represented in the drawings thereof, or is embodied in the model or in the sample which the patentee filed in the Patent Office with his application for the original patent, either fact is conclusive evidence that the thing so claimed in the reissue is 'the same invention' specified in the statute for which the reissue may be legally granted; provided it was new as respects the state of the art, and was original with the patentee at the date of filing his application for the original patent.

"4. That the provision of the statute prohibiting the introduction of 'new matter' into the corrected specification of the reissue does not prohibit the introduction of matter which was omitted from the descriptive text, or from the claims of the original specifications, or from the drawings, by inadvertence, accident, or mistake, and without any fraudulent or deceptive intention, when such matter is found in either the model or sample, or in the drawings, or in the descriptive text of the original patent or of the application therefor on file in the Patent Office; but prohibits only the introduction of matter which is not found in substance in any one of these at the date of the original application, and which in such case is to be construed under the statute as not forming part of the original invention or discovery at that date.

"5. That, in accordance with the last clause of § 4910 of the Patent Law, matter new as compared with the specifications and claims of the original patent or amendatory thereto may be introduced into the corrected specification of the reissue of any other than a machine patent when there was neither model nor drawing filed in the Patent Office with the application for such other patent, 'upon proof satisfactory to the Commissioner that such new matter or amendment was part of the original invention, and was omitted from the specifications by inadvertence, accident, or mistake as aforesaid.'

"6. That the fact that an original patent is operative to the extent of what is described or claimed therein, is not satisfactory evidence that the patent is not inoperative by reason of a defective or insufficient specification to protect the full invention made by the patentee and which he intended to patent, and which he has a legal right to describe and claim in the corrected specification of the reissue, because it does not follow that when a patent is operative to protect a part of an invention it is not inoperative to protect the entire invention.

"7. That in accordance with the earlier decisions of the United States Supreme Court, the fact that a patentee has failed to claim in his original patent a material part of his real invention by reason of inadvertence, accident or mistake, and without any fraudulent or deceptive intention, is not a dedication of the unclaimed part to the public, which acts as an estoppel to the reclamation of such material part by a reissue.

"8. That the fact that some unlicensed party has engaged previous to the reissue of a patent in the manufacture of things embodying the part of an invention unclaimed in the original patent but subsequently claimed in the reissue of it, does not of itself render the reissue invalid, and is not conclusive evidence that there is an unreasonable delay in applying for the reissue.

"9. That if equity requires that a party who has engaged in nocently, before the application for a reissue, in the manufacture of things embodying only the part of the intention claimed in the reissue, should be permitted to continue the manufacture of the same articles subsequent to the reissue, then such party should be deemed to have acquired by reason of the delay of the patentee to reissue an equitable license to continue to make, use and vend to be used the same articles after the grant of the reissue. But the fact of such acquirement of an equitable license by such innocent party does not apply to nor inure to the benefit of any other party who engages in such manufacture subsequent to the date of application for the reissue and who infringes any one of its claims.

"10. That when claims and statements of invention are made in a reissue patent which are broader in scope than those made in the original patent, the fact that any claims, or any statements of invention, or both, of the original patent recite only a part of what is claimed in the reissue should not be construed into evidence that the patentee intended to patent no more than what is so claimed or set forth in the original, provided the inventor has sworn to the correctness of the reissue. On the contrary, the inventor's oath to the application for reissue should be considered as prima facie evidence of the correctness of the claims and statements of invention set forth therein. and the burden of proof to the contrary should lay upon the defendent in a suit.

"As to this last proposition it is a fact well known to all who act as solicitors of patents that an inventor always intends to claim in his original patent everything that is new in what he has done in view of the state of the art at the date of his invention. To presume that an inventor who has taken out a reissue with broader claims that existed in his original patent did not so intend at the time of his application for the latter and that he intended by his original patent to dedicate the unclaimed part of his real invention to the public, is to presume that every such inventor (using the classic language of the workshop) 'knew himself,' at the date of his original application, 'to be a born fool,' who voluntarily abandoned that which the law gave him the right to claim for himself; a presumption which is irreconcilable with the universal laws of human nature and with common sense.

FIRST SALT LAKE SHOW IS OPEN

Salt Lake City, Utah, Feb. 19—A new epoch in the local history of the automobile was inaugurated to-night by the opening of Salt Lake's first automobile show, in the Auditorium. There were none of the characteristics of an initial attempt visible, and, although but one day was allowed for the installation of the decorations, everything was complete. The decorations are mostly in light colors, the scheme being white and pale blue. Imitation marble pillars mark out the aisles, set amid masses of palms and flowers. Under a flood of electric light the effect is gay and summer-like.

The representation of different cars embraces the most varied types, the two extremes being the Brush runabout and the Chadwick "Great Six." The latter car is expected to enter in a number of competitions to be held during the summer. The Hupmobile had a good exhibit, and other comparative newcomers to the trade were the Everitt and the Warren-Detroit. The Botterill Automobile Company had a fine display of Pierce-Arrows, one of which was lent for the occasion by Mayor Bransford. On the same stand appeared the Pope-Hartford, interesting because of its victory at Portola. Chalmers-Detroit had a 30-horsepower touring car and a pony tonneau, and Hudson both the roadster and the new touring car. Moon was represented by the new 30-horsepower car.

The management is receiving much commendation for its quick work in preparing the show. The Auditorium was in use for other purposes up to midnight of the 18th. Five minutes later a force of 50 men was busy installing the decorations, which, of course, had been prepared outside.

BIG RALLY AT MILWAUKEE SHOW

Milwaukee, Feb. 21—The second annual automobile exposition of the Milwaukee Automobile Club, which opens in the new $500,000 Auditorium in Milwaukee, Wis., on the night of Washington's Birthday, will be the occasion for a big rally under the auspices of both the local club and the Wisconsin State Automobile Association, which are closely allied. President M. C. Moore, of the State body, will promote several extensive tours before the meetings of the various committees, while Secretary James T. Drought will lead a discussion of legislation, good roads, etc. Sessions will be held in the headquarters of the club, on the second floor of the Auditorium annex, which has been reserved for the use of members.

The dealers who will hold private shows are organized and their publicity of their shows and general work against the club show have created some feeling. Milwaukee business men have stepped in, fearing the split will be very hurtful.

MANY NEWCOMERS AT BALTIMORE

Baltimore, Feb. 21—There will be many cars new to Baltimoreans seen at the Baltimore show, which takes place at the Fifth Regiment Armory from the 22d to 26th, inclusive, of this month. These cars are the ones that have just established agencies here since the show of last March. Among those to be mentioned are: Washington, Apperson, Parry, Knox, Marion, I. H. C., National, Matheson, Stearns, Mercer, Alco, Velie and Dumont, Kline Kar and Manhattan truck, Rider-Lewis, Moline, Crawford, Chadwick, Rainier, E-M-F, Flanders, and Hudson.

MILESTONES FOR THE AUTOMOBILIST

Feb. 19-26........Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.

Feb. 19-26........Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 19-26........Los Angeles, Cal., Hamburger Building, First Annual Show, Licensed Dealers of Los Angeles.

Feb. 19-26........Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South St.

Feb. 19-26........Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.

Feb. 21-26........Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.

Feb. 22-26........Baltimore, Second Annual Automobile Show, Auto Club of Maryland, Fifth Regiment Armory.

Feb. 21-26........Portland, Me., Auditorium, Fifth Annual Automobile Show. F. M. Prescott, Manager.

Feb. 22-27........Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.

Feb. 24-26........Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 24-Mar. 3...Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Mgr.

Feb. 28-Mar. 5...Omaha, Neb., Auditorium, Automobile Show, Omaha and Council Bluffs Automobile Dealers.

Feb. 28-Mar. 5...Kansas City, Convention Hall, Fourth Annual Automobile Show, Automobile Dealers' Ass'n.

Mar. 5-12.........Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.

Mar. 5-12.........Cleveland, Central Armory, Cleveland Automobile Club Eighth Annual Show.

Mar. 5-12.........Des Moines, Ia., Coliseum, First Annual Automobile Show, Des Moines Automobile Dealers' Ass'n.

Mar. 7-12.........Albany, N. Y., Armory, Automobile Show.

Mar. 15-19........Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

Mar. 17-19........Louisville, Ky., Armory, Louisville Automobile Dealers' Association Annual Automobile Show.

Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 21-28........Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.

Mar. 26-Apr. 2....Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Mar. 26-Apr. 2....Montreal, Coliseum, Motor and Sportsmen's Show. E. M. Wilcox, Mgr.

Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

RACES, HILL CLIMBS, ETC.

Feb. 19-20........Los Angeles, Ascot Park Track, Track Races of Los Angeles Motor Racing Association.

Feb. 22...........Oakland, Cal., Hill Climb, Auto Trades Association of Oakland and Alameda County, Cal.

Mar. 5...........New York to Boston, Voting Trophy Contest, T. F. Moore, Manager, 91 West 103d St., New York City.

Mar. 19..........Altadena, Cal., Hill Climb, Licensed Motor Car Dealers' Association, Los Angeles, Cal.

FOREIGN SHOWS AND RACES

Feb. 18-26........Manchester, England, Automobile Show.

Feb. 20-23........Swedish Automobile Races and Trials.

Mar. 19-Apr. 3....Berlin Automobile Show.

Mar. 22...........Monte Carlo Elegance Competition.

Mar. 27-Apr. 4....Prague, Austria-Hungary, Automobile Show.

Mar. 28...........Brooklands, England, Easter Meeting.

Mar. 31-Apr. 8....French Spring Wheel Competition.

Apr. 2-24.........Turin, Italy, Automobile Show.

Apr. 27-28........Brooklands, England, Two-Day Meeting.

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.

May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.

June 2-8..........Prince Henry (German) Touring Competition.

THE AUTOMOBILE

Vol. XXII Thursday, February 24, 1910 No. 8

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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Long Distance Telephone - - - - - - - - - - - 2046 Bryant, New York

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FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

It may seem a little far fetched to blame the purchaser for the existence of things which fail to sustain the good reputation of the industry, taking it as a whole, but the fact remains that they would not be manufactured were there no prospects of sale. Reform, in so far as this condition is in demand, must come from the fountain head; the purse-string must be tightened until they discourage the undesirable effort.

When a banker wants a cashier, it is the latter who must sustain all his claims of competence; the banker takes his word for nothing; even the bond is scrutinized. The same cautious methods, if they are applied when an automobile is being selected, will lead to no more failures than banks have to put up with on account of dishonest or incompetent cashiers.

There is one characteristic which nests in the breast of every man; it is the very attribute which makes it possible to transfer the title of a valueless thing for money; when we want a thing we want it bad. Caution is the cure—let want wait until caution is satisfied. A man who has never owned an automobile can very well afford to let his funds earn four per cent for a little longer; long enough, in fine, to permit the maker of the automobile to prove his case.

A standard method of accomplishing a given task is good, because it induces a condition of stability, adds to speed of performance, and eliminates error. If a task is performed in some one way, it becomes a habit to continue the process, and habit, if it fastens its fangs upon a performer, no matter what the process may be, acquires a willing slave. There are habits which do no credit to anyone, but the habit of doing a thing in the right way is sure to be induced if the facilities afforded are right.

In an automobile as in everything else, the method of control, to induce habit, must be studied, and that it will be of the greatest advantage to make all control methods on a common basis, is true, for then habit would be acquired by drivers, and in an emergency, from force of habit, the right act would be performed, and safety would be more nearly assured.

That all automobiles relate to each other in some particular goes without saying, but differences, of which there are many, creep into the respective designs so freely that it becomes extremely difficult to realize by what method averages of all can be made to serve a good purpose. In a cylinder, if the mean effective pressure is determined, it gives a means by which the power of the motor may be resolved, and when the value of an alternating current of electricity is being investigated it is necessary to take the square root of mean square of the instantaneous values to evolve the results desired.

When all the motors of the year are taken and averages are struck, the result is something new; it is not representative of a single motor of the whole number taken, and, after more than a little deliberation, the inclination is to enquire what does this average represent?

In taking all the designs into account during the process of averaging, it is necessary to include the designs which are below standard, and to whatever extent they are inferior they drag the average down; is it proper to do so? One way of viewing it leads to the answer yes; every art has its good and its bad; the art is influenced by both; unless the bad can be eliminated it must be included; an average of the good and the bad will be superior to the one and inferior to the other; it is as a gain, on the whole, to advance the bad to the average, at the cost of the good.

The owner of an automobile, if he takes advantage of wisdom, must regard personal safety ahead of many other considerations. If he has an exaggerated ego to the high disregard of personal safety, then, the safety of others, if it is taken into account, will show, at least, that he is endowed with a spirit of consideration for his neighbors. When an automobile is new, if it is reasonably well made, it may be speeded to the maximum of its ability, but as age overtakes it, unless the power plant deteriorates in about the same ratio as the car as a whole, the time may arrive when the effect of speed upon the strain members will make its mark. The greatest chance for trouble of the character which may end in the loss of life will follow when a touring car is used for two or three years and then put through a process of repair with the object of turning it into a racing automobile, which process is ended by the simple expedient of overhauling the motor, removing the heavy touring body, and substituting a light one. True, the speed of the car will be increased, but the strains induced in the parts will increase as square of the speed.

STATEMENT FROM A. L. A. M. ON PATENT SITUATION

BEFORE GOING ABROAD, COLONEL CLIFTON MAKES A DECISIVE AND AUTHORITATIVE STATEMENT OF THE PRESENT AND PROSPECTIVE PATENT SITUATION

WITH a campaign of education that is expected to be of far-reaching effect, those interested in the Selden Patent are endeavoring to show car buyers the many advantages of buying cars licensed under that patent which Judge Hough in the United States Circuit Court of New York held recently to be valid and to cover the modern gasoline automobile.

For the first time since the decision, Charles Clifton, the president of the Association of Licensed Automobile Manufacturers, has consented to talk on the subject. Among other things in the interview given out yesterday he says:

"Many promoters, pointing to the profits made by a few of the old-time manufacturers, encourage the formation of companies and try to induce innocent people to place their money in the enterprises, holding before them the alluring idea of getting rich over night. Such affairs it seems to me, are doomed to failure and the stockholders are almost certain to lose every dollar they supply.

"The success of a few old companies, headed by excellent business men, has induced others to start manufacturing, ever since Judge Hough's decision. Some of them may propose to put out good cars and others to put out inferior cars. Scores of such companies may not get beyond the experimental stage and many who do get out a few cars may depart from this business life, leaving behind them products for which no parts can be obtained. Those who would start companies at this time forget that the makers now getting profits from the business are old-timers, who after years of work, have built up a line of tried products and an organization for handling them, which cannot be duplicated without a great amount of work at this keen competitive period of the industry.

"Some patent attorneys, not appreciating the importance of the decision, or for other reasons," continued Mr. Clifton, "have evidently encouraged people to manufacture cars in the face of this decision; a procedure which may result in a heavy loss for those endeavoring to enter the field at this late date.

"The trade is well informed on the patent question, and since the decision, more than forty concerns have applied for and have been granted licenses. The Association of Licensed Automobile Manufacturers has the right through its Executive Committee, to say who shall and who shall not be granted the protection of the patent, although the licenses are granted by the patent owner, the Columbia Motor Car Company.

"On the other hand some innocent buyers of motor cars have failed to appreciate the importance of Judge Hough's decision and have bought cars that infringe the patent. How unnecessary it was for them to purchase such cars is evidenced by the fact that 76 standard American cars and two imported cars are now licensed. These factories are producing cars of all classes and for all prices, from $485, the lowest-priced car in America, to the most luxurious machine of the automobile and coach-builders' art, with the makers in strict competition with each other, a fact well known by the trade and buying public.

"In the buying of cars it can be readily seen that there is no occasion, with almost every important maker having a license, for any person to take chances of litigation by the purchase of an unlicensed car, to say nothing of the difficulty of trading that car in exchange for a licensed car when a new purchase is contemplated," added Mr. Clifton. "Last year the licensed manufacturers made almost 95,000 cars, or about 85 per cent. of the estimated production and this year are expected to market not less than 160,000 machines.

"With a view of protecting the public and thereby increasing the popularity of the automobile, it has not been the policy of those who controlled the patent, to extend its protection to new and untried, or doubtful products.

"One shouldn't be pessimistic on the future of the automobile, but it doesn't take much of a prophet to figure that the going concerns in the business to-day, almost all of which are licensed under the Seldent patent, should be fully able to care for the demand for motor cars.

"To prevent the unthinking from investing in new automobile companies or buying unlicensed automobiles," concluded Mr. Clifton, "it is deemed proper to issue this statement so that everyone may be advised as to the facts and past history of the litigation which resulted in Judge Hough's decision of last September, wherein he upholds the validity of the patent, declaring it to cover the modern gasoline automobile. Suits may be brought under this patent for infringement by manufacturers, by dealers, or by users of pleasure or commercial gasoline automobiles, and it is the intention of the owners of this patent to protect the exclusive rights secured by it to those who have become licensees by commencing suits against infringers of it."

INDEPENDENTS EXPECTED TO TAKE APPROPRIATE ACTION

NOW that the A. L. A. M. is indicating by its public announcements the action which is expected of it in view of the decision of Judge Hough of the United States Circuit Court of New York, and considering the fact that the Licensed Association represents only 76 of the total number of automobile makers in this country, it is scarcely news to announce that the independents are quietly looking out for themselves, and while they all evince willingness to join the A. L. A. M. under favorable terms, they are hustling while they wait.

To what extent the new independent organization has assumed definite form it is extremely difficult to indicate, because of the reluctance on the part of the possible members to disclose any of the doings, to some extent, in view of the effect such action might have on the A. L. A. M. when considering membership application, and again in view of the considerable number of unprotected automobile makers who have failed to do anything.

It may be a surprising statement to make, but there are automobile makers in this country who are not at all familiar with the patent situation, and, in some cases, they do not seem to know that there has been a long-drawn-out contest in the courts, and that a decision has been rendered. The organizers of the new independent association point out that headway is slow, and that there is much danger in courting publicity at this time, and they are reluctant to disclose their plans, which, however, according to indications, are well advanced.

In a very few cases, when the newly organized companies discovered that to go into the automobile business these days is to court an action at law, they quietly withdrew from the field, but the many companies with plants on their hands, and product in a half completed state will scarcely be able to back out.

Henry Ford, in commenting on A. L. A. M. attitude, stated to the representative of THE AUTOMOBILE that he will have something to say, which will be the result of sufficient deliberation to make it sound attractive.

DOUBLE SHOWS TO BE HELD NEXT WINTER

MADISON SQUARE GARDEN TO BE REARRANGED SO AS TO GIVE MORE SPACE--COMMERCIAL AUTOMOBILES WILL MAKE UP SECOND HALF OF THE DUAL EXHIBITION

OWING to the many additions to the ranks of the Selden patent licensees, the Association of Licensed Automobile Manufacturers has planned a double show for Madison Square Garden, New York, in 1911. The dates selected are January 7 to 14 for pleasure vehicles, reopening on Tuesday, January 17 and closing on the 24th, for commercial vehicles.

Properly to care for the exhibitors, arrangements have been made by the show committee of the A. L. A. M. to rebuild the interior of the Garden, thereby securing 20,000 square feet more floor space than has been available at previous shows. This will be accomplished by extending the elevated platform so that it will be 50 feet wide, with another platform overhead, extending from the level of the balcony. When this is accomplished and the commercial vehicles are cared for at the second week, the show committee can accommodate 80 exhibitors of vehicles in spaces of the same size as those used at the last show. In other words, the new construction will give sufficient room to care for all the present Selden patent licensees. There will also be accommodations for 27 exhibitors of motorcycles and about 300 motor and accessory manufacturers.

The plan of a double show that will give proper space to the pleasure vehicle makers and care for the fast increasing number of commercial car manufacturers has been the subject of long discussion among those interested, and while the expense and work involved will exceed that of any previous exhibition, the affair is certain to be representative of the industry.

Work will begin early in July on the preparation of the interior construction, which will be made in sections to permit rapid installation. When the pleasure vehicle show closes on Saturday night the pleasure vehicles will be removed and their places taken by commercial cars. The signs and carpets will also be changed, but the main decorations will be carried in both.

Many of the members of the Licensed Association are now turning their attention toward commercial vehicles and will have their products ready for the fall trade and for exhibition at the January show. It is believed that the double show of 1911 will exceed in all respects any previous exhibition of motor-driven vehicles. The contract with the Madison Square Garden Company was signed by President Clifton of the A. L. A. M. before leaving on his southern trip.

FIRST NEWS OF BOSTON'S BIG AUTO SHOW

BOSTON, Feb. 19—When the automobile show followers come to Boston for the last of the "big" motor vehicle displays of the season, that of the Boston Automobile Dealers' Association, which opens in Mechanics Building the evening of March 5, they will be impressed with the fact that the show season has nearly run its course and that the riding season is at hand. Boston's show is the Spring show, the final great assembling of the examples of the year's product, before they go into the hands of the consumers, and the manufacturers turn their attention to the designing of models for the succeeding season. Thus it is appropriate that in the setting of the Boston show the idea of springtime should be emphasized. This is the keynote of the decorative scheme which Manager Chester I. Campbell has prepared. The show will depict a typical New England countryside, garden, orchard and fields, in the Spring of the year.

To carry out this idea to the most realistic point growing plants and flowers are to be used to a degree never before attempted in an automobile show. For months one of the largest conservatories in the vicinity of Boston has had under glass hundreds of shrubs and plants which have been brought along so that they will be in bud and full bloom during show week in Mechanics Building. Apple orchards have been despoiled to furnish the material for the orchard that will be a feature of one department, and many an old fence has been torn down to supply materials for the show. Great paintings, depicting New England rural scenery, have been made, and immense quantities of material are awaiting the day when the building will be given over to the decorators.

Grand hall will be the garden, and exhibition hall, adjoining, the orchard. In grand hall the main divisions between spaces will be of neatly trimmed lilacs in bud and bloom, while spirea covered with dainty white blossoms will make up the side divisions. At the bases of these shrubs will blossom thousands of vari-colored tulips, giving a lively touch of color to the whole. All around the side walls will be panelled paintings depicting rural landscape, while on the stage will be a painting 100 feet long and 25 feet high, forming the background. These paintings are intended to give an appearance of spaciousness to the hall. The floor coverings will be of a mahogany-colored material and numerous gray-green rugs will be scattered about. The signs on wrought-iron standards with white lettering will be in keeping with the decorative scheme as a whole.

The first balcony will have a colonnade with vine-draped rafters extending to the base of the second balcony. Vines in profusion also will be used over the balcony front. The bandstand will be on an elevated platform over the second balcony, leaving the main floor free from this obstruction.

In exhibition hall each of the one hundred or more posts will be covered with bark slabs to give them the appearance of tree trunks. At the tops apple tree branches will spread out, and they will be gay with artificial foliage and apple blossoms. Old-fashioned rail fences will serve as division lines between exhibition spaces, and there will be a painted landscape all around the back wall of this hall. The flooring will be similar to that in grand hall, and the signs will be in keeping with the orchard atmosphere. Illumination will be by electric lamps, which will be used in such profusion that no part of the great hall will be dark day or night.

In the basement there will be a typical New England brick inn to house the restaurant, and the decorations for the overflow pleasure car display and for the commercial vehicle department will be of special design, each post being covered with tapestry finished material and carrying arches that are to be studded with electric lamps. The basement floor coverings will be of the same material as that in the departments on the main floor. For the motor cycle and accessories divisions on the balcony level a decorative scheme in harmony with that below though not as elaborate will be employed.

Those who have seen the drawings and materials for the Boston show decorations are enthusiastic over them and predict that the Boston show of 1910 will be the most successful in the long line of attractive exhibitions that have been held in Mechanics Building. Every inch of space has been sold, and there seems a probability that some of those who were unable to secure space will unite in an independent show nearby.

SOUTHERN CALIFORNIA SHOW SUCCESSFUL

Los Angeles, Cal., Feb. 18—The southern California show opened a few days ago in the Grand avenue rink and every indication points to its being one of the most successful exhibitions ever held on the Pacific coast, more than 5,000 people attending the opening. The show colors are green and white and the building is lighted by means of 5,000 incandescents which show to advantage the many beauties of the cars on view. Small cars are in the majority, although the higher-priced models also are in evidence, while the Californians show they are up-to-date by displaying bodies of the gunboat or torpedo type. Walter Hempel, manager of the show, is given credit for producing a most satisfactory affair and as a curtain-raiser yesterday afternoon he had a parade through the city streets of 300 cars, in which the feature was the struggle for the prize offered for the concern having the greatest number of cars in line. This prize was captured by the Standard Motor Car Co., which had fifty Ford cars in the procession, the natty machines coming from San Bernardino, Glendora, Riverside and Redlands. Of the cars on exhibition all of them are well known in the East with the exception of the Tourist, which is a California product and which is shown by the California Automobile Co., which has on view eleven Tourist models as well as showing the Firstone-Columbus torpedo. The Standard Motor Car Co. has the Ford and Velie, the W. J. Burt Motor Car Co. has the Auburn, the Vail Motor Car Co., Pennsylvania; Bosbyshell-Carpenter Motor Car Co., Dorris; W. A. Evans, Waverly electric; Williams Auto Co., Petrel; Burkhard-Crippen Motor Car Co., Lexington; A. N. Jung, Sterling; National Auto Co., National; Hawley-King Co., Grabowsky truck; Lane Steam Car Co., Lane steamer; Newell-Mathews Co., Whiting and Westcott; Tri-State Auto Co., Hupmobile; W. K. Cowan, Rambler; Durocar Mfg. Co., Duro; Pioneer Commercial Auto Co., Reliance; Brush Automobile Co., Brush; Import Motor Car Co., Halladay; American Auto Co., Rider-Lewis; Fred A. Cornell Auto Co., Fal-car; Pico Carriage and Automobile Co., Paterson; Stanley Steamer Co., Stanley steamer; M. S. Bulkley Motor Car Co., Autocar; Mountain Brothers, Royal and Midway. In addition there are displays made of the Fiat, Great Western, Empire and Rauch & Lang electric.

CLOSING NOTES OF HARTFORD SHOW

The best show ever, is the report of the Hartford Automobile Dealers' Association at the conclusion of the one week's exhibition at Foot Guard armory. The show opened Monday of this week and closed this evening and practically all of the exhibitors of cars express themselves as well satisfied with the results attained. Certainly there is much interest in cars in this city as was proven conclusively by the heavy attendance throughout the week. More people visited the show this year than last season and there seemed to be more genuine interest by people who came to see the cars and not merely to look at them as something attractive. Naturally the lower-priced cars were centers of interest. The Maxwell, Flanders, E. M. F., Reo, Ford and Empire; 20 of the lower-priced cars were highly regarded. The Hupmobile surprised many an owner of a larger car when it came down to a real demonstration. The Velie and the Everitt "30," both of which are new to this section of the State, were well thought of. Practically every dealer in the show reports sales and enough demonstrations have been booked to keep them busy for some time to come. At the Park Casino the Jackson was very popular and many cars were signed up by the State agents. This car was in both shows; so was the Winton. The Belmont, another new Connecticut product which hails from New Haven, was a feature of the Casino show. Here, as at the Foot Guard armory, good business is reported. The Packard Motor Car Company of New York has several natty models on exhibition in the salesrooms on Allyn street.

DATE OF CONNECTICUT RUN NOT SETTLED

Hartford, Conn., Feb. 19—The final dates of the forthcoming All-Connecticut Endurance Run which is to be held under the auspices of the Automobile Club of Hartford have not been decided upon. May 1 is the date named by the American Automobile Association, but this date is too early for the Automobile Club of Hartford, and while no definite promise has as yet been received by the contest committee it is the general opinion that the dates desired by the club, that is, May 19, 20 and 21, will be conceded by the national body. The route as now laid out, which covers three days' travel, touches the border of New York State within a half mile, to within three miles of the Massachusetts border and within four of the Rhode Island border and in some places the route lies along Long Island Sound. While the run is confined to the State of Connecticut it affords about as hard a test as could be devised, as the hilliest parts of the State will be traversed on each of the three days of the run. The referee of the event will be Lewis A. Speare, president of the A. A. A., and S. L. Butler, chairman of the contest board of the A. A. A., will be assistant referee. The judges will be A. G. Batchelder, chairman of the executive committee of the A. A. A., and Alfred Reeves, general manager of the A. L. A. M.

BUDLONG DECLINES HEAD OF N. Y. DEALERS

Now that the licensed dealers in New York are in organized relation, all that remains is to complete the details of the plan, and find some one of the members who will be willing to accept the presidency and take the brunt of the fight. That there will be a certain amount of disagreeableness is to be understood, since otherwise there would be no occasion for segregating out the licensed dealers and lining them up. M. J. Budlong, who is the president of the Packard Automobile Company of New York, and who participated in the preliminaries of this new organization, did not indicate, until he was offered the presidency, that he would not be in a position to accept same. As a result, taking the last report, the committee is trying to find someone who will.

It is possible that General John T. Cutting may be induced to accept the office. It is also thought that R. D. Garden may be persuaded to assume the difficult task. At all events, it is thought that the presidency will be taken care of at a meeting which is scheduled to take place at an early date.

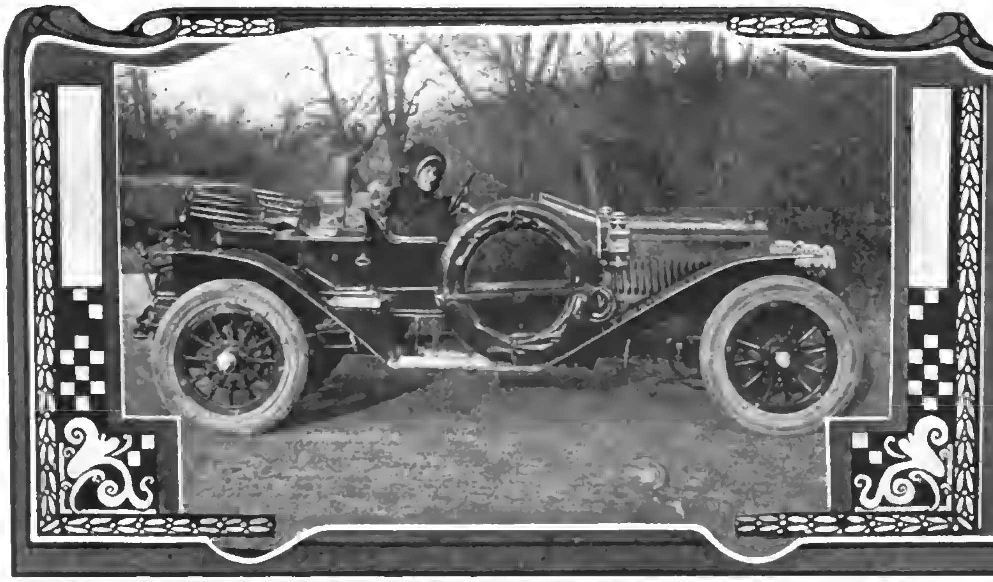
The directors of the Licensed Automobile Dealers' Association are: Carl H. Page, Chalmers; George W. Bennett, White; General John T. Cutting, Olds; Harry Fosdick, Lancia; C. P. Skinner, Mitchell; R. D. Garden, Pierce; M. J. Budlong, Packard; Sidney B. Bowman, Marmon; James Joyce, Alco, and John F. Plummer, Locomobile.

CHANGES FOLLOWING U. S. MOTOR DEAL

Hartford, Conn., Feb. 19—Fred A. Law, superintendent of the Columbia Motor Car Company, severed his connection with that concern this noon and leaves for the West, where his friends say he is to become affiliated with the General Motors Company. Before his departure from the plant, Mr. Law was called into the general offices and presented with a set of solid silver table ware. The presentation speech was made by Henry A. Castle of the sales department, and Mr. Law expressed his appreciation in a few well-chosen words.

COLONEL CLIFTON TO CARIBBEAN SEA

Charles Clifton, president of the Association of Licensed Automobile Manufacturers, and treasurer and general manager of the Pierce-Arrow Motor Car Company, leaves to-day with Mrs. Clifton for a month's cruise on the steamship Moltke to the West Indies and the Spanish Main. Since the decision in the Selden Patent case, Col. Clifton has devoted a great deal of time to Association matters. He expects to secure a well-earned rest on his trip to the Caribbean Sea.



GARAGES

The Briarcliff type of body, originated by the Lozier Motor Company, and shown above on a Lozier car, is very popular among those who desire a rakish and speedy-looking design

Martin Kelley and his son, George Kelley, have secured an interest in the Winnipeg Garage Company, Ltd., of Winnipeg, Canada. They have purchased all interest held by R. M. McLeod and C. McLaughlin. Mr. McLaughlin will remain as manager of the company for the present. This garage handles the Cadillac and Franklin, as well as the Columbus and Babcock electrics.

Green Bay, Wis., will have a new garage, Frank R. Buchholz having awarded contracts for the construction of a fireproof brick structure for D. G. Meyer, a well-known agent now located at South Washington and Doty Streets, Green Bay. The building will cost $10,000. It will be steam heated and have all modern conveniences. It is to be ready June 1.

H. E. Coffin, vice-president of the Hudson Motor Car Company, and president of the Society of Automobile Engineers

The Cream City Brewing Company, Thirteenth and Vliet Streets, Milwaukee, Wis., is building a large private garage for its delivery trucks. The company is using motor trucks almost exclusively. The building will be 100 by 160 feet in dimensions, of reinforced concrete construction, with complete equipment and repair shops.

James Beaver and Philip Fleming, of Lincoln, Ill., have closed a contract with Frank Klatt for the erection of a concrete or brick garage with concrete floor, 60 by 70 feet, on Broadway, which it is hoped will be ready for occupancy by April 1. They will handle the Hudson, Haynes and Chalmers cars.

The Auto Shop Company, Cleveland, agents for the Thomas car, will move to a large garage building being erected for them on Euclid avenue. After locating in new quarters three other cars will be added to the line.

The Gordon Motor Company, Inc., Richmond, Va., has, on account of increasing business, purchased a large lot on which it will erect a modern garage and salesroom at an estimated cost of $50,000.

The Prothers-McGinnis Auto Company, of Baraboo, Wis., has arranged for the erection of a large building during the coming Spring, which will contain its garage as well as a large equipped machine shop.

The Ames Auto Garage Company, of Orrville, Ohio, has been purchased by the Champion Thresher Company. The garage will be enlarged, and R. C. Taylor has been appointed general manager.

B. H. Smith, of Caro, Mich., is about to erect a one-story building to be used as a garage and repair shop, in which will be handled supplies, sundries and automobile accessories.

In Cleveland, Ohio, Harry S. Moore, agent for the Stoddard-Dayton, will open a garage and salesroom on Euclid avenue, continuing his place of business on Crawford road.

Peter Esswein, of Columbus, O., has taken out a permit for the erection of a brick garage building on Wall street between Rich and Walnut streets.

The Foss-Hughes Motor Car Company, of Philadelphia, agent for the Pierce-Arrow, is opening a new garage on North Broad street.

The Thomas Automobile Company, of Pittsburg, will build a new garage at once at 5509 Baum street, East End.

AGENCIES

Fig. 1—Kenny Motor Car Company, Brooklyn, showing a night scene and decorated electric lighting. This is Brooklyn headquarters for Rambler automobiles

The new Wisconsin branch of the Buick Motor Company will soon have permanent quarters in Milwaukee. Contracts are about to be awarded for the construction of a four-story fireproof garage and salesroom building on Wisconsin Street, near the Government building and postoffice. The plans have been prepared by James Peden, supervising architect for the General Motors Company, and Brust & Philipp, architects, Milwaukee, have been selected to superintend the work. It is planned to have the building ready for occupancy on May 1. The offices of the branch, in charge of George P. Hewitt, Wisconsin manager, are now located at 505 Matthews Building, and the temporary garage on Thirteenth street. In addition to the Buick the branch distributes the Welch. The permanent garage is at the end of Wisconsin Street, the main artery of Milwaukee.

The Ideal Auto Car Company has been organized by Ole G. Kinney, of Colfax, Wis., and headquarters have been established in Eau Claire, Wis., for the distribution of the Ford and Brush in northeastern Wisconsin. The temporary location is in the Bonnell Carriage Company's works, and in the spring a large garage will be erected on South Barstow street, Eau Claire.

Rainier motor cars will be represented in Maryland by G. H. Ghaab, 116 W. Mount Royal avenue, Baltimore, Md. R. M. Robinson, Albany, has closed the agency for the Rainier in that city and district. Mr. Robinson also represents the Reo and has taken on the Rainier to supply the demand for a high-class car in central New York.

The Beaver Valley Motor Company, of Rochester, Pa., has been organized, with Stanley Q. Brown, of Rochester, as manager. It will have headquarters in the Traction Building, recently vacated by the Auto Sales Company. Mr. Brown has secured the agency for the Reo and Oldsmobile cars.

The E. W. Clark Auto Company, of Fond du Lac, Wis., agent for the Jackson, has now taken on the Fuller. President E. W. Clark states that the year's allotment consists of 58 carloads, 60 cars having been already received. The company also handles the Buick in the Fond du Lac district.

The Sterling car, manufactured in Elkhart, Ind., will be represented in Cleveland by the Sterling Motor Sales Company, a new company, with a capital stock of $30,000, of which J. C. Koepke is manager.

The F. M. Hacker Auto Sales Company has opened a salesroom at 18 Spruce street, Lewiston, Me., and will handle the Mitchell and Reo in Androscoggin and Sagadahoc Counties.

Thomas Salverson, of Waupaca, Wis., has been appointed a district agent for the Mitchell, of Racine, Wis.

The Tri-State Garage Company has started business in Uniontown, Pa., at 74-76 East Fayette street, with Jno. C. Shaw as manager. The company will handle the White and Ford cars.

The Cole "30," according to arrangements just closed, will be handled in Chicago by the Standard Automobile Company. F. C. Bailey is the manager of the local concern.

Oliver B. Brown, formerly of Brookhaven, Miss., has opened a salesroom at 605 Baronne street, New Orleans. He has the local agency for the Stevens-Duryea.

Fig. 2—M. J. Budlong, general manager of the Packard Motor Car Company of New York. Formerly general manager A. L. A. M.

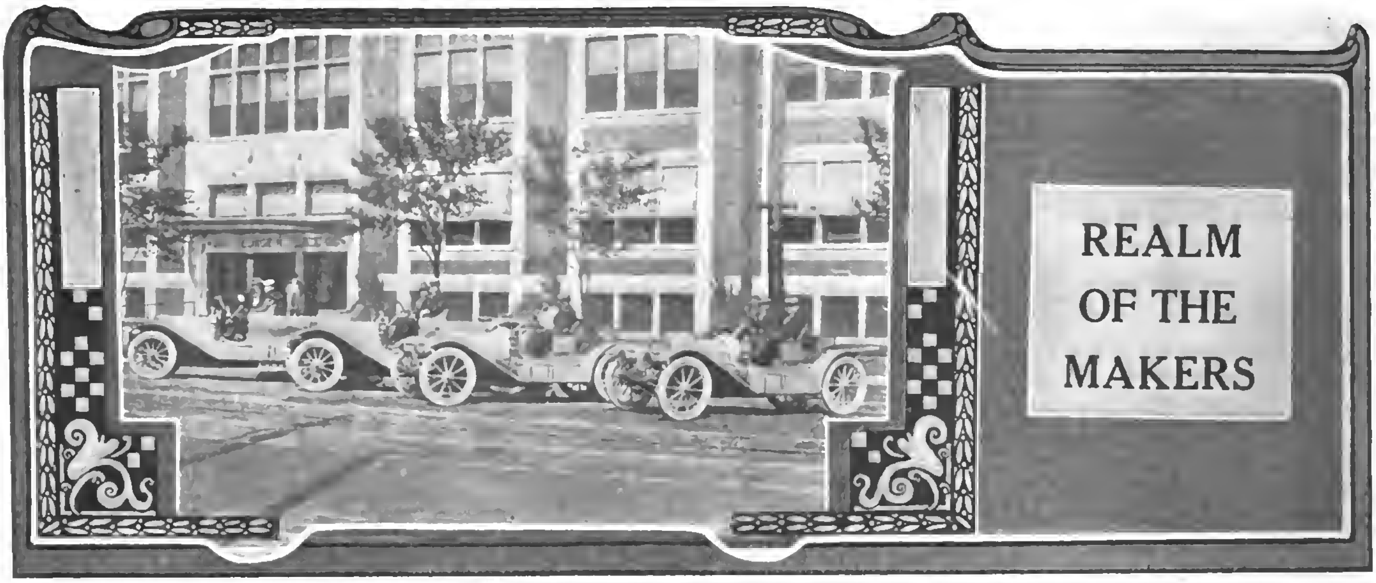


Fig. 1—A view of the Administration Building of the George M. Pierce Company, on Elmwood avenue, Buffalo, with a string of Pierce-Arrow automobiles in the foreground

The affairs of the Petrel Motor Car Company, 480 Virginia street, Milwaukee, Wis., were placed in the hands of a receiver on February 11 on petition of creditors. Referee Nye appointed the Milwaukee Trust Company receiver, under bonds of $1,000. The proceedings were begun by the Hess-Bright Manufacturing Company, Philadelphia, which has a claim of $220; the Herman Andrae Electrical Company, Milwaukee, with a claim of $239.62, and the Julius Andrae & Sons' Company, Milwaukee, $316.38. The involuntary bankruptcy petition cites that the company's estate is worth $30,000. The Petrel Motor Car Company was organized a year and a half ago, and established a factory in Kenosha, Wis. Later, through proper inducements, Milwaukee became the home of the company. The product is a popular-priced car, using the Waite friction transmission exclusively. It is believed that the company will be able to extricate itself from this legal difficulty in due time.

The Cartercar Company at the Detroit Automobile Show received an order from the Kellogg Toasted Corn Flakes Company, of Battle Creek, for twenty-four Cartercars, model "H," touring type. Instead of being equipped with the regular body these will be fitted with a specially constructed body built in the exact shape and proportions of the package of the goods manufactured by the purchaser. It is said that about $30,000 is involved in the deal.

The Columbus Buggy Company, of Columbus, O., announces that it will manufacture during 1910 100 electric and 1,500 gasoline cars. In addition to the models that have been placed on the market, the company has completed two new models, to be known as 74A and 1010. The model 74A is a gasoline runabout, with a torpedo body, built on entirely new lines. The style 1010 is a two-passenger electric, modeled after a runabout.

The Reliance Truck and Garage Company, incorporated several months ago, has announced the organization as follows: Theodore Leonard, president; Andrew Timberman, vice-president; George C. Bohn, secretary, and Frank Tray, treasurer. The company will open a garage and sales agency for the Reliance trucks.

Reports from Lima, Ohio, state that the Gramm-Logan Motor Car Company, of Bowling Green, Ohio, will invest half a million dollars in a plant in that city with a capacity of 1,500 cars annually. The plant at Bowling Green will not be abandoned, but will be devoted to the building of taxicabs.

The first shipment of Mitchells to the Orient was made last week, when a carload of 1910 models left Racine, Wis., for Seattle, Wash., where they will be loaded on the Puget Sound's Japan mail steamers and unloaded en route at Manila, P. I.

The manufacturers of the Babcock Electric Carriage claim a car which has made record time on the level and on hills, also that it has made more miles on one charge under the same conditions than has any other electric vehicle. This concern presents eight models.

It is stated that the Hudson Motor Company will build a $400,000 plant in Fairview, Mich. A site of 106 acres has been bought, and it is believed that the railroad will build a freight and passenger station in the vicinity.

The first shipment of E-M-F cars has already been disposed of.

Fig. 2—S. D. Waldon, general manager of the Packard Motor Car Company of Detroit

NEWS IN GENERAL

Fig. 1—Special design of hospital ambulance made by the Knox Automobile Company and used to very great advantage at the Springfield Hospital

It is authoritatively announced that the Eagle Manufacturing Company, of Appleton, Wis., has decided to reorganize at once, increase its capital stock, and engage in the manufacture of motor cars. The largest interest in the company is owned by the Saiberlich brothers, of Appleton. It is likely that the capital, which now is $6,000, will be increased to $200,000 and possibly $250,000. Appleton capital will be heavily interested. The new name will probably be the Eagle Automobile Manufacturing Company, and the product will be known as the "Eagle." It is planned to build two types of cars, a four-cylinder of 30 horsepower selling at $2,000 and a 4-40 selling at $3,000. W. D. Legge, an engineer associated with the Tuttle Press Company, of Appleton, will have charge of the new industry. Mr. Legge is now preparing plans and specifications and designs for the car, and it is planned to have the first car completed by May 15. However, the plant will probably not be in shape to begin actual production before June 1. Every part of the car will be built at Appleton.

Fig. 2—L. H. Kittridge, President Peerless Motor Car Company, Cleveland, O.

A Sacramento (Cal.) man who runs a stage line between that city and Folsom solved the problem of carrying an increased number of passengers, without overloading his car or tires, in an original way. As the illustration shows, he took one car and attached the back part of another to the rear axle. Thus he was able to carry practically twice as many passengers as before at the same expense. The car is equipped with Morgan & Wright tires, and he reports that the car has been running between the two cities 4,500 miles a month for the past three months, 13,500 miles in all, with absolutely no trouble from either car or tires.

The automobile factory of Besserdich & Zachow, at Clintonville, Wis., producing a new type of four-wheel drive car, will probably move to Appleton, Wis. The Merchants' Association of Appleton has offered strong inducements, especially in a financial way, which are expected to lead to the reorganization of the concern to include Appleton capital and to engage in the production of the car on a large scale. The probable capital will be $50,000. The car is the invention of William Besserdich, formerly of Appleton.

G. A. Maisland, representing the Ingram-Richardson Manufacturing Co., of Beaver Falls, Mass., says the Syracuse Automobile Club inaugurated in this State the movement to place danger signs and railroad crossing warnings. He came here to renew his contract with the Syracuse Club for 1910 signs, and was heard to remark at the club's offices that his contract with the Syracuse Club for last season was the means of inducing many other clubs to place such danger signs along the roads.

The Abresch-Cramer Auto Truck Company has been incorporated in Milwaukee, Wis., with a capital stock of $20,000. The incorporators are Charles Abresch, Robert Crawley and L. Schneller. Charles Abresch is at the head of the Charles Abresch Company, 398 Fourth street, Milwaukee, which has been manufacturing wagons and carriages and now devotes most of its time to building bodies and a line of commercial vehicles.

At Los Angeles, Cal., the Moline Car recently made a "mile-a-minute" record on the motorcycle saucer track.

PROMINENT ACCESSORIES

Quite a little attention is being paid to aeroplane work by the Livingston Radiator & Mfg. Co., of West Fifty-second street, New York City. The Livingston radiator is particularly adapted to aeroplane work because of its extreme lightness of construction, great strength, high efficiency and small resistance to the air. The only difference between the aeroplane radiator and the automobile radiator is the style and size, the principle being identical in every case. By using a design that is a great improvement on the square-tube radiator, it has been found possible to produce a cooling device showing 100 per cent. increase of direct radiating surface in contact with the circulating water. In fact, the circulation is equal both perpendicularly and laterally, through the cooling tubes, and at no time is there dead water in any portion of the radiator. Equal circulation through all the tubes is secured by the square corrugations. The combined area of the water passages is over 15 square inches, equal to the discharge of a pipe 4 1-2 inches in diameter.

These features, together with the fact that there are 64 square inches of radiating surface in direct contact with the circulating water for every square inch of frontal area, makes the radiator an extremely efficient one.

Patented lapped seams on all edges with the patented tubes increase the strength enormously and permit a pressure of over 30 pounds to the square inch, without any danger of leaks.

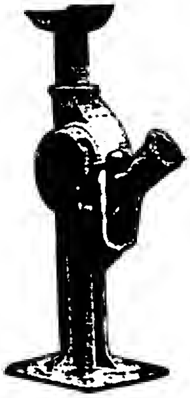
The resistance to the air is reduced by the patented swaged edges, which form the water passages without the use of space wires, thus saving weight and reducing the amount of solder used. The edges form sharp funnel-shaped entrances to the air passages, so that the radiator completed offers only one-sixth of the total area as resistance to the air, whereas in most cases one-half or more of the total area is offered as resistance to the air.

Throughout the entire construction the idea of great stability is never lost sight of. The radiating section and the frame are built complete in themselves and then assembled. All joints in the frame are made with long overlaps, reinforced with special pieces of the correct shape on the inside. Even the brackets are riveted fast and covered on the inside with an extra sheet of metal so that no leak could occur even though a rivet might tear loose.

The sides of the radiators are blocked off thus forcing the water to pass through the radiating section instead of down the sides.

Although the company did not begin active operations until October of this year it has already placed contracts with several concerns. Of course the aeroplane work will not be so heavy at first, but even this phase of the project is attracting considerable attention.

Among the novelties recently imported from Europe by Chas. E. Miller, the jobber, of 97 Reade street, New York City, is the "Radium" illuminated dial watch, on which the time of night can be distinctly seen in pitch darkness. This watch, it is believed, will be found of great interest to the public in general and to automobilists in particular. The hour divisions on the dial are indicated by dots of a luminous substance, and the hour and minute hands have a narrow line of the same substance imbedded in them. It might be thought that some difficulty would be experienced in reading the time without the usual numbers at the hour divisions, but it has been demonstrated by psychologists that these are not really necessary, for the reason that no one really looks at them. This is proved by the numerous advertising clocks which have letters, forming a name, instead of the numbers. In practice it has been found that it is as easy to read the time from this illuminated dial watch in the dark as from an ordinary watch in the light.



"A.B.C." jack, of the ratchet type.

The watch has also an alarm attachment, that they may be set at any desired time as usual. It has an "Anchor" movement. A special brass case is furnished for the attachment of the watch to the dashboard of an automobile. The case is fastened with a plug lock, which permits of the watch being removed only on the use of a special key.

The A. B. C. Jack Company, 14 Columbus avenue, Boston, has put on the market the "A. B. C" jack, which sells at a moderate price, and embodies many distinct improvements over the ordinary type. The jack has a ratchet movement, with a separate lever handle. By a special device the handle is locked, so that it is impossible for it to come out while the jack is in operation. The parts are few and interchangeable. The movement is single action, controlled by a small lever projecting from the frame.

In appearance the jack is simple and neat, all the mechanism being enclosed; the only projecting part is the reversing handle. The base is ample in size, and on the whole easy and powerful action seems to have been combined with light weight.

Windsor T. White, president of the White Company, one of the family who revolutionized the steam automobile industry

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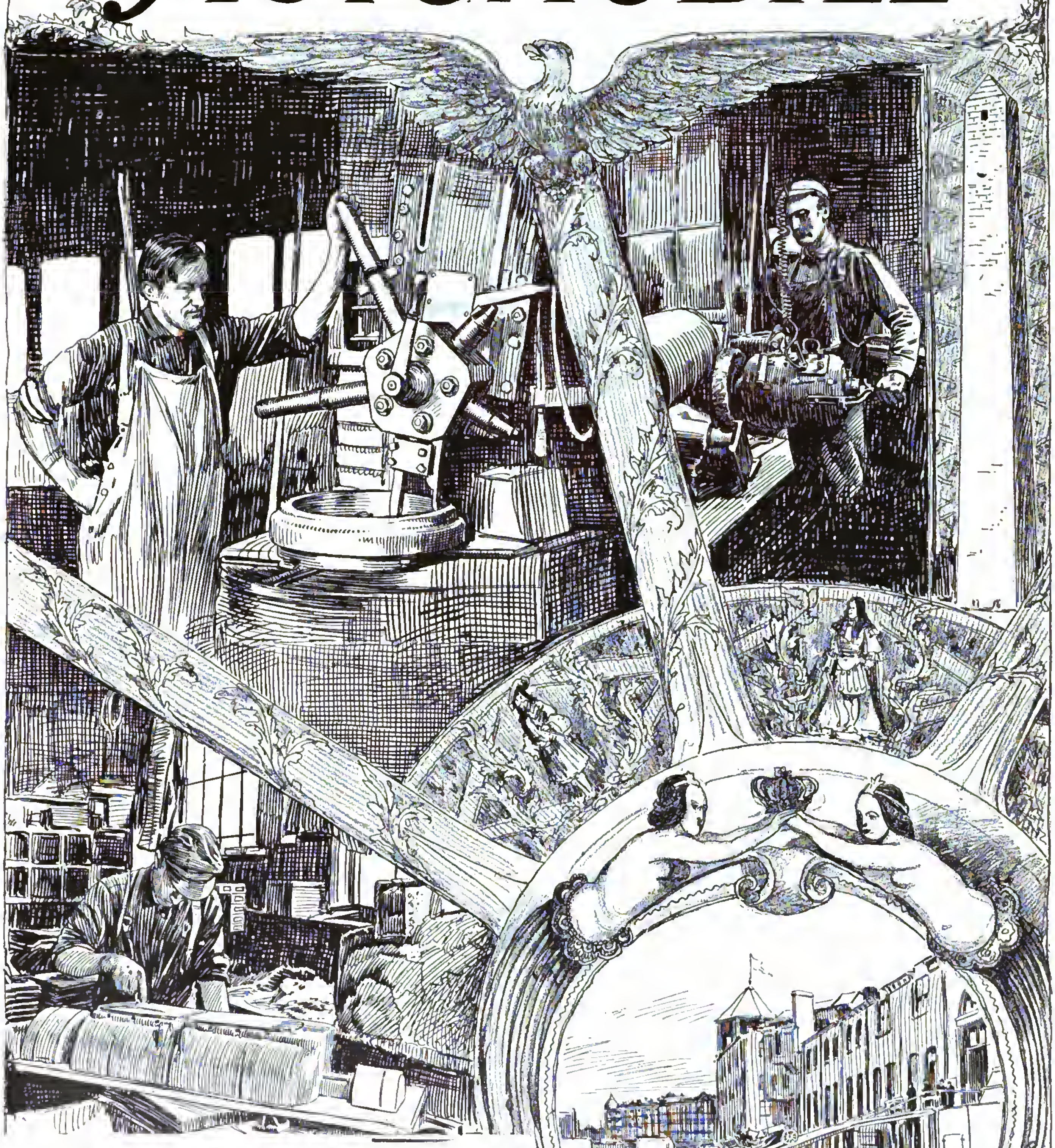
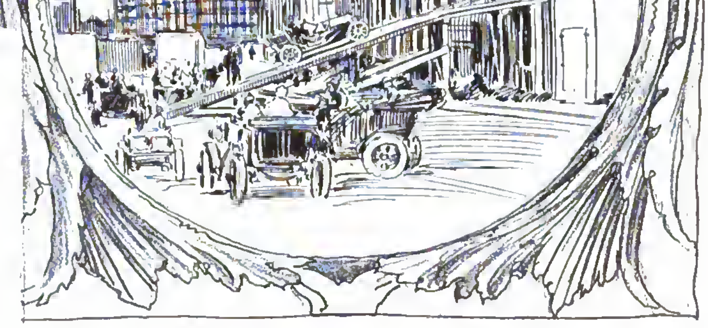
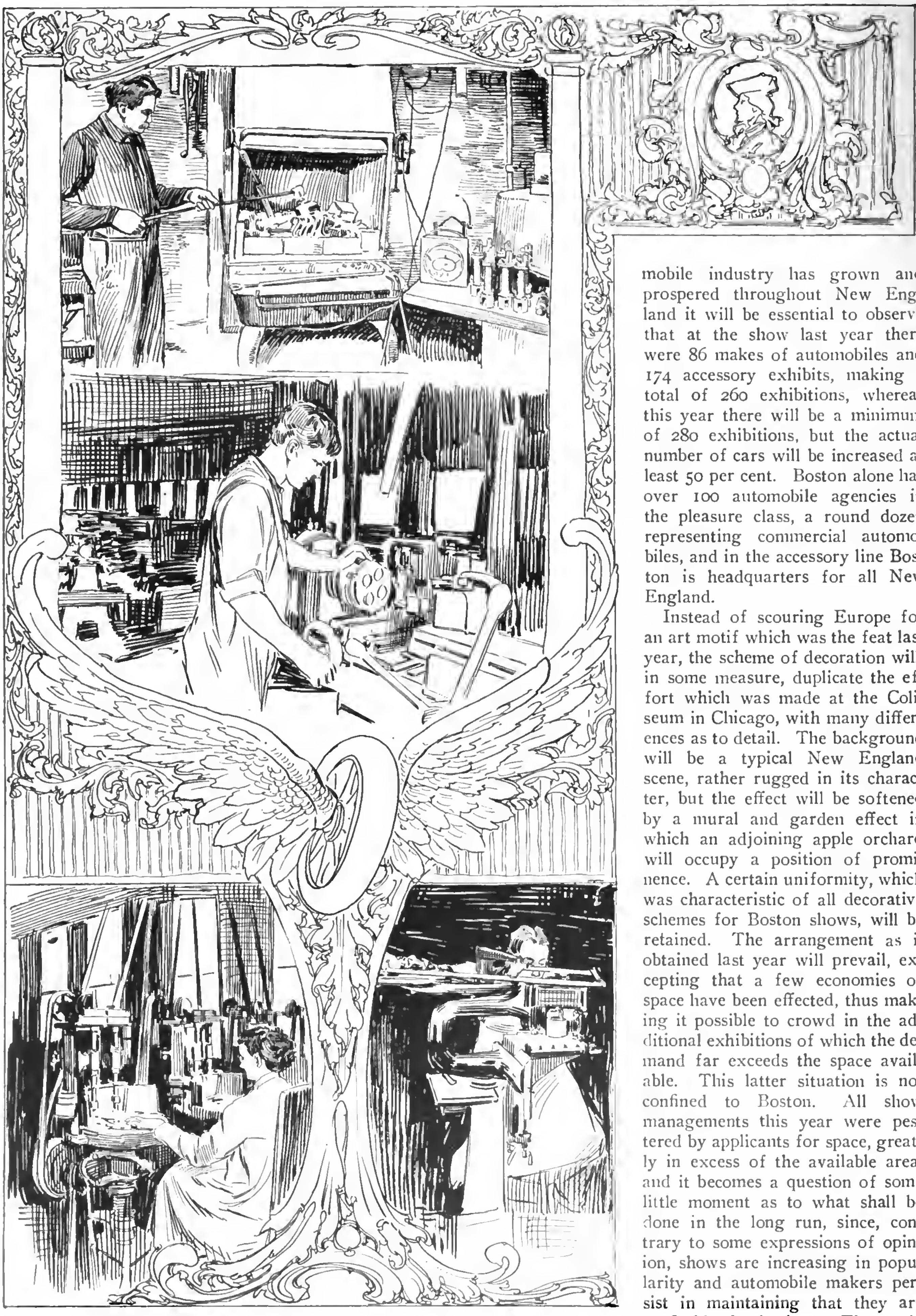
The Automobile





EXHIBITORS ARE GATHERING AT MECHANICS' HALL

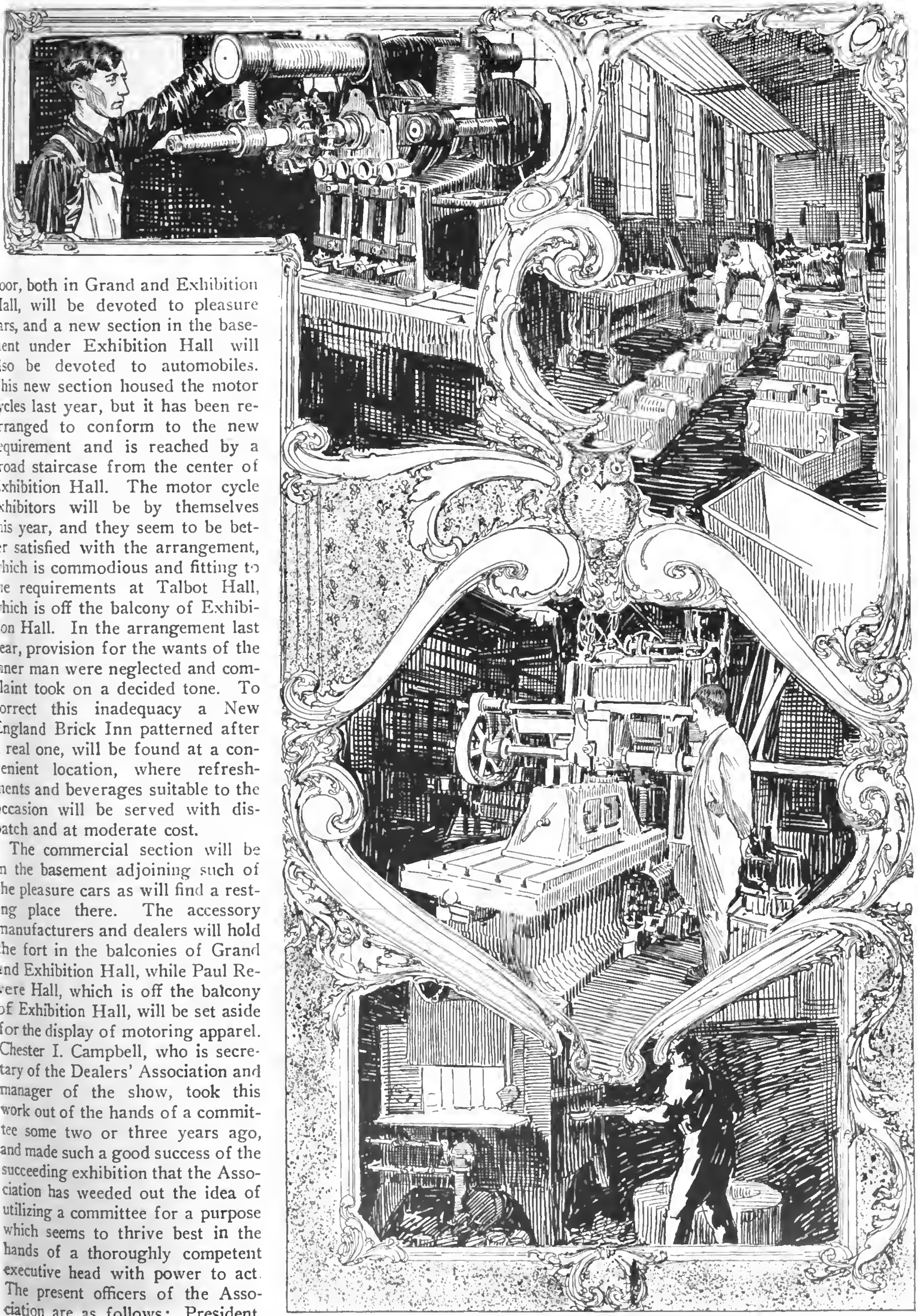
BOSTON will enjoy another automobile show which will open at Mechanics' Building on March 5, to run for 7 days, and will be known as the Eighth Annual event of this character. The undertaking will be under the auspices of the Automobile Dealers' Association, and under the direction of Chester I. Campbell, general manager, whom, it will be remembered, was directly responsible for the splendid success of last year's event. **In order to fully understand just how the auto-**



DYNAMIC ABILITY IS INDUCED BY PROPER HEAT TREATMENT

mobile industry has grown and prospered throughout New England it will be essential to observe that at the show last year there were 86 makes of automobiles and 174 accessory exhibits, making a total of 260 exhibitions, whereas this year there will be a minimum of 280 exhibitions, but the actual number of cars will be increased at least 50 per cent. Boston alone has over 100 automobile agencies in the pleasure class, a round dozen representing commercial automobiles, and in the accessory line Boston is headquarters for all New England.

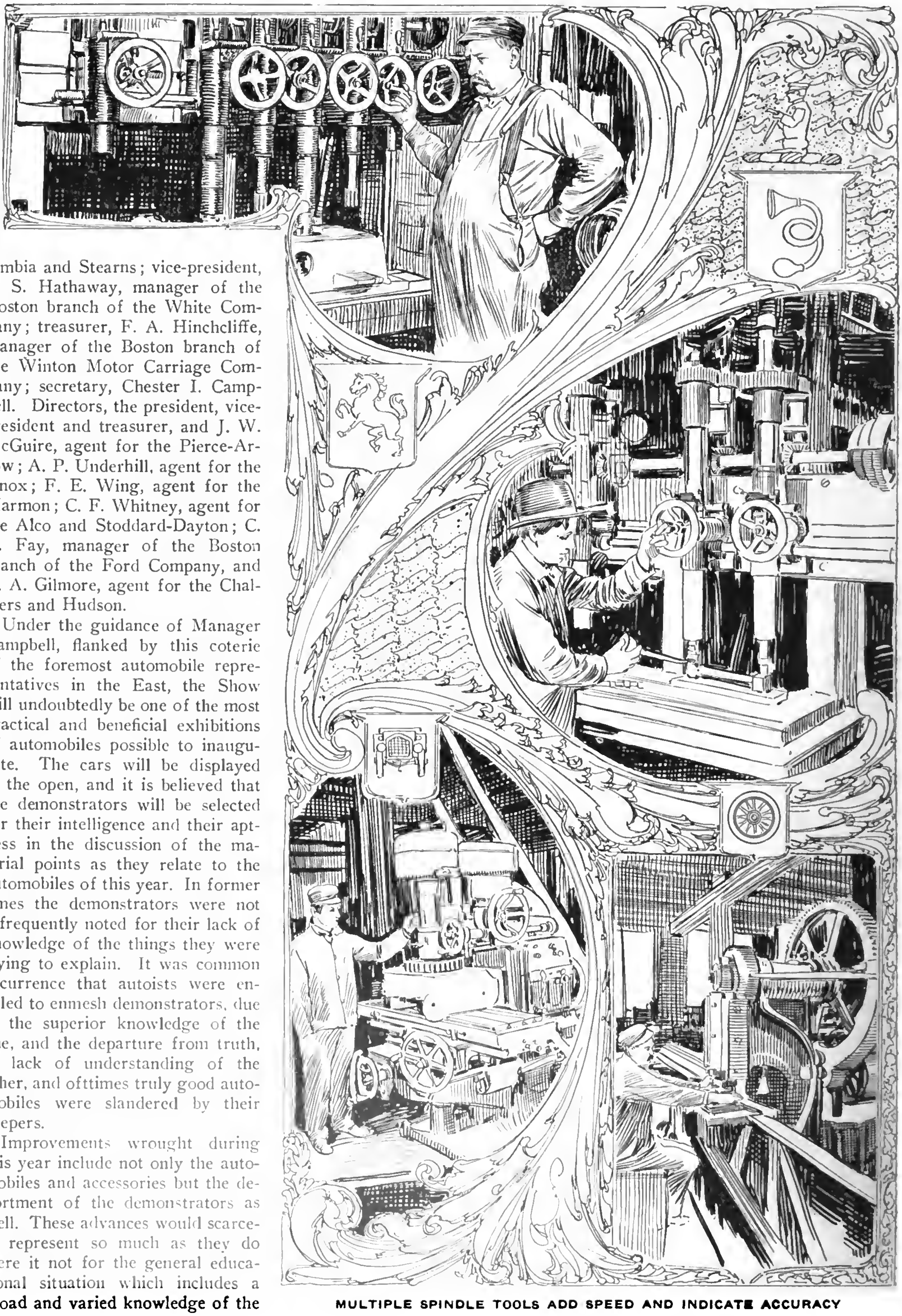
Instead of scouring Europe for an art motif which was the feat last year, the scheme of decoration will, in some measure, duplicate the effort which was made at the Coliseum in Chicago, with many differences as to detail. The background will be a typical New England scene, rather rugged in its character, but the effect will be softened by a mural and garden effect in which an adjoining apple orchard will occupy a position of prominence. A certain uniformity, which was characteristic of all decorative schemes for Boston shows, will be retained. The arrangement as it obtained last year will prevail, excepting that a few economies of space have been effected, thus making it possible to crowd in the additional exhibitions of which the demand far exceeds the space available. This latter situation is not confined to Boston. All show managements this year were pestered by applicants for space, greatly in excess of the available area, and it becomes a question of some little moment as to what shall be done in the long run, since, contrary to some expressions of opinion, shows are increasing in popularity and automobile makers persist in maintaining that they are **profitable institutions. The main**



floor, both in Grand and Exhibition Hall, will be devoted to pleasure cars, and a new section in the basement under Exhibition Hall will also be devoted to automobiles. This new section housed the motor cycles last year, but it has been rearranged to conform to the new requirement and is reached by a broad staircase from the center of Exhibition Hall. The motor cycle exhibitors will be by themselves this year, and they seem to be better satisfied with the arrangement, which is commodious and fitting to the requirements at Talbot Hall, which is off the balcony of Exhibition Hall. In the arrangement last year, provision for the wants of the inner man were neglected and complaint took on a decided tone. To correct this inadequacy a New England Brick Inn patterned after a real one, will be found at a convenient location, where refreshments and beverages suitable to the occasion will be served with dispatch and at moderate cost.

The commercial section will be in the basement adjoining such of the pleasure cars as will find a resting place there. The accessory manufacturers and dealers will hold the fort in the balconies of Grand and Exhibition Hall, while Paul Revere Hall, which is off the balcony of Exhibition Hall, will be set aside for the display of motoring apparel. Chester I. Campbell, who is secretary of the Dealers' Association and manager of the show, took this work out of the hands of a committee some two or three years ago, and made such a good success of the succeeding exhibition that the Association has weeded out the idea of utilizing a committee for a purpose which seems to thrive best in the hands of a thoroughly competent executive head with power to act. The present officers of the Association are as follows: President, J. H. MacAlman, agent for the Co-

FOUNDRY METHODS ADVANCED TO AUTOMOBILE REQUIREMENTS



lumbia and Stearns; vice-president, J. S. Hathaway, manager of the Boston branch of the White Company; treasurer, F. A. Hinchcliffe, manager of the Boston branch of the Winton Motor Carriage Company; secretary, Chester I. Campbell. Directors, the president, vice-president and treasurer, and J. W. McGuire, agent for the Pierce-Arrow; A. P. Underhill, agent for the Knox; F. E. Wing, agent for the Marmon; C. F. Whitney, agent for the Alco and Stoddard-Dayton; C. E. Fay, manager of the Boston branch of the Ford Company, and E. A. Gilmore, agent for the Chalmers and Hudson.

Under the guidance of Manager Campbell, flanked by this coterie of the foremost automobile representatives in the East, the Show will undoubtedly be one of the most practical and beneficial exhibitions of automobiles possible to inaugurate. The cars will be displayed in the open, and it is believed that the demonstrators will be selected for their intelligence and their aptness in the discussion of the material points as they relate to the automobiles of this year. In former times the demonstrators were not infrequently noted for their lack of knowledge of the things they were trying to explain. It was common occurrence that autoists were enabled to enmesh demonstrators, due to the superior knowledge of the one, and the departure from truth, or lack of understanding of the other, and ofttimes truly good automobiles were slandered by their keepers.

Improvements wrought during this year include not only the automobiles and accessories but the deportment of the demonstrators as well. These advances would scarcely represent so much as they do were it not for the general educational situation which includes a broad and varied knowledge of the

MULTIPLE SPINDLE TOOLS ADD SPEED AND INDICATE ACCURACY

GRINDING PROCESSES REDUCE LIMITS OF TOLERANCE

mechanical intricacies of the automobile on the part of the autoing public. In former times, prospective purchasers of automobiles were wont to attach their faith to apparently nice selling points, but they have learned the story over again, which is so aptly put in the paraphrase, "one swallow does not make a summer."

What they expect to find in the 1910 automobile situation is noiseless performance, interchangeability, a certain get-at-able-ness, and the facility which will enable them to overhaul the automobiles without having to use a variety of special wrenches which are so prone to stray away and leave one in the lurch by the roadside, distant from a repair shop.

Despite the apparently critical attitude of the patrons, it is believed that they will be more sensible and tolerant, but they will not exhibit the rare quality which was once present in a King of Spain who thought that if he had the making of the world he could have done it better. It is now common belief that the automobile is sufficiently near a conventional state in point of design so that buyers will hardly have to inflict their ideals upon the makers, and they will confine themselves during selection to the questions which will be reflected by their own needs.

There is a little curiosity expressed among autoists in general bearing upon the attitude which the New England will assume in relation to torpedo body work and a few of the other ideas which dominate the present situation. So far this type of body has received favorable comment and it is claimed by makers that it is here to stay. Mechanically, the situation is less likely to be judged as otherwise than favorable, since the changes are less radical following along defined lines well executed.

CHESTER I. CAMPBELL
MANAGER BOSTON SHOW

BOSTON

Abbott-Detroit Boston Co. of New England, 188 Columbus Ave. 44A
Aetna Life Insurance Co., 4 Liberty Sq.................. 612
Adams & Co., J. Q., 120 Boylston St.................. 656
Ajax Trunk and Sample Case Co., 91 Mercer St., New York.... 302
Ajax-Grieb Rubber Co., 15 Park Sq.................. 549, 550
American Automobile Co., 563 Boylston St..........26-30, 33-37
American Ever Ready Co., 114 Bedford St.................. 526
American Motor Co., Brockton, Mass........... 600, 601, 602, 603
American Simplex Co., 261 Dartmouth St..................426, 427
American Storage Battery Co., 8 Congress St.................. 300A
Arseno Electric Co., 39 Cortlandt St., New York............ 613A, A
Austin Automobile Co., 182 Columbus Ave.................. 43
"Auto Trade Journal," Market and Forty-ninth St., Philadelphia. 52
Auto Improvement Co., 316 Hudson St., New York.............. 527
"The Automobile," 231 West Thirty-ninth St., New York........ 49
"Automobile Topics," New York City.................. 45
Atlas Motor Car Co, Springfield, Mass.................. 150
Atlas Rubber Co., 751 Boylston St.................. 245
Atwater-Kent Mfg. Works, 46 N. Sixth St., Philadelphia...... 554
Austin & Doten, 102 North St.................. 429B
Autocar Co., The, Ardmore, Pa..................311, 312, 313
Auburn Auto Pump Co., Auburn, N. Y.................. 608B
Aurora Automatic Mach. Co., 1307 Michigan Ave., Chicago. 617, 618

Bailey & Co., Inc., S. R., Amesbury, Mass.................. 39
Baker, Roy C., 208 Summer St.................. 229
Baldwin Chain & Mfg. Co., Worcester, Mass.................. 555
Baldwin Tumbler Carrier Co., 134 Federal St................ 600AA
Batavia Rubber Co., Batavia, N. Y.................. 608A
Berkshire Auto Car Co., Pittsfield, Mass.................. 314
"Bicycling World," New York City.................. 563A
Bi-Motor Equipment Co., 27 Haverhill St.................. 353
Bosch Magneto Co., 223 W. Forty-sixth St., New York.......... 568
Boston Tire & Rubber Co., 184 Friend St.................. 564A
Bowman Co., The J. W., 911 Boylston St 3, 7
Boston Elec. Auto Garage, 321 Columbus Ave 341, 342, 345, 346
Boston Motor Co., 17 Ipswich St.................. 223
Bowser & Co., S. F., 141 Milk St.................. 432, 448
Boyd, F. Shirley, 893 Boylston St.................. 446
British Napier Motors, 47 Union Ave., Jamaica Plain............ 316
Brunner Mfg. Co., Utica, N. Y.................. 550AA
Brush Runabout Co., Detroit, Mich.................. 321
Buick Motor Co., Motor Mart, Park Sq........ 137, 138, 139, 140, 141
Burn Boston Battery Co., 7 Doane St.................. 428
Burroughs Rem. Rim Co., 114 Liberty St., New York.......... 569A
Butler Motor Car Co., 12 Harcourt St............200, 208, inclusive
Buxton Machine Co., W. A., 40 Central St., Worcester.......... 249

Castle, H. C. & C. D., 893 Boylston St.................. 131, 132
Champion Ignition Co., Flint, Mich.................. 344
Chandler & Farquhar Co., 34-38 Federal St.................. 225, 226
Chase, L. C., & Co., 89 Franklin St.................. 508, 509
Clapp, Harry A., Harvard Garage, Cambridge...... ...... 147, 149
Clayton Air Compressor Works, 42 Batterymarch St.......... 303AA
Cleveland Speed Ind. Co., Cleveland, O.................. 619
Coates Clipper Mfg. Co., Worcester, Mass.................. 227
Coe Wrench Co., Worcester, Mass.................. 419
Colton Comb. Tool Co., Chester, Vt.................. 414A
Columbia Lubricants Co. of New York, 116 Broadway, New York 440
Columbia Tire & Top Co., 31 Irvington St.................. 326
Columbus Buggy Co., 84 State St.................. 234
Connecticut Oil Co., Waterbury, Conn.................. 354
Connecticut Telegraph & Electric Co., Meriden, Conn............ 501
Consolidated Mfg. Co., Toledo, O.................. 577, 578
Consolidated Rubber Tire Co., 11 Hawkins St.............. 528, 529
Continental Caoutchouc Co., 1788 Broadway, New York........ 416
Corlew-Coughlin Co., 21 Hawkins St.................. 105, 340, 347
Couch & Seiley Co., 10 Thatcher St.................. 624
Coward, John D., Motor Mart, Park Sq.................. 442
Craig Co., David, 68 Broad St.................. 365
Cramp & Sons, Wm., Co., Philadelphia, Pa.................. 539
Crane, L. M. Co., 91 Oliver St.................. 221
Crouch Motor Co., Stoneham, Mass.................. 585
Culver Stearns Mfg. Co., Worcester, Mass.................. 350AA
Curtis-Hawkins Co., The, 218 Eliot St............ 143, 144, 145, 148

Daniels, Smally, Motor Mart, Boston.................. 569B
Diamond Rubber Co., The, Akron, O.................. 420
Dike, Francis, 2 Brimmer St.................. 327
Dixon Crucible Co., John Hancock Bldg.................. 514, 515
Dodge Motor Vehicle Co., 25 Irvington St.................. 11
Doening, C. H., 1777 Broadway, New York.................. 408, 409
Dover Stamping & Mfg. Co., Cambridge, Mass.................. 449
Dunham, Geo. J., Co., 182 Columbus Ave.................. 44
Duren & Kendall, 30 Summer St.................. 335

E. M. F. Boston Co., 28 Summer St.................. 233
Eagle Oil & Supply Co., 104 Broad St.................. 556A
Easton Machine Co., 24 Milk St.................. 146
Eastman, W. E., Charlestown, Mass.................. 244
Eaton, Charles A., 64 Pembroke St.................. 325
Eco Mfg. Co., 53 State St.................. 443
Eisner & Co., Harry, 29 Scotia St.................. 570B
Eldridge, W. G., 178 Devonshire St.................. 230
Electrical Storage Battery Co., 80 State St.................. 510
Emblem Mfg. Co., Angola, N. Y.................. 563B
Empire Tire Co., Trenton, N. J.................. 430
Excelsior Supply Co., Chicago, Ill.................. 567

Federal Rubber Co., 102 Portland St.................. 500
Fiat Automobile Co., 885 Boylston St.................. 114, 115

New England, as the home of the Industrial Arts, becomes the court of last resort, and the makers of automobiles display wisdom in its serenest form, when they bring the best of their wares and lay them down in Mechanics' Hall to be judged. That they will be critically examined and passed upon in accordance with their respective merits, to the prejudice of none, is a conclusion which it is safe to draw, and which is reflected in the every day life as it is viewed in perspective.

It will be important to the exhibitors to make their representations in conservative and fitting language. They will find the audience intelligently critical, observing, and tolerant. They will want to know the reasons why the innovations are given a resting place instead of contrivances which may have served them faithfully, and they will look for accessibility as they never did before. The makers have had their say, and they promised interchangeability in the automobiles of the year. The Boston autoist, instead of reflecting the characteristics of the man from Missouri who wants to be shown, will look for himself, and his experience will be sufficient for his wants.

It is confidentially expected that the Boston critic will find many things to satisfy him among the new automobiles and the many phases of the accessory situation. The materials employed this year are the result of long deliberation and have been reduced to a standard at the behest of engineers of skill and discrimination. The machining processes are the direct result of automobile engineering in its most advanced form, some of the most capable of which have been suggested here in sketches taken from life, with the avowed object of hinting to buyers something of the underlying situation.

EXHIBITORS

Fiat Repair Co., 199 Berkeley St.	309
Firestone Tire & Rubber Co., Akron, O.	506, 507
Fisk Rubber Co., The, Chicopee Falls, Mass.	436
Flentje, Ernest, Cambridge, Mass.	532AA
Forbes, W. J., 70 Long Wharf	620
Ford Co., Percy 226 Columbus Ave.	400, 407, Inc.
Ford Motor Co., 149 Columbus Ave.	118, 119
Fox Metallic Tire Belt Co., Brooklyn, N. Y.	530
Franklin Automobile Co., 671 Boylston St.	128, 129
Fuller, Alvan T., Park Sq.	1, 2, 247, 248
G & J Tire Co., Indianapolis, Ind.	556, 557
Gabriel Horn Mfg. Co., Cleveland, O.	444, 445
Gasoline Motor Efficiency Co., Jersey City, N. J.	570
General Vehicle Co., 84 State St.	236, 237, 238
Gilbert Mfg. Co., New Haven, Conn.	558
Goodrich Co., The B. F., 851 Boylston St.	540, 541
Goodyear Tire & Rubber Co., 669 Boylston St.	534, 535
Gramm Motor Car Co., 222 Eliot St.	231, 232
Gray & Davis, Amesbury, Mass.	433
Grout Auto Co., 218 Eliot St.	360, 361, 362
H. I. K. Co., 116 Bedford St.	220A
Harriman Engine Co., 53 State St.	304, 305, 306, 307
Harris Oil Co., A. W., Providence, R. I.	519, 520
Hartford Rubber Works Co., Hartford, Conn.	537, 538
Hartford Suspension Co., 150 Bay St., Jersey City, N. J.	542
Harvey Co., Arthur C., 374 Congress St.	224
Havoline Oil Co., 749 Boylston St.	559
Heinze Electrical Co., Lowell, Mass.	536
Henderson-Lowe Co., 75 Massachusetts Ave.	154, 155
Hendee Mfg. Co., Springfield, Mass.	572, 573, 574
Henshaw, C. S., 228 Columbus Ave.	24, 25
Herz & Co., Lafayette St., New York City	513
Hillman Auto Supply Co., 98 Massachusetts Ave.	531
Hilton Mfg. Co., 15 State St.	343
Holt & Beebe, 40 Sudbury St.	357, a, a
Hol-Tan Co., The, 66 Hereford St.	113
Hoffecker Co., The, 222 Eliot St.	515, 517
Hopewell Bros., Newton, Mass.	509A
"Horseless Age," New York City	47
Howard Detachable Rim Co., Trenton, N. J.	359
Hub Auto Renting Co., 366A Columbus Ave.	363, 364
Hudson-Colby Co., 122 Massachusetts Ave.	349, 350
Hydraulic Oil Storage Co., 25 Broad St., New York City	336
Isotta Import Co., 24 Cambria St.	652
Jacobs, Volney J., 887 Boylston St.	333, 334
Jeffery & Co., Thos. B., 90 Massachusetts Ave.	106, 107
Jenkins & Co., W. M., 286 Columbus Ave.	21, 22
Jones Speedometer Co., Seventy-sixth St., New York City	502
Jordan, R. W., 8 Belvidere St.	314, a, a
Kellom & Co., Chas. F., 113 Arch St.	623
Kemble, A. M., Greenwich, Conn.	451, a, a
Kempshall Tire Co., 585 Boylston St.	570, a
Kennedy Carbureter Co., 226 Columbus Ave.	402
Keystone Lubricating Co., Philadelphia, Pa.	332
KisselKar Co., 741 Boylston St.	1a, 2a
Kilgore Mfg. Co., 585 Boylston St.	604
Knapp-Greenwood Co., 1000 Boylston St.	615
Lavoiette Co., New York City	413
Leather Tire Goods Co., Niagara Falls, N. Y.	544
Leland & Co., W. H., Worcester, Mass.	417
Linscott Motor Co., 163 Columbus Ave.	120, 121, 130
Locomobile Co. of America, 589 Boylston St.	111, 112
Lovell-McConnell Mfg. Co., Newark, N. J.	415, a
Lunt-Moss Co., 43 S. Market St.	320
Lyon Non-Skid Co., 435 N. Broad St., Philadelphia	358, a, a
MacAlman, J. H., 96 Massachusetts Ave.	124, 125, 126, 127
Maching, Theo. H., New York City	352
Maguire Co., J. W., 743 Boylston St.	14, 18
Martin Carriage Works, York, Pa.	328
Matheson Auto Co., 823 Boylston St.	103, 104
McCue Co., The, Hartford, Conn.	152, 153
Merkel Light Motor Co., Pottstown, Pa.	581, 582
Metcalf Machine Works, Geo. A., Woonsocket, R. I.	355, B
Mezger, Inc., C. A., Seventy-sixth and B'way, New York City	504
Miami Cycle & Mfg. Co., Middletown, O.	579
Miller, Chas. E., 97 Reade St., New York City	566
Michelin Tire Co., Milltown, N. J.	418
Moore, Smith Co., 250 Devonshire St.	651
Morgan, R. L., Co., Worcester, Mass.	322
Morgan & Wright, Detroit, Mich.	438
"Motor," 2 Duane St., New York	46
"Motor Age," 1200 Michigan Ave.	50
Motor Print, Philadelphia	38
Motor Specialties Co., 8 Motor Mart	301
"Motor Vehicle," New York City	329, a, a
"Motor World," New York City	51
Mutty, L. J., & Co., 91 Federal St.	609
Murray Co., P. A., Newton, Mass.	308, 324
National Carbon Co., Cleveland, O.	439
N. Y. & N. J. Lubricant Co., 165 Broadway, New York City	503
Neale, A. F., 10 Motor Mart	331
New England Auto Journal, Pawtucket, R. I.	48
Nichols & Co., D. P., 5 Edgewood St., Roxbury.	209, 210, 211, 212, 213
Nightingale Whistle Co., 1777 Broadway, New York City.	614, 625
Noonan Tool & Machine Co., Rome, N. Y.	355, a
Olds-Oakland Co., Massachusetts Ave.	100
Oulton Motor & Mfg. Co., 311 Atlantic Ave.	246
Oakley Steel Foundry, Millbury, Mass.	429, a
Panhard Oil, 226 Columbus Ave.	407
Park Sq. Auto Station, 443 Columbus Ave.	13, 17, C, 231
Parker Motor Co., Hartford, Conn.	352
Parker & Co., F. R., 243 Columbus Ave.	150, a, 351
Panhard Oil, 226 Columbus Ave.	407
Pantasote Co., The, 11 Broadway, New York City	523, 524
Peerless Motor Car Co., 178 Columbus Ave.	12, 16
Pennsylvania Rubber Co. of New York, Jeanette, Pa.	423
Perfection Wrench Co., Port Chester, N. Y.	616
Pierce Cycle Co., The, Buffalo, N. Y.	575, 576
Pittsfield Spark Coil Co., Dalton, Mass.	431
Pittsburg Auto Equipment Co., Beatty St., Pittsburgh	564, B
Poison, W. F., Buffalo, N. Y.	410, 411
Pope Mfg. Co., Hartford, Conn.	215
Post & Lester Co., 288 Devonshire St.	424
Premier Motor Car Co. of N. E., 1008 Boylston St.	42
Proctor Supply Co., G. H., 25 Irvington St.	100, 243
R. I. V. Bearings, New York City	406
Rainier Co., The, 587 Boylston St.	156
Randall-Faichney Co., The, 251 Causeway St.	512
Rausch & Lang Carriage Co., Cleveland, O.	330
Rayvello Chemical Co., Malden, Mass.	351a, a
Reading Standard Co., Reading, Pa.	606, 607
Regal Motor Co., 12 Park Sq.	151
Reliance Motor Car Co., Owosso, Mich.	250, 251
Reliance Motorcycle Co., Owego, N. Y.	580
Reliance Speedometer Co., 134 Eliot St.	426a
Remy Electric Co., Anderson, Ind.	547, 548
Republic Rubber Co., Youngstown, O.	545
Robinson & Son Co., 44 Commercial St.	525
Rogers, Leo N., 264 Warwick St., Roxbury	367
Russell & Co., W. L., 169 Huntington Ave.	20
Russell, T. F., & Co., 176 Federal St.	427a, a
Rutherford Rubber Co., Rutherford, N. J.	622
S. M. Supplies Co., The, 22-24 Lincoln St.	136, 142
Sage Trunk Co., 144 High St.	609a, a
Salman Co., John A., 21 Bromfield St.	447
Sampson Mfg. Co., Alden, Pittsfield, Mass.	319, 323
Sanders, N. S. H., 173 Huntington Ave.	133
Sawyer Oil Co., Howard B., 65 Long Wharf	366
Schacht Mfg. Co., Cincinnati, O.	222
Seamless Rubber Co., New Haven, Conn.	532
Selden Motor Car Co., 801 Boylston St.	135
Shawmut Tire Co., 103 Bedford St.	450, 451
Simmons, Hatch & Whitten Co., 141 Milk St.	654
Sireno Co., New York City	610, 611
Smith Co., Wm. J., New Haven, Conn.	414, B
Smith, Fred S., 38 Columbus Ave.	15
South End Motor Car Co., 24 E. Concord St.	315, 316
Splitdorf, C. F., New York City	422
Stackpole Battery Co., St. Mary's, Pa.	414a, 3
Standard Motor Car Co., 224 Pleasant St.	339, 348
Standard Thermometer Co., 65 Shirley St., Roxbury	428B
Standard Tire & Rubber Co., 102 Portland St.	500A
Standard Welding Co., Cleveland, O.	421
Stanley Motor Carriage Co., Newton, Mass.	19
Star Auto Locks, 53 State St.	220, B
Sterling Hardware Co., 10 Warren St., New York City	358
Stevens-Sowers Motor Car Co., 821 Boylston St.	23
Stromberg Motor Devices Co., 1253 Mich. Ave., Chicago.	551, 552, 553
Studebaker Bros. Co. of N. Y., 1020 Boylston St.	40, 41, 218, 219
Suburban Concrete Block Co., Somerville, Mass.	368
Swinehart Tire & Rubber Co., Akron, O.	543
Thomas Motor Co., E. R., 587 Boylston St.	655
Tyler, Frank J., 121 Massachusetts Ave.	116, 117, 134
U. S. Light & Heating Co., 84 State St.	546
Underhay Oil Co., 73 Batterymarch St.	621
Underhill Co., The, 222 Columbus Ave.	6, 10, 241, 242
Vacuum Oil Co., Rochester, N. Y.	521, 522
Valentine & Co., 74 Pearl St.	533
Veeder Mfg. Co., Hartford, Conn.	437
Victor Auto Supply Co., New York City	511
Victor Metals Co., Braintree, Mass.	329
Voorhees Rubber Co., Jersey City, N. J.	613
Warner Gear Co., Muncie, Ind.	415
Warner Instrument Co., 925 Boylston St.	435
Ward & Sons, E. T., 23 Purchase St.	122, 123
Weed Chain & Tire Grip Co., New York City	505
Westinghouse Electrical & Mfg. Co., Pittsburgh	356, 357
White Co., The, 320 Newbury St.	5, 9, 216, 217
Whitten-Gilmore Co., The, 907 Boylston St.	108, 109, 110
White, Ware & Co., 1024 Boylston St.	317
Whittaker Chain & Tread Co., 12 Pearl St.	553, a, a
White & Dagley Co., Worcester, Mass.	425
Whitney Mfg. Co., Hartford, Conn.	518
Wilkinson Co., A. J., 184 Washington St.	560, 561
Wing, F. E., Motor Mart	122, 123
Winton Motor Carriage Co., 148 Berkeley St.	4, 8
Y. M. C. A. Auto School, Boston	[illegible]

Looking Ahead
in the
Automobile Industry

CONTEMPLATION of the future prospects and possible growth of the automobile industry is an occupation fraught with considerable danger; no other product of man's ingenuity has shown such a perverse tendency to confound all would-be critics. An example of this disposition will be afforded by a glance at the statistics of the industry printed in these columns but four weeks ago. In the article referred to tables were given of all the known companies engaged in manufacturing automobiles; the list totaled 211 names. In the four weeks following no less than 23 additional firms—more than 10 per cent—have been added to the ranks.

At the same time the total number of cars to be produced in this country during 1910 was estimated at 280,000, and at the time this seemed hardly a conservative figure. Since that time a great number of firms have increased their figures, and with the added product of the newcomers, it is inevitable that the total will run well over the 300,000 mark.

The standings of the various cities and States as centers of the industry have been considerably changed by these additions. Milwaukee, Wis., has been the scene of the greatest activity; it has, since the compilation of the last set of tables, acquired four companies manufacturing motor trucks and other commercial cars. These place it sixth in the list of cities ranked according to the number of firms, with a total roll-call of seven. St. Louis has been moved up to fifth by the acquisition of three new firms, one manufacturing pleasure cars and one both pleasure and commercial vehicles, which make its present total eight.

Chicago has become the home of three new companies, one for the production of pleasure cars and two for commercials, which give it a total of eleven and advance it to second place, ahead of Cleveland and Indianapolis, and second only to Detroit. This last city has had its roll increased by two, one making pleasure and one commercial cars, so that its number of factories now attains the comfortable figure of 25. Minneapolis, Minn., also has shown some activity, and has obtained two new plants.

AMERICAN PRODUCTION BY YEARS
What May Be Expected from Continued Increase

		Cars Produced	In Use
Figures known approximately	1907....	80,000	100,000
	1908....	130,000	200,000
	1909....	200,000	350,000
	1910....	300,000	600,000
Figures based on 50 per cent annual increase	1911....	450,000	1,000,000
	1912....	675,000	1,600,000
	1913....	1,012,000	2,500,000
	1914....	1,519,000	3,800,000
	1915....	2,278,000	5,900,000

During the past three or four years the number of automobiles produced in the United States has increased each successive year by some 50 per cent over the preceding year. The number for 1909 was in the neighborhood of 200,000; for 1910 it will inevitably exceed 300,000. Carrying on this line of thought, it is interesting to see just where this rate of increase, if constantly maintained, would land the industry. With an increase of 50 per cent over the 300,000 for 1910, 1911 should see 450,000 cars brought forth; for 1912 the figure would be 675,000, for 1913, 1,012,000, and so on.

Five years is a very reasonable expectation of life for a modern automobile; there are plenty of cars of the vintage of 1904 in every-day use at the persent time. On this basis, and assuming the rate of progress outlined above, the end of the year 1913 would find a total of 2,637,000 cars in use!

At first this sounds like the wildest speculation; but perhaps these figures will repay a short consideration. How many automobiles can the population of the United States use? There are many possibilities in such an inquiry.

It is a matter of common knowledge that there are in use in the United States at the present time more than 300,000 automobiles, and the demand still seems almost unlimited. When the additional 300,000 to be made this year are included, it will be seen that at the close of 1910 one person out of every 150 in the country will have an automobile, or one family out of every forty or fifty. Obviously the number of families capable of maintaining an automobile is comparatively limited, although the average is brought up by some who are able to support two or more. One family out of twenty seems about the ultimate limit, even considering the utmost possibilities of the $500 car.

The population of the country is increasing pretty rapidly, but not in a proportion to keep pace with the automobile product. Some time in the latter part of 1912, when, according to the schedule outlined above, there will be roughly a million and a half automobiles in use, the limiting ratio of one car to every 70 persons will be reached.

At that time the $500 car will have reached its perfection. With the great increase in the number of cars manufactured, and the consequent reduction in overhead charges and cost of material, the cars selling at that price will probably be very nearly what we now pay from $750 to $1,000 for. Barring the possibility of radical changes in design, it should be possible at that price to put on the market a four-cylinder car of 20 or 25 horsepower, seating four or five persons, with a wheelbase of not less than 100 inches, and 32 or 34-inch tires; these cars to be made in series of not less than 50,000.

When the million-and-a-half mark has been reached, this will imply the owning of a car on every farm of even moderate size, and by most of the salaried workers in the country. But private ownership and use, albeit largely for purposes commercial in their nature, is but the smaller part of the usefulness of the automobile. Some indication of the trend which the industry is now taking may be had from statistics of the 23 firms mentioned above as the latest comers in the field. Of these, 10 make pleasure cars, 11 make commercial cars, and two make both pleasure and commercial models. In the list previously published were enumerated 176 makers of pleasure cars, 22 who made both, and 24 who made commercial cars exclusively. The addition to the commercial ranks is nearly 50 per cent., that to the pleasure car makers less than 6 per cent. Thus is indicated the turning of the tide.

In all branches of commercial vehicle work the progress made so far has been only sufficient to give some view of the immense field ahead. From the lightest 500-pound delivery wagon to the 10-ton coal truck there is an immense range of possibilities. The comparatively few commercial vehicles in operation now have been sufficient to prove the economies of this method over the old-fashioned horse-drawn vehicles. During the four years which we have in prospect the greatest advances will be made in this line.

In several classes the automobile has already made notable inroads into the province of the horse. Most of the large department stores in New York, Chicago, and other large cities have discarded their horse-drawn delivery wagons, and have adopted motor vehicles instead. In brewery trucking motor power is almost supreme, and in the conveyance in large quantities of groceries and miscellaneous merchandise it has become prominent. Most conspicuous of all is the taxicab, which in the space of three years has practically put horse cabs out of business in all the large cities.

Newspapers find the automobile invaluable as a means of conveying their editions to outlying distributing stations. When the crowds leave the Harvard Stadium after a football game, they are met at the gates by newsboys with Boston papers from presses five miles distant, giving practically complete the details of the game and the final score—thanks to automobile delivery service.

With the lone exception of the Fifth avenue and Riverside Drive busses in New York, this country has nothing to compare with the innumerable bus lines in London, Paris and other large European cities. Certainly they are needed, and they will come. The 'bus line has every advantage over the trolley for infrequent service, and proves a formidable competitor even under "rush" conditions. For suburban and country service the next few years will find them supreme.

Further developments may be forecasted with some degree of accuracy. Automobile delivery service is sure to become universal; now used only by companies who must maintain extensive establishments, and by a few smaller concerns for advertising purposes, it will gradually spread among all classes. Great numbers of light delivery wagons with two-cylinder motors of moderate power, especially adapted to this service, will be produced this year.

In the truckage field the prospects are equally bright. Manufacturing plants, large retailing and wholesale merchandise houses, and dealers in coal and building materials will find motor service quicker, surer and more economical than horse service. Those concerns will especially benefit whose business requires the transporting of heavy goods between factories or distributing points twenty or more miles distant. All sorts of express and mail delivery will be done by motor power.

An important development in this connection will doubtless be the appearance of companies which will rent automobile trucks and delivery wagons on a service basis. The renting companies will own their own machines, a hundred or more in number; will maintain their own garages, do their own repairing and hire their own drivers. The companies who buy the service will do so simply on a mileage or ton-mileage rate, or on a basis of the number of deliveries made, according to agreement; they will buy a definite service and incur no risk beyond.

As feeders for railroad and interurban electric lines automobiles are already of great utility. Many farmers are finding that they can combine in one car a pleasure vehicle for family use, a swift runabout for business purposes and a light wagon for carrying fruit, vegetables and milk to the railroad station. The enormous spread of the good roads movement is constantly broadening the possibilities in this field.

When all these spheres of activity are considered, the number of automobiles which it is possible for the people of the United States to buy and make use of seems to enlarge almost beyond limits. With every delivery wagon, truck, farm wagon, cab and omnibus replaced by an automobile, it is easy to see the possibility of absorbing the two million or more cars of the estimated production by 1913.

The benefits of the change will be far-reaching. The primary reason for the adoption of the automobile in all the cases cited is its economy over present methods, whether in money or what is just as important, time. With automobile service universal, the economy may even be extensive enough to make a reduction in the "cost of living," now such a prolific source of discussion. Although the automobile has been the cause of many jokes on the mortgaging of homes, and is regarded in some quarters as a sign of reckless extravagance and profligacy, innumerable business men will vouch for its usefulness. Truer than ever before is the saying that transportation is civilization.

GEOGRAPHICAL DISTRIBUTION OF PLANTS

Plants	States	Plants	Cities
42	Michigan	25	Detroit, Mich.
31	Indiana	11	Chicago, Ill.
29	Ohio.	10	Cleveland, O.
26	New York.	10	Indianapolis, Ind.
24	Illinois	8	St. Louis, Mo.
17	Pennsylvania	7	Milwaukee, Wis.
15	Massachusetts.	7	Buffalo, N. Y
14	Wisconsin	6	Cincinnati, O.
9	Connecticut	5	New York City.
8	Missouri	5	Pontiac, Mich.
5	Minnesota	4	York, Pa.
3	New Jersey	4	Springfield, Mass.
3	Maryland	3	Philadelphia, Pa.
2	Iowa	3	Dayton, O.
6	Scattered	3	Reading, Pa.
		3	Hartford, Conn.
234	Total	3	Auburn, Ind.

In cities the use of automobile trucks and delivery wagons will solve the traffic problem. Although traffic as a whole is able to move faster than its slowest members, it is nevertheless considerably impeded by them. Moreover, the adoption of the automobile means the saving of the space formerly occupied by the horses, in many cases amounting to half the total length of the vehicle. With each individual vehicle only taking up half the space that it formerly did, and moving at twice the speed, it is plain that there will be four times as much room. Increased speed, even in cities, is by no means necessarily dangerous to the public. With proper traffic regulation, the greater speed means ample time for crossing in each direction at street intersections, at the same time without causing undue congestion.

The advantage to public health resulting from the disappearance of horses and their accompanying pests, the livery stables, will be inestimable. Street dust is a prolific breeding place for germs of every kind; its noxious effects are recognized by physicians. The passing of the horse means no more dust, and a consequent saving to municipal street-cleaning departments. These advantages will be recognized more and more with time, and in 1913, with the speculative two millions of automobiles in operation, it will not be a cause of surprise if all large cities will have passed laws prohibiting the keeping or use of horses within their limits, save perhaps for driving or riding in certain specified parks and boulevards.

One more consideration—these estimates have been made without considering the export possibilities, which are sure to be developed much more than at present. Although the field for automobiles in all Europe is perhaps not so large as in the United States alone, it is nevertheless of very considerable size, and the home factories are not only incapable of caring for it, but show no inclination to expand in order to do so. Quite possibly another million cars may be absorbed by the European market, at present developing rapidly.

ESTIMATED PRODUCTION BY STATES

States	Cars	Value
Michigan	160,000	$205,000,000
Ohio	45,000	66,000,000
Indiana	38,000	55,000,000
New York	12,500	40,000,000
Illinois	11,000	17,000,000
Wisconsin	10,000	14,000,000
Pennsylvania	7,000	12,000,000
Connecticut	4,000	12,000,000
Scattered	15,500	29,000,000
Total	303,000	$450,000,000

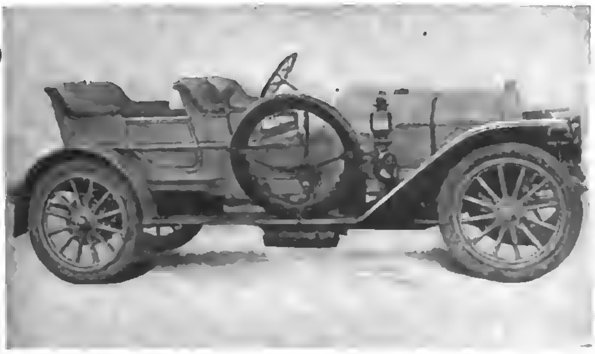
Mechanical Details of New England's Product

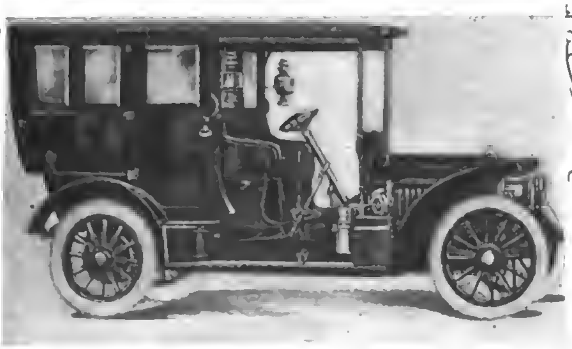
CONSERVATISM, which is said to dominate all of the actions of New England folks, need not of a necessity be applied to the automobile manufacturers located in that flourishing part of the country. These makers, though rather few in number, compare favorably with those from any other section in progress, both in larger matters and in the small niceties of detail.

The parts shown elsewhere on these pages show this and if further proof be needed some brief description will be added, this dealing more particularly with some one feature of each car, rather than attempting to describe the car as a whole. This scheme will have the advantage of accenting the more notable details of construction, to which every maker is pledged in one form or another, as well as supplying at the same time much real and practical information.

With perhaps a single notable exception, no one feature is more notable than that of uniformly high or medium prices, that is to say, there are few if any very low-priced cars made in New England. As to features, all of them are represented, including chain drive, two-cycle engine, air-cooled engines, steamers, wire wheels, electrics, commercials one, two three four and six cylinders unit power plants, valves in pockets and in the head, two, three and four speed transmissions, and many more minor features. In short, taking the cars as a whole, they run the whole gamut of motor car parts, both as to design, methods of construction and assembling and manufacturing methods.

This is, of course, to be expected, and probably, or at least, possibly, would be true of any other section of the country, which might be picked out, and its product analysed. Of all the features listed, steam has long been thought to have its home exclusively in New England, but latter day statistics show this idea to be fallacious, the increased output of Ohio, Michigan and Illinois factories devoted to this branch, coupled with the decreased activity of some Bay Staters in this line, having shifted the geographical center, so to speak, so much farther West that it passes out of the western boundaries of New England proper.





Top—Hartford, Conn., Is the Home City of the Columbia
Bottom—The Locomobile, of which Bridgeport, Conn., Is Proud

Alco Adopts Shaft Drive Entirely

With the announcement of the season's models it was noted that the Alco has now definitely abandoned the chain drive for its own system of shaft drive, in which the load-supporting member of the rear axle is a solid drop-forging. This drive has been thoroughly tested in the Alco town cars and taxicabs, in which it has been always used, and its adoption in the larger models is in no way remarkable. Another important change is the adoption of the Bosch dual system of high-tension ignition, which includes a storage battery with the magneto, although both work on the same set of plugs. The use of the battery enables the motor to be started on the spark. These are the chief changes; they are in conformance with the policy of the company to Americanize the French design of the Alco in order to meet the prevailing demand. The company emphasizes the fact, however, that never is any change made until it is certain that the quality and all the distinctive character can be maintained.

Rakish Knox "Sportabout," a Product of the Springfield, Mass., Factory

Most of the excellent features have been retained, and each one of these is a reason for buying in itself. The special design of rear axle of the full floating type, the French type of engine, Americanized, the anti-fatigue steel used throughout the car regardless of cost, the unusually large and powerful brakes, the deep, square tube radiator and other features which space prevents the mention of, are all mute but eloquent arguments in favor of the Alco car. With these changes goes a considerable reduction of prices.

Turning to the table of standard American automobiles, as given in last week's The Automobile, it will be noted that the changes were such as to bring this car more close to the standard, the percentage of chain-driven models in their class, the $4,000 class, being but 8.1. So, too, with the change in ignition, although this percentage is but 10.4 it marks a tendency which is growing rapidly.

Cameron Line All Air Cooled.

Air as a means of cooling the cylinders of the engine seems to appeal to the makers of the Cameron cars, the Cameron Car Company, located at Beverly, Mass., and New London, Conn., since all models turned out are thus cooled. For this year both four-cylinder and six-cylinder models will be listed, with all styles of body, a distinctive engine, as well as transmission, while the prime idea of the whole construction is that of obtaining light weight without making any sacrifice in other ways.

Not only will two separate and distinct types, such as a four and a six, be built, but they will be manufactured in two separate and distinct factories, each devoted to a single style and type of car. This should result in each one being superior to what it would be if the two were made under the same roof. The fours are manufactured at the Beverly plant and comprise five models, including two-passenger runabout, special two-passenger featherweight flyer, three-passenger roadster, four-passenger surrey with detachable rear seat, and standard touring car. The prices range from $950 to $1,100. The sixes are manufactured in the new plant of the Cameron Company located at New London, Conn., and the line comprises five models as above, all listing at $1,500.

It has been the policy of the Cameron Car Company from the very earliest days of its existence in 1902 to manufacture its cars complete in its own works, and this policy is being pursued in exactly the same manner to-day. The four and six-cylinder cars are manufactured in separate plants which build, from the ground up, all parts which go into their

Knox Close-Coupled, Fully Equipped, Made in Springfield, Mass.

respective cars. Every detail is known to a certainty.

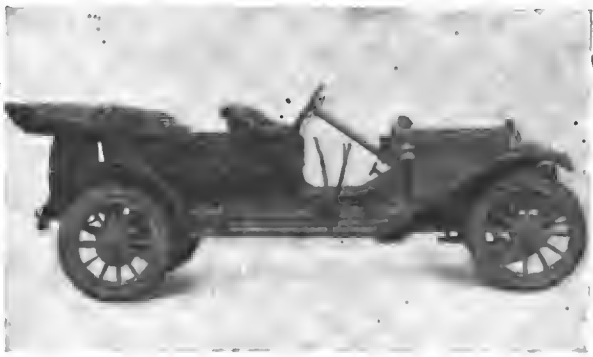
The motors for the coming season show no radical changes and are built along the lines on which Cameron has been working for the last seven years. Minor improvements will be found, but reference to the illustrations herewith will show that important features such as the system of air-cooling and location of valves remain the same as heretofore. The four-cylinder motor is 3 7-8 bore by 3 1-2 stroke, developing 24 horsepower, and the "Six" developing 36 horsepower. Both are regularly equipped with high-tension dual system of ignition, which inclues the magneto and auxiliary set of dry cells, gear pump, constant level oiling system of a very simple, effective design, oil being carried from a large chamber on the lower side of the engine base through a tell-tale on the dash and forced into the crankcase under a high pressure, where it is sprayed on shaft and connecting rod bearings. Thence it flows to the bottom of the case and lubrication is furnished to the cylinders by splash. The engine base is of aluminum, split horizontally in the center, the cylinders cast singly with radial fins.

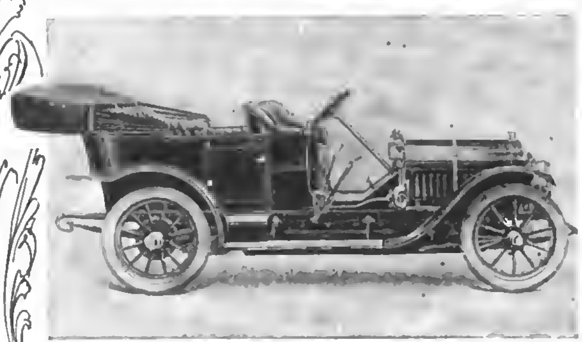
Clutch is a self-contained cone of proportionately large diameter and easy angle of contact. Engine bearings are of nickel babbitt; camshaft bearings, case-hardened steel set in cast-iron bushing, and crankshaft rocker arms and all important small parts are of drop forged nickel steel. The wrist pin construction of these motors is the same as has been used by Cameron for years and is slightly different from that known to general practice, the wrist pins being steel drawn tubes, hardened and ground, with a hardened and ground connecting rod swinging directly upon them with no bushings whatever, thus giving two round surfaces as a bearing. These will run almost indefinitely without showing any signs of wear whatever. It is claimed that this construction will outlast half a dozen bronze bushings.

The valve action is unusual. The valves are set in the cylinder heads opposite each other, with their stems horizontal. They are actuated by long rockers, one end of which bears on the cam and the other on the valve stem; no push rods are used.

SPECIAL REAR AXLE TRANSMISSION SYSTEM

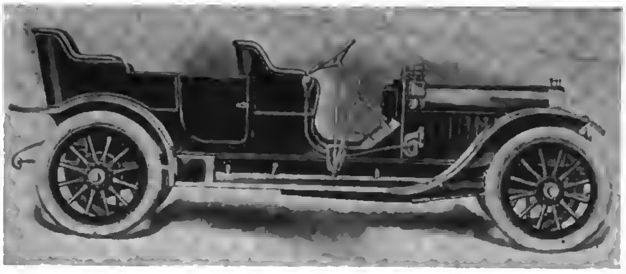
This is of the Cameron patented type, three speed selective, direct drive on all speeds. The six-cylinder system is slightly different from that used on the four-cylinder cars. This change will readily be understood by those who are familiar with the

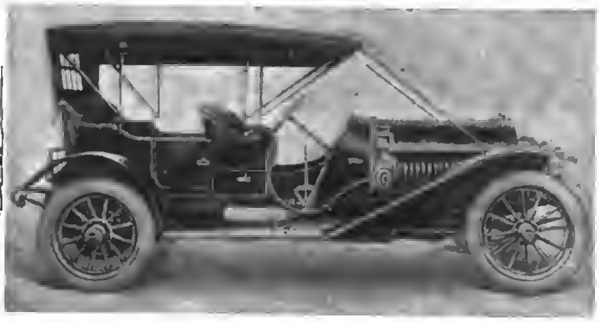


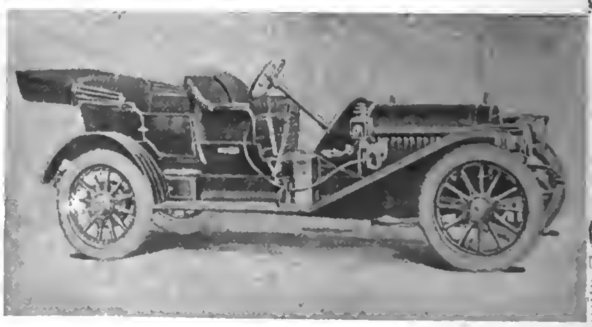


Top—The "Full Jeweled" Corbin from New Britain, Conn.
Bottom—Hartford, Conn., is the Home of the Pope-Hartford

transmission. On the lighter machines, that is, the four-cylinder line, the transmission carries three gears on the cross or jack-shaft and one on the differential, while on the heavier transmission used in the six-cylinder cars, two gears are carried on the cross-shaft and two on the differential. While all of the six-cylinder models weigh less than 1,700 pounds, still this car is slightly heavier than previous models, and with the great power of the motor, of course, requires a heavier gear all round than the four-cylinder cars. The power is delivered from the engine to the rear wheels through a single universal joint to driving shaft and bevel gears, to the cross or jack-shaft, and finally, from the cross-shaft by wide face spur gears to the rear







Top—Another from Springfield—the Two-Cycle Atlas
Middle—Alco, from Providence, R. I., as a Tourer
Bottom—Representative of the Locomobile Factory

axle. The advantage gained in this construction aside from the fact that the gears, instead of being thrown into mesh sideways, are thrown directly together face on and rolled together with a natural motion, is the fact that the bevel gears never receive more than the engine pull, and being set up firmly in mesh in a solid steel frame running on adjustable ball bearings, have no chance of springing out of mesh under heavy load or showing any undue wear, which always means much loss of power to a bevel gear.

In shifting gears, the arch carrying the gear set is first thrown forward in the case when the combination of gears wanted is thrown into line. When traveling crosswise in the case there is no strain against the gears to prevent sliding over. Gears are then brought together, face on, with a natural rolling motion which prevents jar, shock, or any injury to the gears themselves, as no strain of the engine pull can be put upon the driving gear until they are firmly in mesh and locked into position. The reverse gear stands idle except when in use, and is then thrown down in mesh from the top of the case. All gears are of unusually wide face and coarse pitch, are made up of drop forged blanks of chrome nickel steel, as are also the shafts. Ball bearings are used throughout the transmission and rear axle and are of annular type, of Cameron's own design and construction.

Refinement of Fine Car, Columbia

Close attention to the main details of the product will be the keynote of the Columbia production for 1910, the result being an ultra-refined Model 29. With the model first evolved in 1906 there has been opportunity to raise each unit of construction to a very high place and for the year at hand the new car will first interest veteran motorists for a number of little niceties which have been incorporated. Friends have said that it contains more clever features than any car of current building. Also, it is fair to state that no new car in its first or second year could have been worked out to a state of such high efficiency.

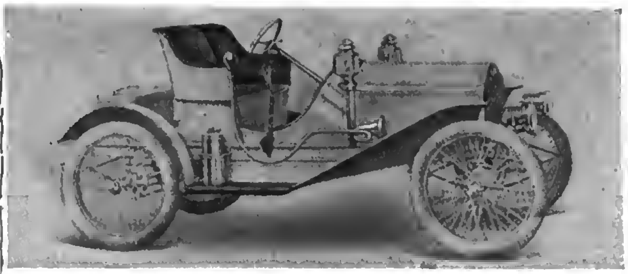
The company is building the car as well as Columbias have been built in the past, which means to a fine point of machining accuracy. Further it is provided with a higher quality of raw material than the market has ever previously held. These and what seems to be a fortunate selection of body styles have made for a strong interest in the car.

As to body style, the latest form which this takes is the short chassis with toy tonneau, double or single rumble. All three of these are interchangeable. This particular body is frequently done in a light gray, striped a lighter green, and upholstered in dark green. The whole effect is very attractive, as are also all of the other color tones, most of which show a tendency towards gray and the other, pleasing lighter colors.

BRIEF MENTION OF DETAILED CHANGES

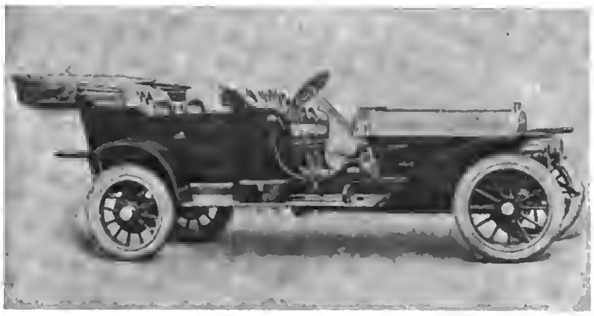
Considering the mechanical parts in detail of the model known as Mark 48, Lot 4, the bore and stroke, together with the dependent working parts of the engine have been increased in size. The valve springs are completely covered to exclude dirt and eliminate noise. The crank case is extended to enclose the front engine gears, so that the splash oiling system now lubricates these gears. The oil supply is carried in a compartment cast integral with the lower half of the crank case, a float indicator showing the amount on hand. The oil pump, driven by bevel gears from rear end of valve cam shaft, is located below the level of the supply, thus relieving it from drawing up the oil. The oil level in each compartment of the crank case is regulated by thumb screws, easily accessible from the outside. The governor is driven by bevel gear from rear end of cam shaft. A drain cock has been installed on the water pump. The float feed, multiple-jet carburetor has a hot water jacket surrounding each mixing chamber and an automatic air valve is added to the small barrel, resulting in a more uniform mixture. A square section intake pipe replaces the round pipe of preceding practice. The "Seeley" jump spark ignition system with separate set of plugs, introduced over the inlet valves is installed in addition to the regular make-and-break system, and takes current either from an "Exide" Storage Battery or "Bosch" low tension magneto, enabling one to start from the seat. The distributor for the jump spark system is driven by bevel gear from rear end of cam shaft. The engine starting ratchet is attached to the engine middle section instead of the frame, resulting in perfect alignment. The radiator of "Extended section type," is of increased size and provided with a rubber covered cap. It is swung on trunnion supports and therefore receives no strain from any frame movements or distortion.

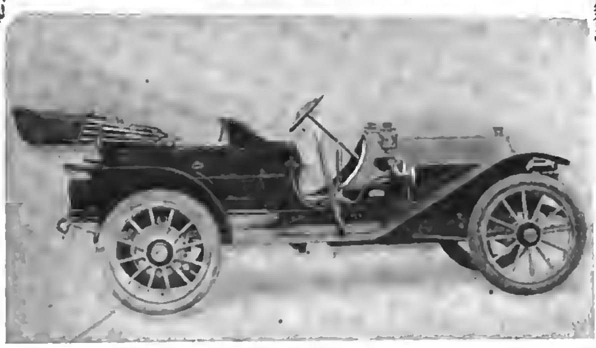
The fly-wheel rim markings are numbered in sequence to facilitate valve and ignition timing. The cone clutch is increased in diameter and the clutch shoe springs are made adjustable and self-locking. The universal joints on the propeller shaft are completely enclosed in grease retaining covers. The rear axle housing and all moving parts therein are increased in size in proportion to the increase of engine power. The braking surfaces on rear hub drums are greater and the contracting foot brake bands lined with "Thermoid." Clutch and brake foot pedals are of disappearing type, adjustable to any length of limb. All brake rods are adjusted by locking bar turnbuckles, eliminating the use of wrench or other tool. The foot pedal operating the large carbureter is set level with the floor to insure foot support and steady, easily applied pressure.



ELECTRICS, TOO, HAVE BEEN REFINED

In this day and age of the gasoline machine, it is interesting to note a maker giving almost equal attention to the electric. This is the exact situation of the Columbia concern, the electric vehicles having been made the recipient of as much study as the gasoline driven cars. The electrics are now made in two distinct models—a light Victoria-Phæton and a town carriage of the coach class, the first being well suited to the use of physicians and women and valuable for all purposes demanding a light, speedy conveyance for two persons. The leading features include divided Exide Hycap battery of 24 cells with its weight evenly distributed over both axles. improved type of motor, six speed continuous torque controller, two complete sets of brakes, each independent of the other, "Hess-Bright" ball bearings throughout, and thirty inch wheels fitted with Hartford quick detachable rims and tires.





Top—Metz, from Waltham, Mass., Sold Unassembled.
Middle—Stevens-Duryea, from Chicopee Falls, Mass.
Bottom—Four-cylinder Stevens-Duryea Baby Tonneau

The Columbia town carriage is provided with either a brougham or landaulet body, and for private service is unexcelled. In the construction, lightness has been obtained everywhere but nowhere at the expense of strength. Hartford pneumatic tires in combination with a most flexible form of spring suspension insure easy riding qualities never before attained in a vehicle of the coach type, either self-propelled or horse-drawn. Speeds ranging from 4 to 18 miles per hour are quickly and easily obtainable through a controller lever mounted upon the steering column within convenient reach of the driver. Two powerful, independently operated brakes, and a safety switch insure absolute certainty of control under all conditions of street traffic. The special Exide battery is the most efficient and reliable yet devised for vehicle use. There are inside seats for five persons. The upholstering, interior fittings and appointments are of the finest materials obtainable and the entire finish down to the smallest detail is of the most elegant.

Finances Favorable for Corbin

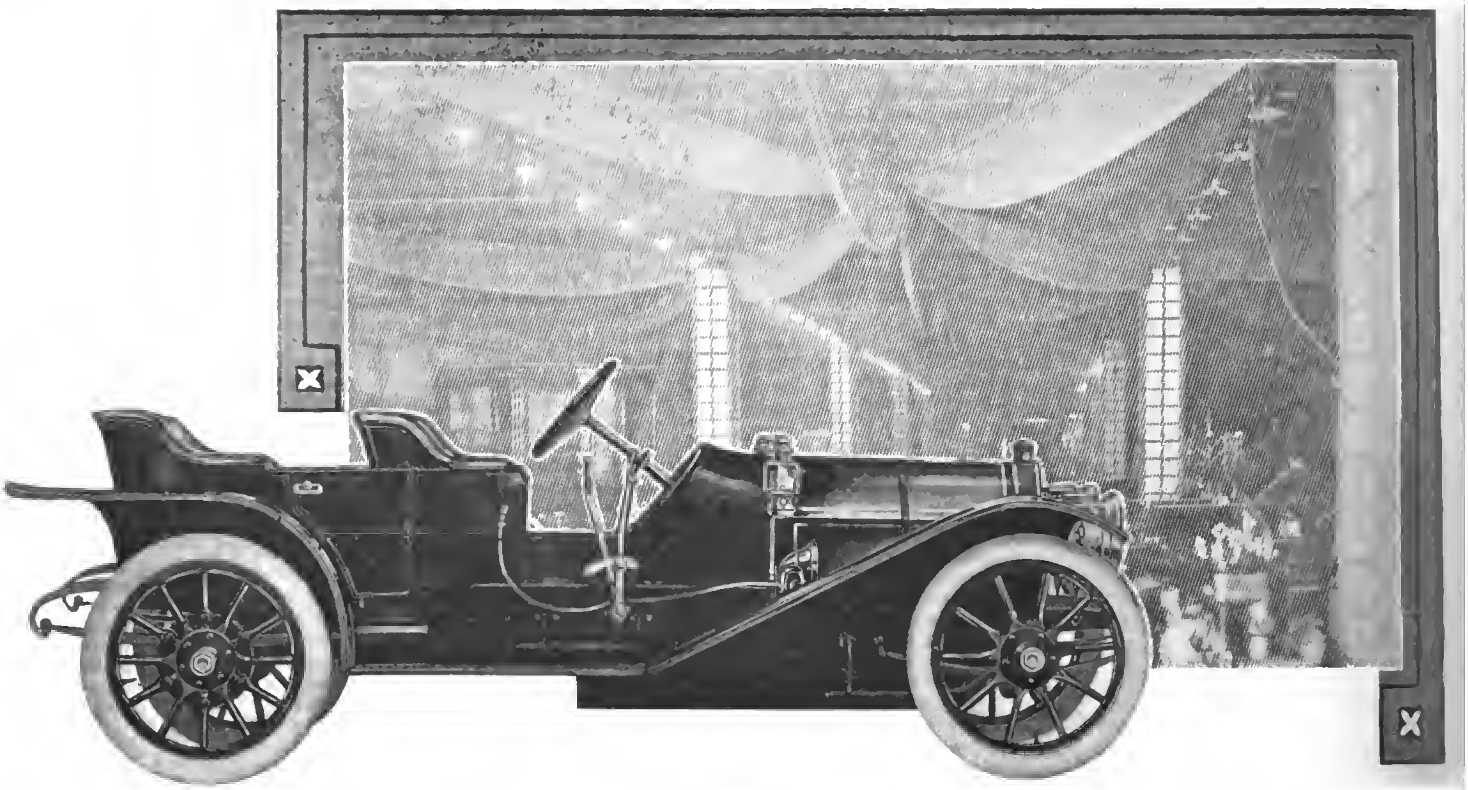
Standing and backing of a firm have a great deal to do with the ultimate best results to be obtained from a car, and considering this, the Corbin Motor Vehicle Corporation, New Britain, Ct., considers itself eligible for a large share of the possible business to be done in 1910. This concern is associated with other large manufacturing establishments, the cars have been the results of splendid engineering skill and knowledge, and it is the announced intention of the factory that the same standards shall be maintained throughout the immediate as well as future seasons.

As in the past the efforts of the entire force will be concentrated upon a single model, giving the experiences gained in five years of making Corbins, and some of the constructive details proven in the models in which they were pioneers are important still. With one type of chassis will come two motors, either water or air-cooled, though the latter will be made only on special order, and the two engines are interchangeable, of course, with their individual fittings. The success of the 1909 season was so marked that the prospects become bright for an even more flourishing one ahead and orders for material sufficient for 600 automobiles have either been let or are pending. It is planned by the officials to turn out that number of cars during the 1910 period and already deliveries have been going on for a month.

WHAT HAS BEEN DONE IN REFINEMENT

As has become somewhat general among the stable members of the industry, standardization has been attained to such a degree that few deviations are necessary. In the new Corbins this will be well illustrated, for the variations from previous practice may be counted upon the fingers of one hand. In the motor itself the principal ones include enclosed timing gears, a new type of oil pump and a changed location, and the moving of the magneto from the front inlet side to the rear exhaust side. The oil pump was formerly mounted midway on the exhaust side and driven directly from the camshaft, but now it is further back on the same side and is driven by the same helical gear which operates the distributor. The pump is now a centrifugal one instead of plain-gear and forces oil from the reservoir, under the foot-boards, through dash sight feeds to the four cylinders and thence to the crankcase for splash. The two-to-one or timing gears remain at the forward end of the case and are enclosed in an aluminum oil-tight case. A Bosch magneto is now regular equipment and this is placed at the rear of the exhaust side and driven by aluminum to fiber gears from the camshaft. In previous models this has been extra equipment and provision was made to drive it from the timing gears at the front next to the carbureter. The change keeps all moving parts on one side.

In the chassis the frame has been lengthened $2\frac{1}{2}$ inches and this put into the wheelbase to insure greater comfort.



Of the New Roadsters and Baby Tonneaus, None Has More Dashing Lines than the Chalmers "Forty" in This Model

Houpt Makes Large-Sized Engine

Bristol, Conn., is the home of the Houpt car, a comparative newcomer in the automobile line, but made by a man old in years of experience, Harry Houpt, formerly Metropolitan agent for the Thomas cars. The first car was a four-cylinder sixty horsepower model, but a later model is to be produced of six cylinders, which will be rated at 90 horsepower. The four-cylinder Houpt car is thought to be the largest four-cylinder stock car made in this country; its cylinders are 5½ inches bore by 6 inches stroke, rated at 60 horsepower. The cylinders are cast in pairs, and the valves, 2⅝ inches in diameter, are placed on opposite sides. In general the motor follows standard design. In the tests at Bristol, the motor showed exceptional power and quick acceleration, combined with practically noiseless operation. The carbureter is float-feed, the gasoline being under pressure in a tank slung from the rear of the frame. The water-cooling system employs a centrifugal pump with both

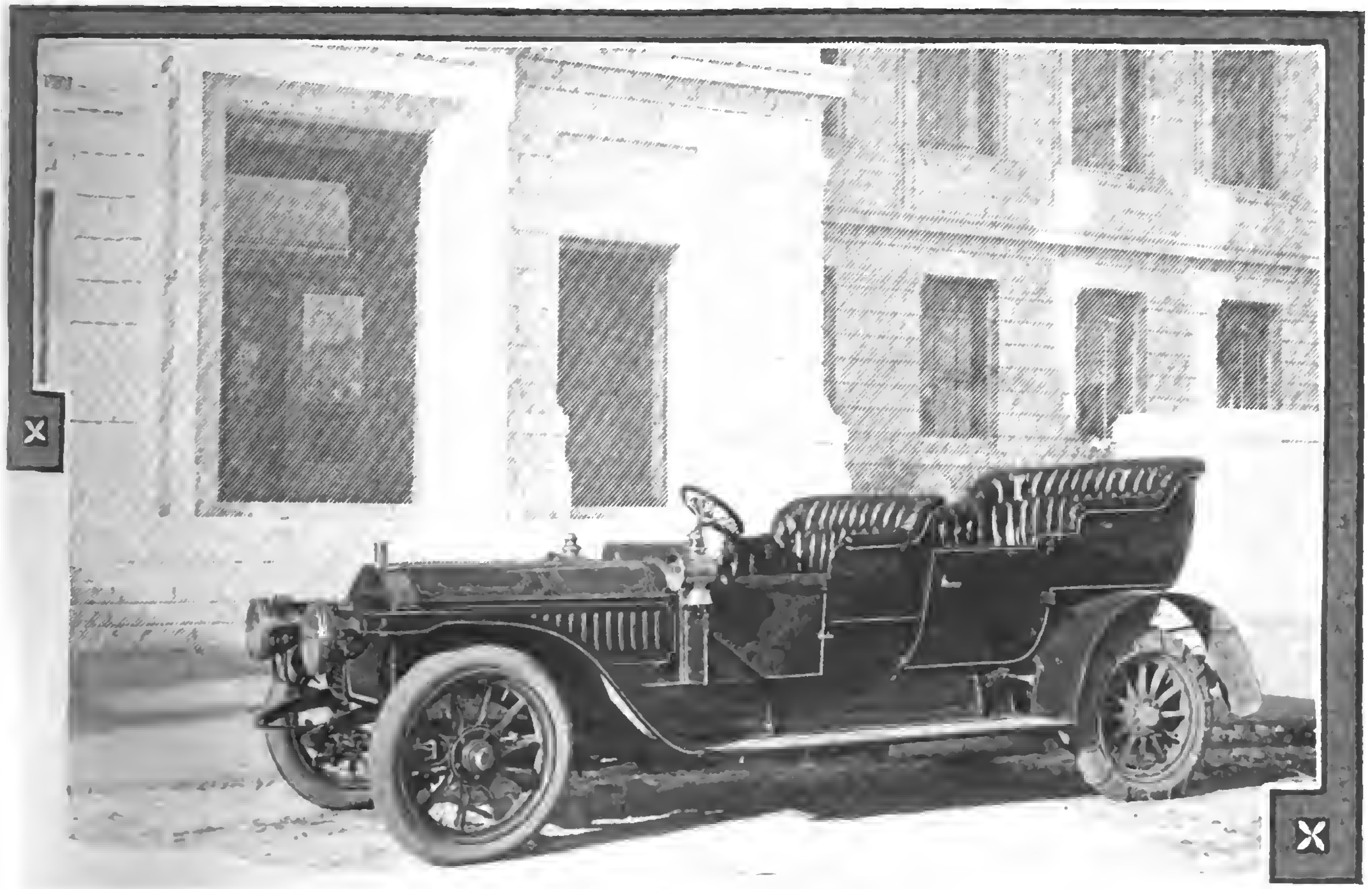
Packard's Body-Building Plant Is Famous for the Excellence of Its Product, Exemplified In This Limousine-Landaulet radiator and flywheel fans. The ignition is double, with a single set of spark plugs in the cylinder heads.

Power is transmitted through a multiple-disc clutch containing 53 steel-on-steel discs, and the change-gear is of the selective type, giving four speeds and reverse. Drive is by a nickel-steel cardan shaft to a full floating type of live rear axle, with bevel differential. The frame, also of nickel steel, is dropped forward of the rear axle and rests on semi-elliptic springs both front and rear. The motor suspension is four-point and that of the gear case three-point. Brakes are internal expanding on the rear hubs and external contracting behind the gear case. The wheelbase of the four-cylinder car is 127 inches; wheels are 36 inches, with 4-inch tires in front and 5-inch in rear. The car weighs 3,100 pounds. The six-cylinder model has cylinders the same size as those of the four, and its power will be conservatively expressed by the maker's rating of 90 horsepower.

ENGINES WATER-COOLED, FOURS AND SIXES

All Knox motors are now water-cooled, with valves located in the head, a location which has become very popular on the other side, being a noticeable feature of every winning car of this season. Model "R" cylinders are 5-inch bore, 4¾-inch stroke, rated at 38 horsepower, A. L. A. M. standard; Model "M" is 5½-inch bore and 5½-inch stroke, rated at 48 horsepower, A. L. A. M. Both have cylinders cast separately; each consists of two distinctive castings—the cylinder proper and the head. The water jacket of the cylinder is cast integral therewith, the water entrance being at the lowest point, and the outlet near the top on the right-hand side of the casting.

In the upper end of the cylinder casting a deep concentric groove is machined in which fits a copper asbestos gasket. Upon this is seated a corresponding concentric tongue formed on the bottom of the head which is firmly secured to the head by four



Boston Is Headquarters of British Napier Car, Which Is Imported from the London Factory

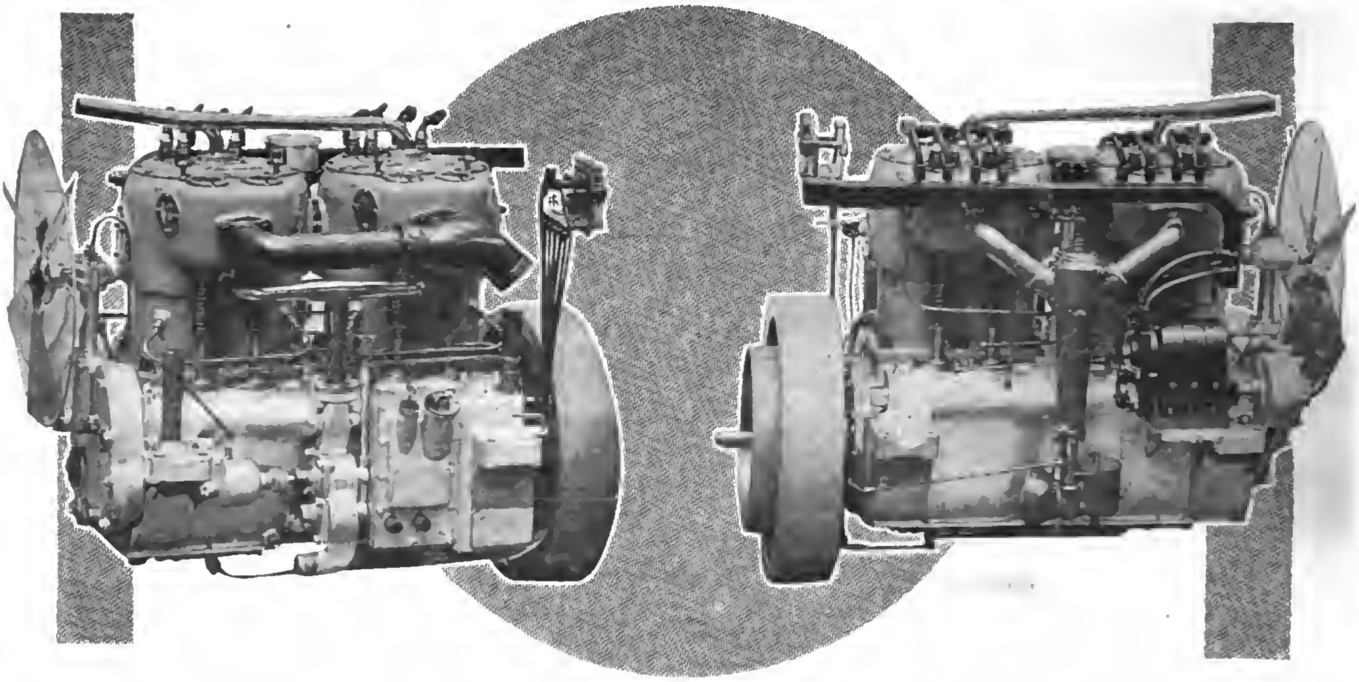
Unit Power Plant a Knox Feature

Among the many excellent cars hailing from the Bay State, no one is more prominent than that hardy pioneer, Knox. This car is made by the Knox Automobile Company, Springfield, [illegible] and contains many features of mechanical excellence, [illegible] been used so long as to be synonomous with the [illegible], might be mentioned: Unit power plant, three-[illegible], multiple disc clutch, double ignition, De Dion [illegible] lubrication, and many more. For 1910 this concern [illegible] out three models, Model M, continued from 1909 and [illegible] on account of its continued successful career; [illegible] different cars just added to the list, Model R, of 40 [illegible], which replaces Model O of last season, four cylin[illegible] a new "six," Model S, rated at 57 horsepower. All of the newcomers follow in a general way the construction of Model O, since the success of that model is taken as the best kind of proof that the form of construction is wholly right. The similarity of the different motors is remarkable.

bolts. It is impossible to bring these parts together except in a correct location and with a correct bearing. This joint, it should be noted, is not a water joint; in fact, there are no water joints in this construction which can occasion a leak into the cylinders.

By this simple construction cylinders are secured symmetrical in form and perfectly uniform in cross section, which fact reduces to a minimum the liability of going out of round. Furthermore, they may be easily and accurately machined, the casting being entirely open at both top and bottom. The bottom of the head is also machined so that the entire surface of the combustion space is smooth and accurate in capacity, giving a perfect balance of the volumes of all cylinders, which contributes to sweet and even running. Machining the combustion space has other advantages, usually not taken up because of the cost.

In addition to this, the smooth surface of the combustion space is less likely to retain deposits of carbon than the rough casting, and the entire absence of sharp points, edges and roughness is supposed to be a preventive of premature ignition. The



Peerless Motor Shows Neat Detail in Exhaust Manifold Jointed for Expansion and in Solid Rubber Bus-Bar

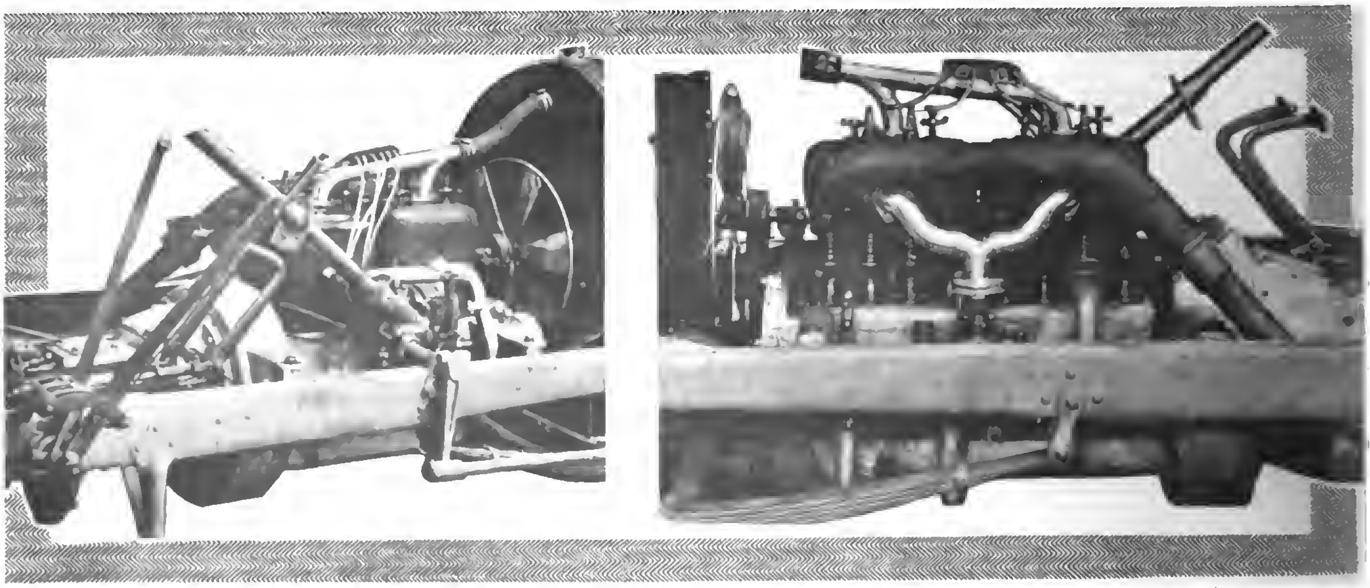
head is cast integral with its own independent water jacket, and the inlet and exhaust passages from the manifolds to the valves are cored in the head. The water spaces are large, the water circulating freely around all the parts mentioned as well as around both valve seats, the head being cast with a division through it horizontally, making two separate water spaces, the water circulation being directly over the valve seats, returning through the top water space to the return manifold, the water entering the lower one through a single U-shaped hollow casting. The "U" connection and the return water manifold are held in place by a double clamp and single bolt easy to connect and disconnect.

Concentration at Hartford

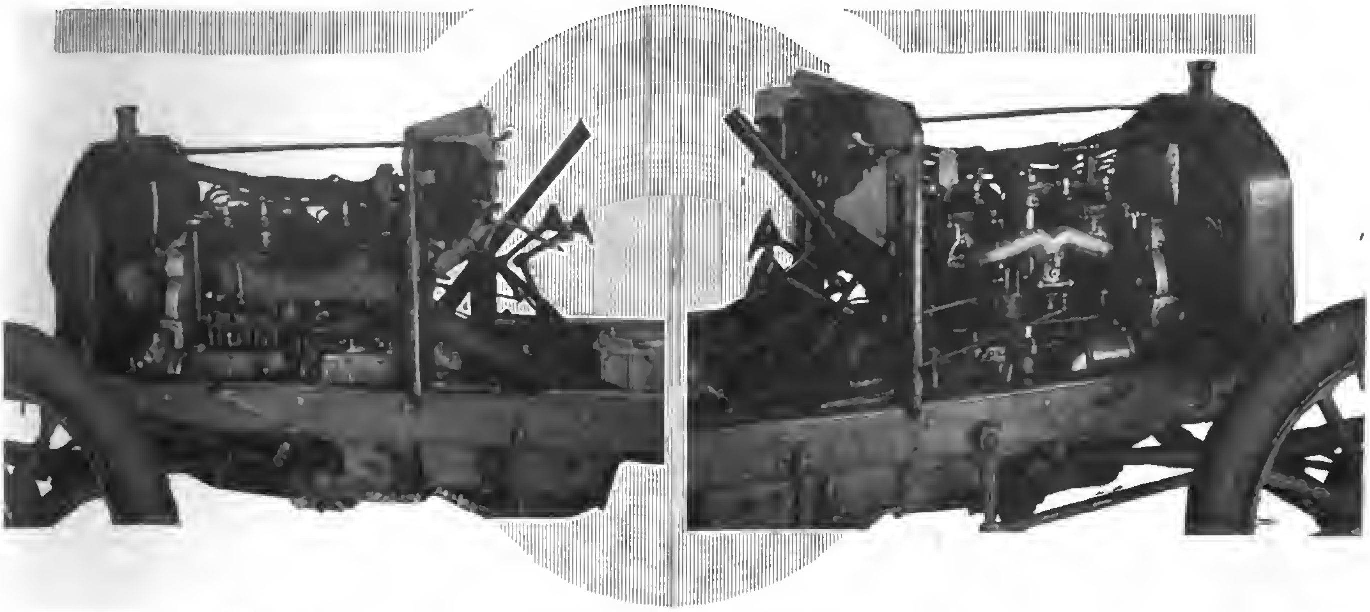
At the factory of the Pope Manufacturing Company, Hartford, Conn., although the body shops are located at Westfield, Mass., it has been decided to concentrate the whole attention upon one model and perfect that. For the year 1910, no attempt will be made at a large production, the modest figure of 1,000 cars being set.

This will bear the name of Model T, is a four-cylinder, 40 horsepower car, and may be had, at the purchaser's option, in six different and up-to-date body types. These are: roadster, seating two, three or four as no rumble, single or double rumble is used; pony tonneau, seating four or five; close-coupled body, seating five; seven-passenger, the name of which indicates its seating capacity; and two enclosed bodies, a limousine and a landaulet.

The changes which have been made since the details of last season's model were announced are few and far between. In the main, they constitute refinements, not changes. Thus, the longer wheelbase allows of a longer, more roomy and, consequently, more comfortable body. The greater length of body calls for slightly different lines, to conform with which the fenders and radiators were altered. The modern tendency to larger wheels is followed, and this year all sizes are 36 inches. The changes which include some actual difference in the design are: the lubricating system; new torque and radius rods; changes in the crankshaft and bearings; new clutch and clutch coupling. All have details which offer many points of interest to the student of automobile design.



Unit Power Plant Is a Cole "30" Feature; Note the Oil Level Gauge and Filling Cap on Valve Side



Mora, the "Mechanically Right" Car, Has Its Fan Driven by a Train of Spur Gears, Completely Enclosed

Doubtless the motor is worthy of the most attention, and this attention will not be wasted, for it possesses many meritorious points. Of the four-cylinder type, with cylinders cast in pairs, heads and water jackets are made integral. The cylinder castings are machined close to size and then ground to an accurate interior surface. Valves are located in the head, in cages which are readily removable and interchangeable. All valves are mechanically operated from the single camshaft on the left side by means of vertical pushrods and overhead levers. The valves are of large diameter, work on a 30-degree taper seat, and are ground to size. The valve springs are enclosed in a neat housing, thus keeping out dust and grit and preventing wear.

MUCH ATTENTION GIVEN TO LUBRICATION

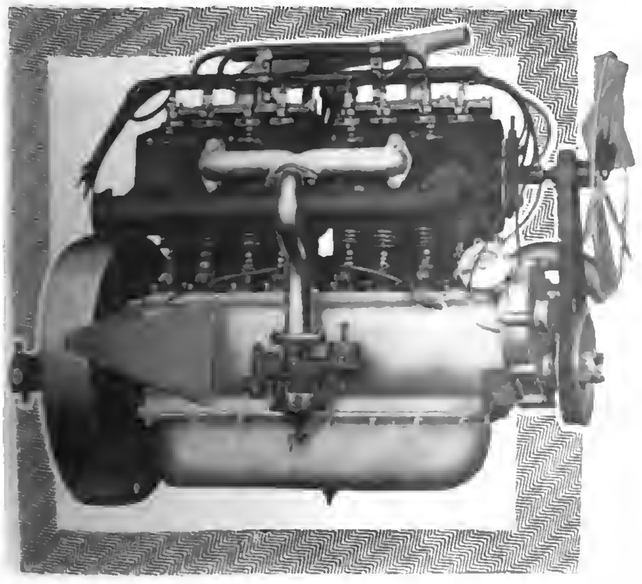
Over previous years, the lubrication is much improved; the mechanical oiler has been increased in size, moved slightly forward, an overflow from the oiler back to the oil pocket placed in the bottom of the crankcase, and a suction pump located in the case, which keeps the oiler body full. The oil pocket is cast on the bottom of the case, and is an integral part of it, although separated by a wall. The complete system is such as to lubricate the whole engine very efficiently. Besides the engine, the oiling of other parts is a subject of consideration.

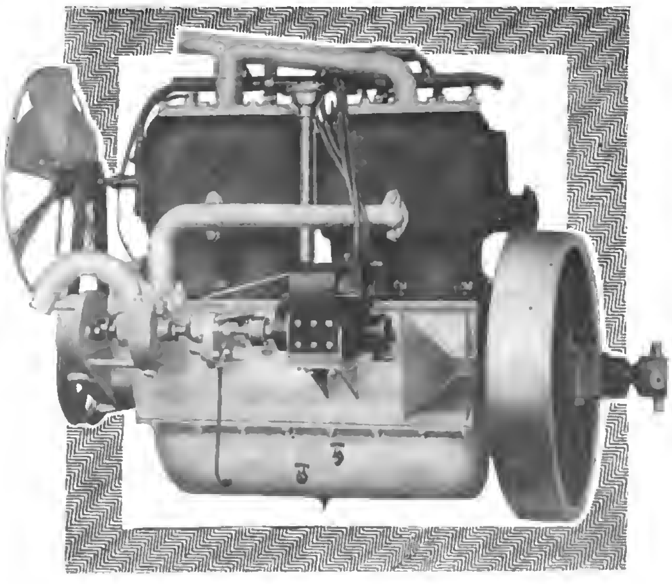
SEVERAL MODELS OF POPE COMMERCIALS

This firm also turns out on a somewhat similar chassis a fine line of commercial cars. Chief among those of this class which have been successful may be mentioned the ambulance, an excellent example of which was recently shipped to as far away a port as Rio de Janeiro. A description of this one will suffice to describe any and all of the ambulances made.

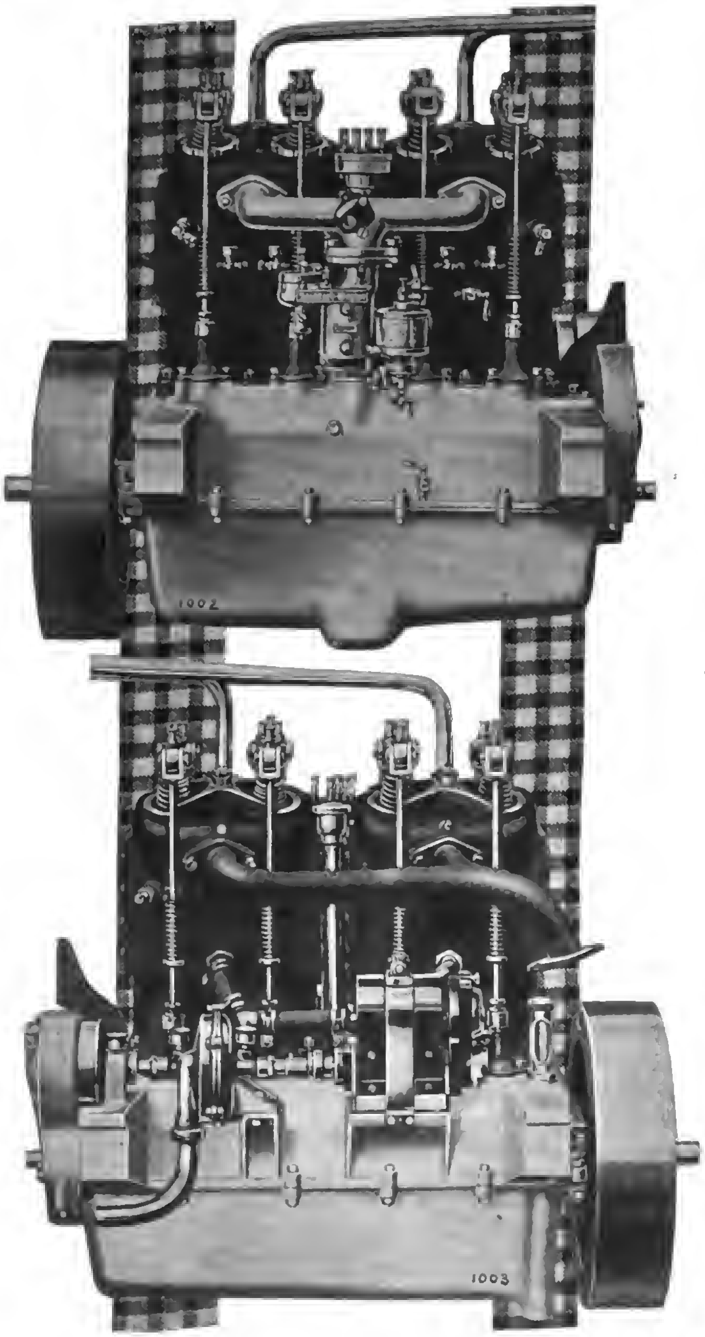
The body was mounted upon the regular chassis for commercial use, this being equipped with a 40 horsepower engine, three speed transmission, 130-inch wheelbase, standard tread, 34-inch wheels, 5-inch tires, and a special sixteen-gallon fuel tank.

Upon this chassis is mounted the body which was built after the special plans by the Navy Department of Brazil. It is very striking in appearance, for instead of the dark colors generally used on ambulances, it is painted with a soft French gray. This makes it more appropriate for use in a warm climate. One of the features particularly distinctive of this ambulance is the top. Here an entirely new idea has been put into effect. Instead of the closed roof, devoid of any means of ventilation, usually employed, this ambulance has what is called the "trolley" top. In this the top is carried up a little way above the sides, giving room for four oblong windows on each side and two both in front and in back.





As a Separate Unit, the Inter-State Motor Is Supported at Three Points; the Clutch Is in the Gear Box



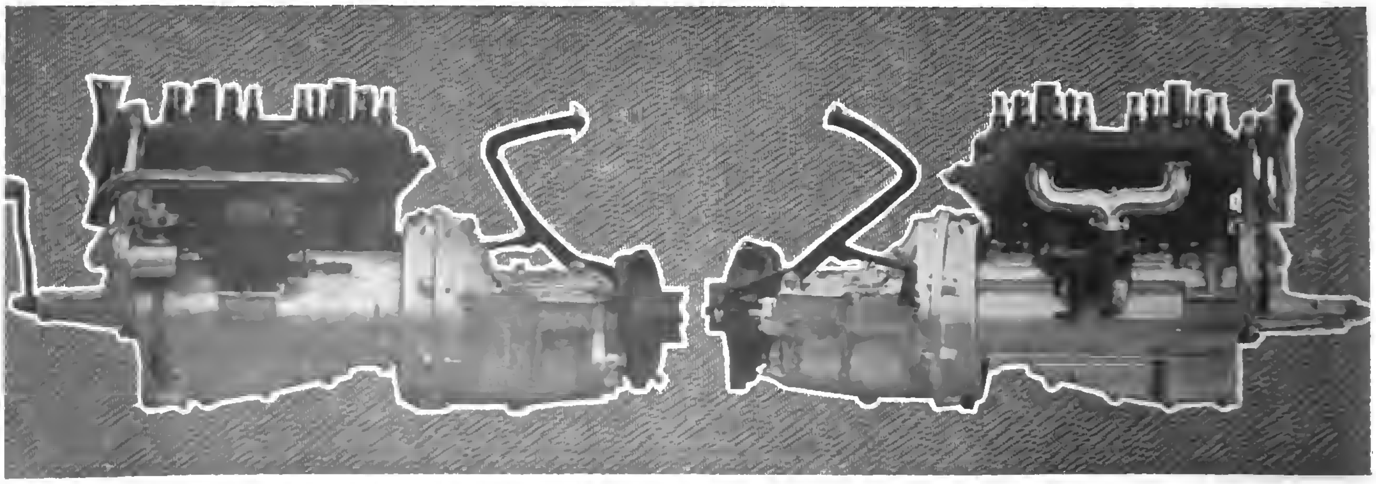
Stoddard-Dayton Motor Follows Lines Already Familiar

Features of the Noiseless Berkshire

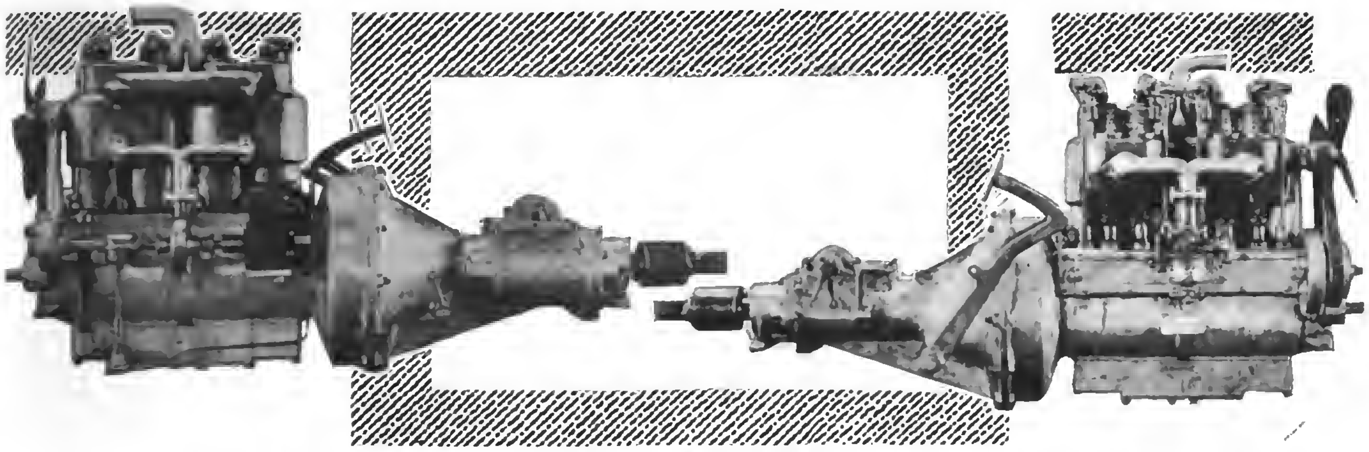
Built in the Berkshire Hills not only gives an idea of the location of the factory of the Berkshire Auto-Car Company, Pittsfield, Mass., but also conveys the idea of strength, rugged and hill climbing ability. The Berkshire motor is a four-cylinder vertical water-cooled type, and is rated at 35-40 horsepower, the rating by the A. L. A. M. formula being the former figure. The cylinders are cast singly with water jackets integral of a special gray iron which combines endurance and strength, and which by virtue of its composition resists wear better than the ordinary grades employed for this purpose. The water jacket spaces are of ample proportions and all parts are well surrounded by water. The cylinders are of the T-form, the inlet valves being at the right side of the motor, the exhaust members at the other. Special stress is laid upon the method of finishing the cylinders, foreign practice being followed. The cylinder after rough boring, and when the valve seats have been finished, is allowed to age for several weeks, and following the final boring, in which an exceedingly fine cut is taken, the interior of the cylinder is finished to exact size by a lead lap and paste made of oil and fine abrasive. The bore is four and eleven-sixteenths inches, the stroke of the piston five and a half inches. The valves are the flat seat type, a form which gives about 25 per cent. more area than the bevel seat of equal lift and diameter, and which has been demonstrated to be more enduring and to make for quieter operation. These members are nickel steel, are two and one-quarter inches in diameter and are interchangeable. The valve guides are not cast integral with the cylinder, but are screwed into place, making it possible to replace them at slight expense when worn, and insuring the same perfect mixture given when the engine was first built, by eliminating air leaks at this point which are unavoidable after the engine has been in service for a period.

LONG PISTONS WITH FOUR RINGS

The pistons are long, and are of special hard gray iron, and are fitted with four concentric rings all above the wristpin. Five oil grooves below the wristpin make for proper distribution of lubricant to all points on the cylinder wall. The dome head piston design is followed, it being maintained that this prevents carbon deposits by allowing the oil to drain away from the top towards the walls instead of accumulating at one point, as is the case with the flat top piston. Pistons are rough turned, aged and lapped to size in much the same manner as are the cylinders. The wristpin is one and one-sixteenth inches in diameter, of special alloy steel, hardened and ground to size. The connecting rods are of the marine type, and are H-section drop forgings of nickel steel, having a special bearing construction at the big end. The wristpin bearing is a phosphor bronze bushing, while the lower end has separate phosphor bronze caps, bushed with Parsons' white brass.



High Efficiency Characterizes the Herreshoff Power Plant, a Unit Construction with Many Good Details



Location of the Exhaust Valves in the Cylinder Heads, as on the New Lion, Allows Exceptionally Large Area

Many Taxicabs from Bristol Works

A limited number of Rockwell public service cabs, manufactured by the New Departure Manufacturing Company, of Bristol, Connecticut, are now on the market. This company has been manufacturing this cab for some time past, but its entire output has been taken by one concern. The contract has been completed and cabs are now available for purchase.

The Rockwell taxicab is distinctive in design and construction and offers a combination of advantages that appeal to both the operator and the patron. In the development of this cab, the company's designers went abroad and studied all the best makes of foreign taxicabs. Two hundred of these cabs have been in use in New York City for more than a year. A record of this practical service has proven the extremely low up-keep cost, strength and durability of construction, and economy of operation. During the severe storms of the past winter in the metropolis when the traffic was exceedingly heavy, the cabs were in constant service, and proved their reliability.

The motor is four-cylinder cast en bloc, with a bore of 3⅝ inch, stroke of 4⅛ inch, Bosch high tension magneto ignition with fixed spark. The force pump spray system of oiling is used with gauge on the dash. The clutch is three plate, floating ring of special design and mounted entirely on ball bearings. The radiator is one of the strongest types and is protected on the front by a heavy grid. The frame is pressed steel, extra wide with exceedingly strong front axle, spindle and wheels. The front and rear axles and transmission are mounted on New Departure double row ball bearings.

An important advantage is the easy accessibility of all parts and the quickness with which repairs or interchanges can be made. The engine and clutch can be removed by loosening four bolts and pipe connections and another set installed in less than half an hour. The coupling to the transmission is made by an Oldham slip coupling requiring no bolts. The control levers are integral with the gear case. The gear case and levers can be removed by lifting the foot board and loosening four bolts. Another set can be installed and all adjustments made in less than one-half hour. All upholstering can be easily removed for cleaning or repairing and is interchangeable.

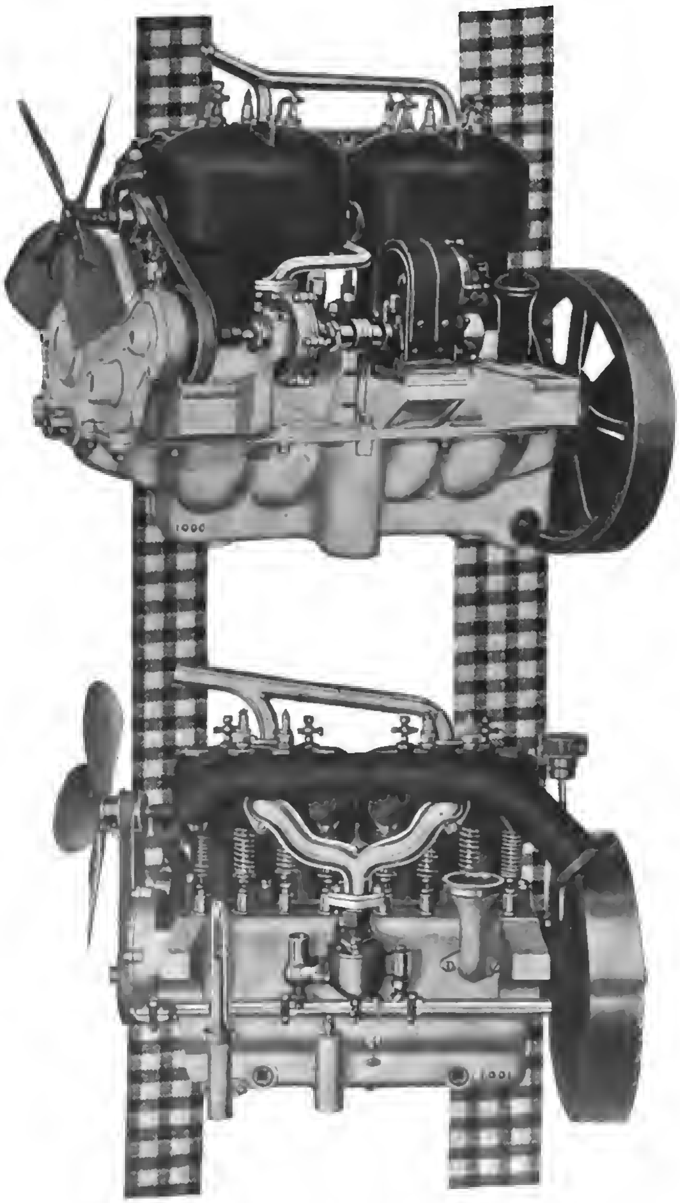
Constructional Differences in Rae

Electrics are also well represented in the list of New England makers. Vermont has few, but that is the part from which the new Rae electric hails. In its victoria electric, many important differences in construction are to be noted.

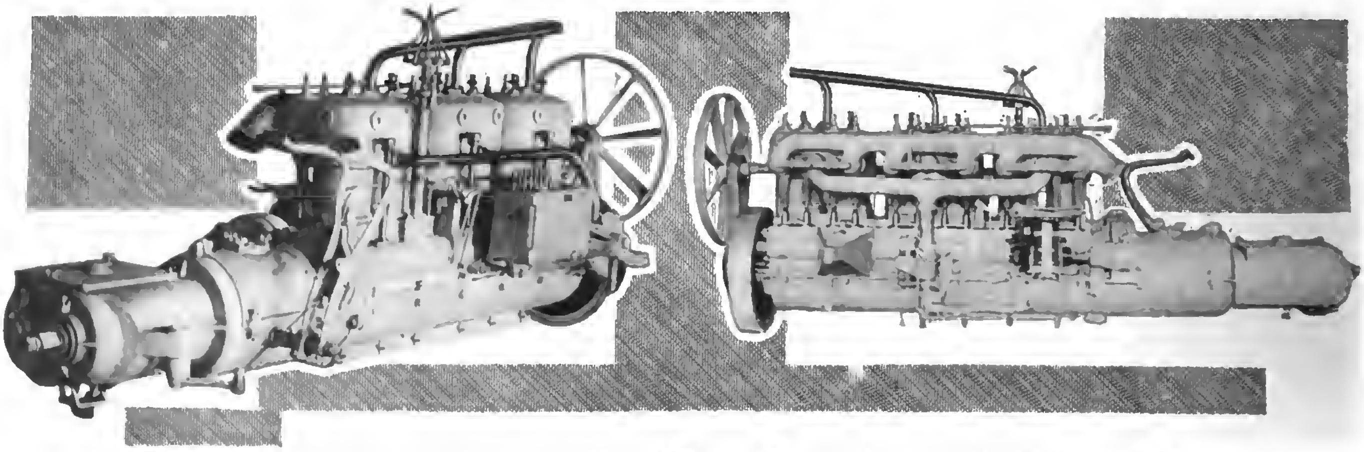
Besides the victoria, the company will have ready for the 1910 season equally well-designed coupé and runabout types of the Rae electric car. The factory is located at Springfield, Vt., but offices have been opened at 747 Boylston street, Boston.

The first machine, as shown at the electric show in Boston last month, had at that time run over 16,000 miles. In operation, it is claimed that this car will cover from 100 to 130 miles per battery charge, and irrespective of the number of stops.

By means of the control of this car, just brought out and patented, the starting and accelerating effort is produced by a normal discharge current, thus conserving the energy stored in the batteries and making a larger percentage of it available.



Two Lambert Motors: Above, Model L; Below, Model H



A Leader in the Adoption of the Unit Construction, Stevens-Duryea Simplifies It by Placing the Flywheel in Front

Sixteen speeds, varying from 3 to 20 miles per hour, are furnished by the controller in its various positions, the operation being such as to vary the field of the motor without external resistances. Noiselessness is made a great feature, being secured by the use of special gears, on short shafts, the latter being mounted upon radial ball bearings. They are well enclosed and run in oil at all times. This enclosing the gears in an oil bath, not only makes for noiselessness, but materially aids the longevity of the gears themselves, to say nothing of the matter of reducing friction losses to an absolute minimum quantity.

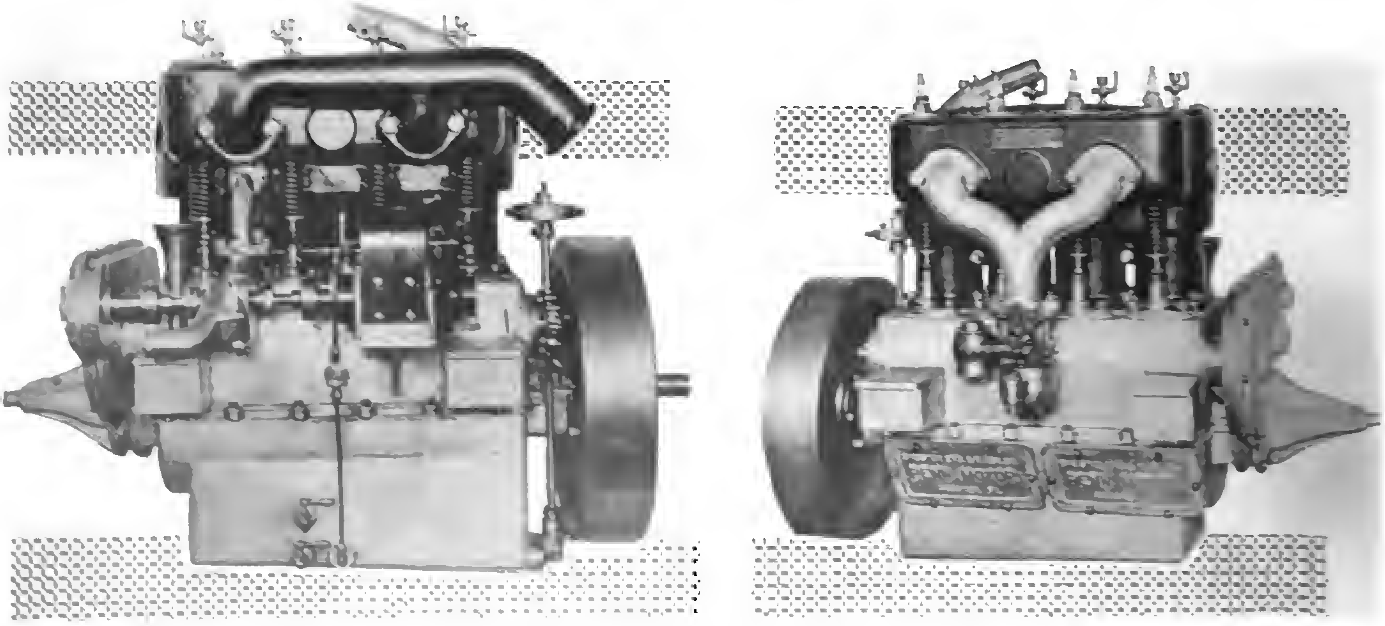
Stevens-Duryea Sixes and Fours

Six-cylinder engines have had at least one steadfast adherent in the Stevens-Duryea Company, Chicopee Falls, Mass., and the season's output will contain a good representation of that type of motive power. In addition to this, the New England concern has advocated the unit power plant with three-point suspension ever since 1904, and the cars for the season of 1910 will all contain a power plant constructed along these lines. Such was the clarity of the original ideas in both that no changes have been made from that time to this, and as the present product shows, the construction has not been altered from the first.

This season's leader will be the old standby, Big Six, a six-cylinder forty-horsepower car called Model Y, with cylinders of 4¾-inch bore and 4½-inch stroke. As a standard equipment this will have a roomy seven-passenger touring body. Then there will be two "fours," differing mainly in the bodies and the little changes that go with the different bodies.

MOTOR SIZES AND POWERS

Model Y is powered with a six-cylinder engine of 4¾-inch bore by 4½-inch stroke, rated at forty horsepower. The cylinders are cast in pairs, with integral water jackets and valves located all on the left side. The construction is so planned that nearly every part ordinarily removed may be taken off without disturbing the others. Thus, the exhaust pipe rises above the exhaust ports and passes across the upper part of the cylinder, while the inlet pipe drops down below the line of the openings, in this way making each pipe removable without disturbing the other. The carbureter is made integral with the lower part of the intake pipe, and can be removed with it. Similarly with the magneto, which is located at the rear on the left side opposite cylinder number six. This is driven from the two-to-one gears at that end of the engine through the medium of a small universal joint, which relieves all strain upon the armature shaft and allows its easy removal.

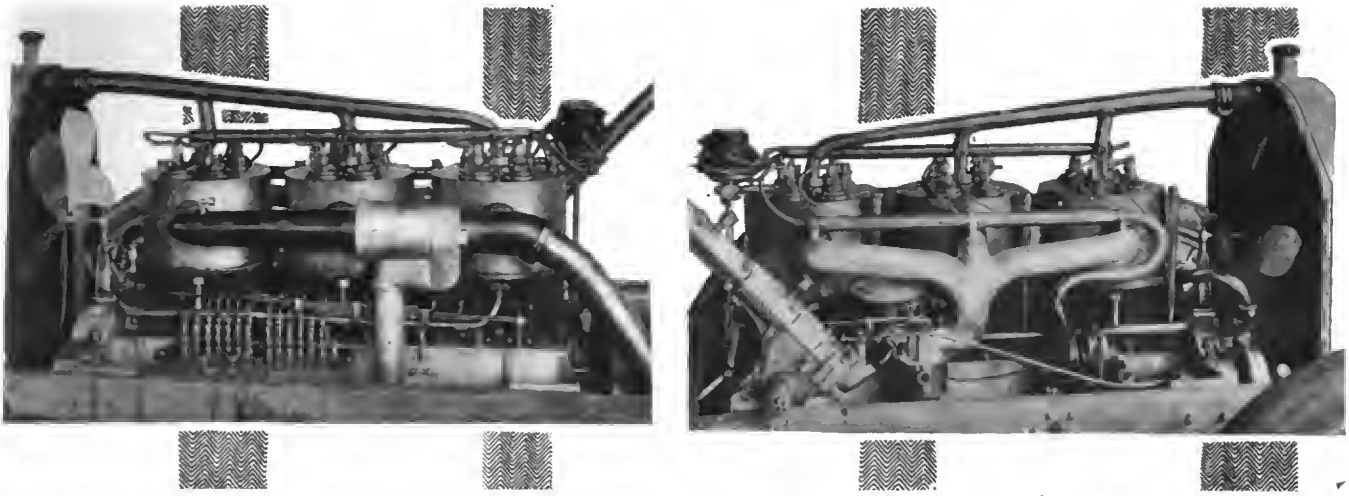


Penn Motor Is One of the New Block Types, with Valves Oppositely Disposed, Which Has a Three-Bearing Crankshaft

Alden-Sampson Commercial Cars

Interchangeability is the goal toward which the Alden-Sampson Manufacturing Company is struggling, the statement being made relative to the product that every part of the "Sampson" truck is designed and built at the factory of the company, and built to jigs and fixtures which guarantee every piece.

During the comparatively short time since the Alden-Sampson Manufacturing Company, of Pittsfield, Mass., developed and



Chadwick "Six" Motor Has Applied Water Jackets of Cylindrical Shape and Retains the Multi-Feed Sight Oiler

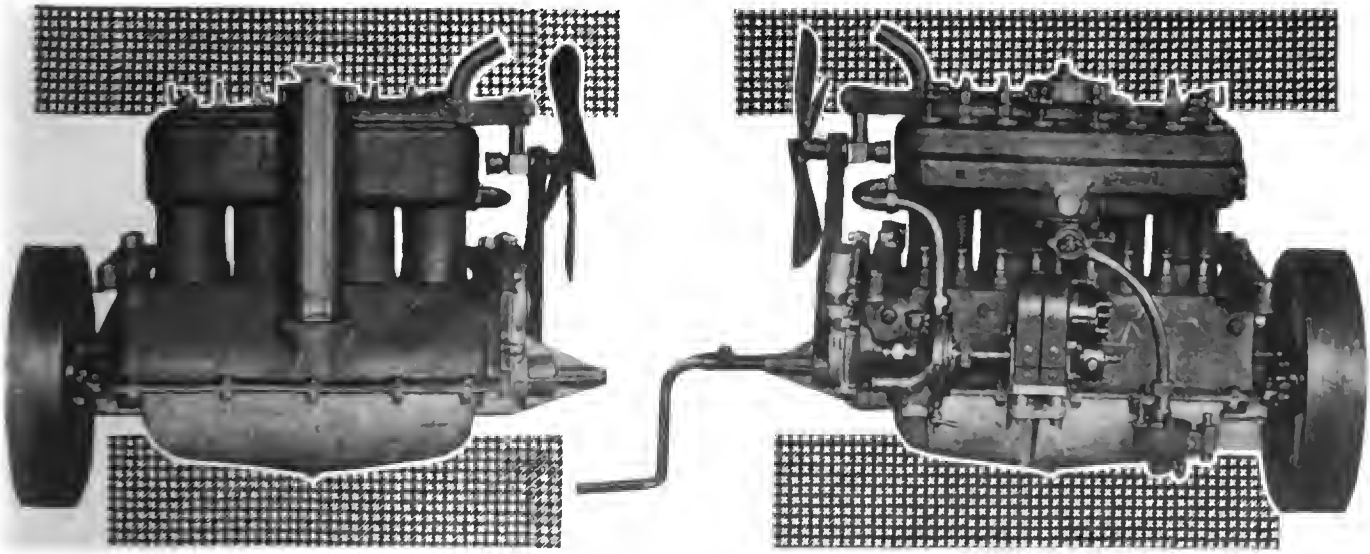
placed one of its four-ton trucks under test in their Motor Transportation Company in Boston, the trucks have excited a tremendous interest among our industries, whose engineers saw at once that here was a truck which embodied ideas and points in design neglected in others, and which seemed to have been designed with the idea that a truck, though doing rough, heavy work, was yet necessarily a machine of fine parts and fine materials, which ought to be protected in their workings to insure economy.

Considering the short time since its development the sales have been most gratifying and the interest shown through inquiries is constantly increasing.

The few points of design and workmanship outlined will show that the effort to build the best and to greatest advantage of the user is always of universal interest. The engine is of 5-inch bore by 5½ inch stroke, and is governed to run at about 925 r.p.m. It is designed and built by the Alden-Sampson Manufacturing Co. especially for truck severity.

in the torque rod support of the shaft-driven cars, the adoption of external and internal brakes instead of the double internal brakes previously used, and a refinement of the brake-adjustment mechanism. Aside from the features above mentioned the general characteristics of the Locomobile cars are similar in every respect. In the Model L 30-horsepower motor the valves are located on opposite sides, camshafts are one-piece drop forgings with integral cams, and the intake shaft carries the igniter cams of the make-and-break mechanism, which have a taper face so that by sliding the entire camshaft endwise the spark may be advanced or retarded. The crankcase is of cast bronze, with its lower removable portion of aluminum. The train of gears operating the valves, pump and ignition is inclosed and runs in oil.

A water-jacketed carbureter of Locomobile design is fitted, ignition is make-and-break, and the cooling system is comprised of a centrifugal pump, a honeycomb radiator and an adjustable belt-driven fan.



Block Construction is Carried Further than Usual in the New Everitt, the Crankcase Upper Half Being Included

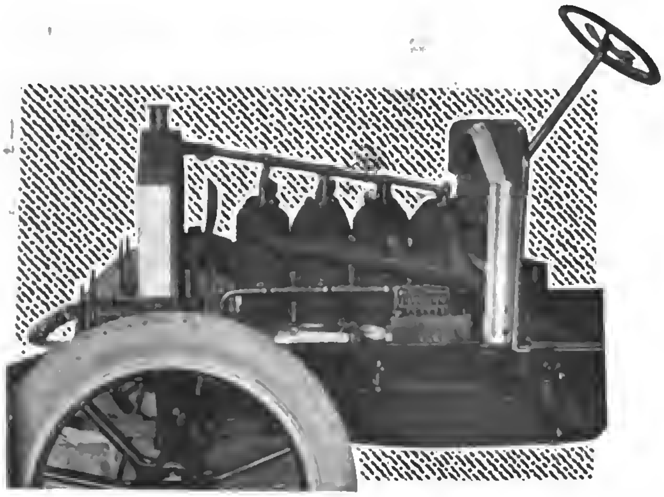
Spiral Timing Gears for Locomobile

The Locomobile line for 1910 remains practically unchanged with the exception of a few improvements in regard to several mechanical details and the general refinement of the product. In the motor the timing gears are now of the spiral type instead of the straight spur gears previously employed; and with the exception of a change in the type of mechanical oiler used there are no further changes. All other mechanical features of the car also remain the same except for an improvement

Unit Power Plant in Sultan Taxicab

In the taxicabs built by the Sultan Motor Company, at Springfield, Mass., the unit power plant idea is utilized, this serving to make the whole power unit removable in a very short time.

The four cylinders of this engine, 3-in. bore by 4¾-in. stroke, are cast in pairs with all valves located on the same side in single combustion chamber pockets and operated by a single camshaft fully enclosed within the crankcase, where it is times exposed to the fullest possible lubrication. The



Great Western Motor Has Separately Cast Cylinders

castings are imported from France, it being claimed that closer and more uniform casting can be obtained in this way. Grinding is extensively employed in the manufacture of these engines, all such parts as cylinder bores, pistons, wrist pins, crank and camshafts, etc., being finished in this way. A high grade of aluminum alloy is used for the crankcase upper and lower parts. All moving parts about the engine are either directly or indirectly carried by the upper part of this case, which is provided with four integrally cast arms by means of which it is attached to the subframe. The crankshaft has three long main bearings of good diameter and it. as well as the pistons and flywheel, is accurately balanced.

New Grout in a Single Model

The reorganized Grout Automobile Company, Orange, Mass., will make but one model. This is offered as a five-passenger touring car and as a toy tonneau, the motor carrying four cylinders which are individually cast and which are 4¾ by 5 inches, giving a rating of 45 horsepower. The valves are interchangeable, mechanically operated, and both sets are on the same side. The lubrication system employs a circulating pump which is located in the bottom of the crankcase, there also being a gauge in the reservoir. The clutch is a leather-faced cone and tbe cooling is by means of a honeycomb radiator and a gear pump, the latter being driven direct from the camshaft. The motor bearings are of hammered babbitt and bronze, while in the transmission, which is of the selective type, Hess-Bright ball bearings are used. The axles are an I-beam in front and floating in the rear and use Timken roller bearings. There are two universal joints on the propeller shaft and a straight line drive is had through strut rods.

Two-Cycle Atlas in Three Models

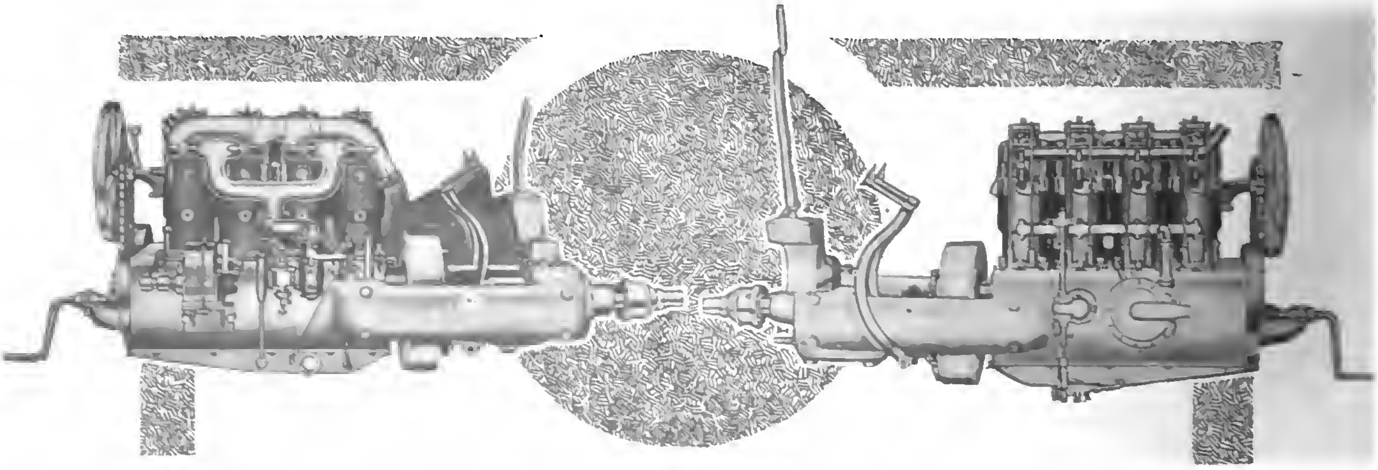
To the discriminating buyer, the makers of the Atlas two-cycle cars offer for 1910, three differing models, each with a two-cycle engine of suitable size and power. Model F, selling at $2,000, has a three-cylinder engine of 4½ in. bore by 4½ in. stroke, and is equipped with a five-passenger touring body. Model G has a four-passenger body, four cylinder engine with 5-in. bore and 5-in. stroke, and sells at $2,500. H has the same engine but a differing chassis, which with a five-passenger touring body sells at $2,500. In connection with the merit of this car, the selling organization of the factory, located at Springfield, Mass., puts forth the following argument why one should buy this product rather than other cars of a competing price and construction: The average automobilist to-day demands safety, comfort, silence, style, power, fair speed, simplicity, durability and low maintenance charge—and usually a fair price. The Atlas combines all of these features to a greater extent than any other car. First.—Safety. Every part of the engine and car is made of the best quality of material—thoroughly tried and tested under severest conditions. Second.—Comfort. Experience has shown that the three-quarter elliptic spring now being generally adopted and first used in this country on the Atlas cars gives the easiest riding car eliminating all side sway of the platform springs—the springs of the Atlas are extra long, three-quarter elliptic, made from imported Krupp silicomanganese steel, the best material known for this purpose—which, combined with the long 128-in. wheelbase, gives a car which for comfort has no superior. Third.—Silence. The absence of external moving parts makes the engine the quietest engine running. Fourth.—Style. Atlas cars are classy in lines, are bighly finished and handsomely upholstered in hand-buffed leather with every convenience and comfort.

Low-Priced Car from Waltham

In the Metz Plan car, the lower limit of automobile price has been reached, this being sold in parts, so that one may buy and assemble at leisure. This plan also allows of buying at one's financial convenience, and has many more advantages, some of which are well told by the makers, C. H. Metz, president of the Metz Company, Waltham, Mass. He says: "No argument will induce the man who longs for a palace and who has the means to acquire it, to put up with a modest cottage.

"The expense of maintaining our little car in comparison with the big tourist is in about the same proportion as the cost of dwelling in a cottage is to the luxury of living in a mansion.

"If it is a matter of how many miles per dollar for your automobile use and pleasure, we can figure as close as anyone in the business, and our statements can be substantiated. We do not pretend to tell you what you should purchase, but you owe it to yourself to ascertain which car will carry you the farthest with the least trouble and expense."



Massachusetts' Old Guard Includes the Knox, a Believer in the U :it Power Plant, with Other Original Features

Stanley Steamers in Three Models

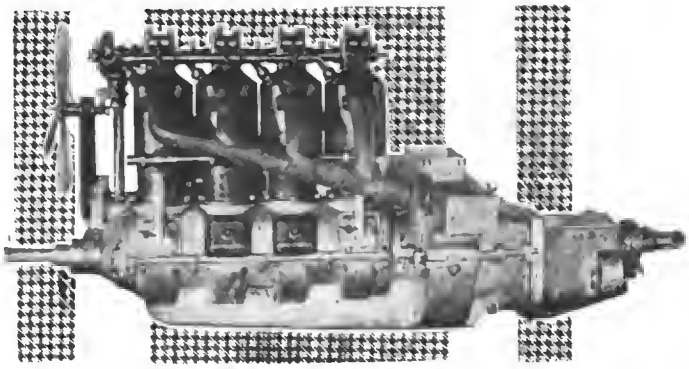
Newton, Mass., is the home of the Stanley Motor Carriage Company, which builds the well-known Stanley steamer. This is turned out in three models, known as "60," R, and U. All of these have two-cylinder double-action, simple steam engines. Model "60" has a cylinder bore of 3¼-in. by 4¼-in. stroke, using slide valves, the engine being located on the rear axle. All of this is true also of Models R and U, except for the engine sizes which are then 4-in. bore and 5-in. stroke. In every case the boiler is of the flash tube type. No condenser is used. There is no transmission, speed variations being effected by changing the speed of the engine. A wood frame is used, and ball bearings throughout, engine and both axles. Model "60" sells at $850 and has a two-passenger runabout body, 104-in. wheelbase, 56-in. tread, weighs 1,500 pounds, and has 34 by 3 in. tires all around. Passing on to the next larger model, R, this sells at $1,400 for a four-passenger roadster, with 114-in. wheelbase, 56-in. tread, and 36 by 3½-in. tires.

New Car, New Plant for McCue

Among the past year's newcomers is the McCue Company, Hartford, Conn., which is building a four-cylinder car to sell at $2,750. This has a number of distinctive features among which might be mentioned the rear axle of special design. In the matter of design, the McCue 40 horsepower motor is most symmetrical, there is not a bad line to the unit and it is built as light as is consistent with hard service demands. The cylinders are twin cast, of the best gray iron, the water jackets are cast integral and are of very liberal dimensions. Even the valves are completely jacketed so that there is no liability to deformation of either valve seat or of valve head under hard continuous service. The cylinders are offset one inch, which together with the long connecting rods permits of slow speed under a heavy load with decrease in wear upon the reciprocating members. It is to be noted that this, the L type, sometimes called the Renault type of construction, is much in vogue in 1910 cars. The cylinder bore is 4½ in. and stroke 5 in.

Newcomer from Bay State--Morse

Among the additional new cars of recent origin is the Morse, made at South Easton, Mass., by the Easton Machine Company. This car is made in two models, of the same price and on the same chassis. The engine is of four cylinders, 4⅝-in. bore and 5-in. stroke. The horsepower rating is 34.3, while the actual piston displacement is 336 cubic inches. Model B is a three-passenger runabout selling at $3,500. Cylinders are cast singly, while the valves are located in the head. The cooling water is circulated by a pump to a honeycomb radiator.



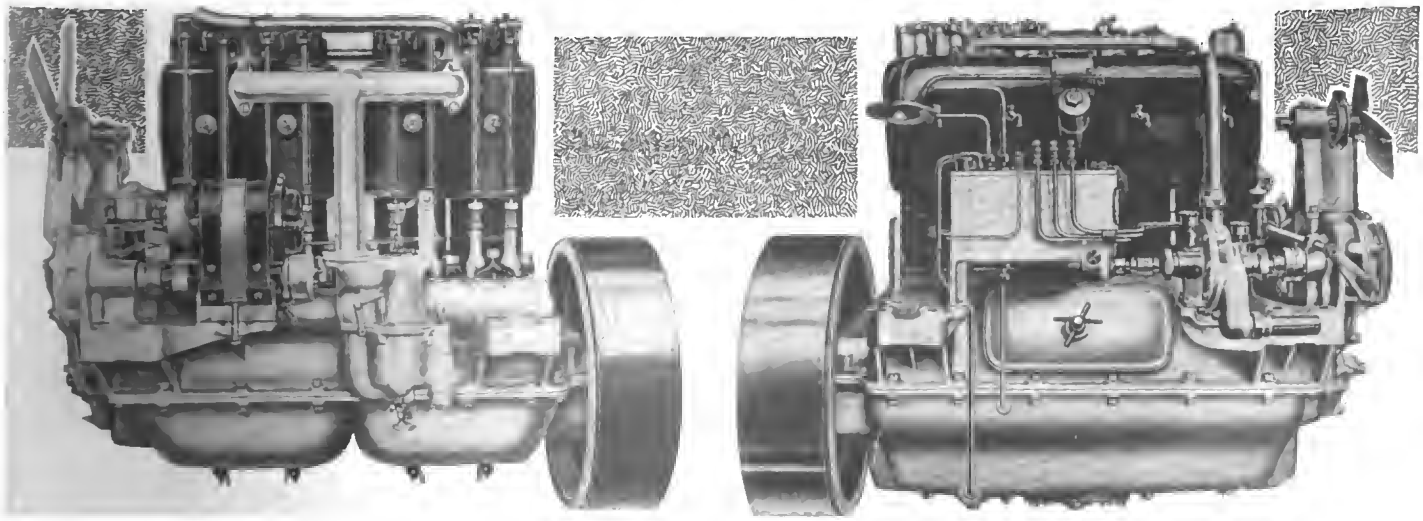
Freedom for Exhaust Is Secured on the Great Western

Morse-Radio—New Englander

Of very nearly the same name, and approximately the same location, the Morse-Radio automobile, made at Springfield, Mass., by the Morse-Radio Auto Company, offers a chance of much business complication. Not that the chassis details agree, for they do not. The four-cylinder motor has a bore of 4¾ in. and a stroke of 5 in., giving it a displacement of 354 in. and a rating of 36.1. The only model turned out is equipped with a 5-passenger baby tonneau body, which sells at $2,500. Paired cylinders of the L type are used, with valves in pockets on the side, of course. Thermo-siphon cooling is through a cellular radiator with a fan as an auxiliary, the latter being driven by belt. A high tension magneto and dry cells furnish the current respectively for the two ignition systems. The contracting band clutch is of steel on a cast iron drum, while the transmission, which is located on the rear axle affords three speeds and a reverse operated selectively. The wheelbase is 112 in., while the tires are 36 by 3½ in. all around.

Among the Foreign Contingent

The British Napier of which a touring car is illustrated, is made in 9 separate models ranging from 10 to 90 horsepower, within which classification no allowance is made for Napier special chassis work. The Napier cars have water-cooled motors with cylinders arranged in pairs, enclosed half time gears, and the company calls attention to the inlet and exhaust valves operated from a single camshaft on one side and many other features which are retained with a view to inducing silence. The ignition is by high tension magneto, gear driven and mechanically applied, with a view to quick replacement. In the transmission system both the fixed and sliding gears are mounted on castellated shafts. The clutches have metal-to-metal faces, are immersed in lubricant, and are not "fierce."



Pope-Hartford Is a Prominent New England Product, and Consistently Upholds the Valves-in-the-Head Idea

In the Selection of an Automobile

BOSTON will be awarded the last comprehensive opportunity of the year to examine the various makes of automobiles, and in many respects the situation will be unique. In former years it has been the practice of makers to go to Boston with their best selections; to present the best foot, as it were and it is confidentially expected that 1910 will be no exception unless it transpires that this condition may be accentuated.

The New England autoist differs from his type in other sections of the country in many respects; he is imbued with mechanical ideas which are bred in the bone; appropriateness appeals to him, and art is far from a stranger to this section of the country. In a sense, Boston is the place where the makers go with their products for approval, and every attempt is therefore made by them to explain the reasons for the innovations of the year, to tell why some of the tried-out features were dispensed with, and to submit the whole to the court of last resort.

The exhibition at Boston will be under conditions which should prove to be more advantageous than otherwise. Most of the automobiles which will be seen there have been examined and discussed, after having been displayed at the shows elsewhere, and the various makers have been most liberal in their attitude as respects visitors to their plants, so that the information given and exacted has proven to be of a much more reliable character than that which appeared in print in former years.

SELECTION IS ATTENDED BY DIFFICULTIES

The situation, despite the wealth of information at hand, is attended by difficulties, due to the large increase in the production this year, and the budding autoist who goes in for his "first" is bound to be more or less disconcerted. It is one thing to examine a given object and determine as to its value in a predetermined service, but it is quite another matter to go to a show, and, among several hundred automobiles, select the one which will represent all that money can buy.

It will not be easy to devise a system which will adequately serve the purpose, but it may be possible to help the situation, and the aim here will be to classify the motors, and introduce a "point system" which, if it is intelligently applied, may help out sufficiently to be worth while. It is believed that the power plant is of such great importance that it will be better to confine the idea to motors only, rather than to try to cover the whole situation, and, as a rule, the automobile which has a properly applied power plant, is so adaptable in other respects, that the purchaser is very likely to find it equal to all of his needs.

Types of Motors Exhibited at the Palace

Air-cooled	7
Water-cooled	231

Types of Motors Exhibited at the Garden

Air-cooled	4
Water-cooled	166

National Show Power Plant Statistics

Air-cooled	14
Water-cooled	336

How the Motors Were Divided Into Schools

Four-cycle	355
Two-cycle	15
Six-cylinder	51
Four-cylinder	276
Two-cylinder	17
Single cylinder	6

Classification of the Cylinders Used in These Motors

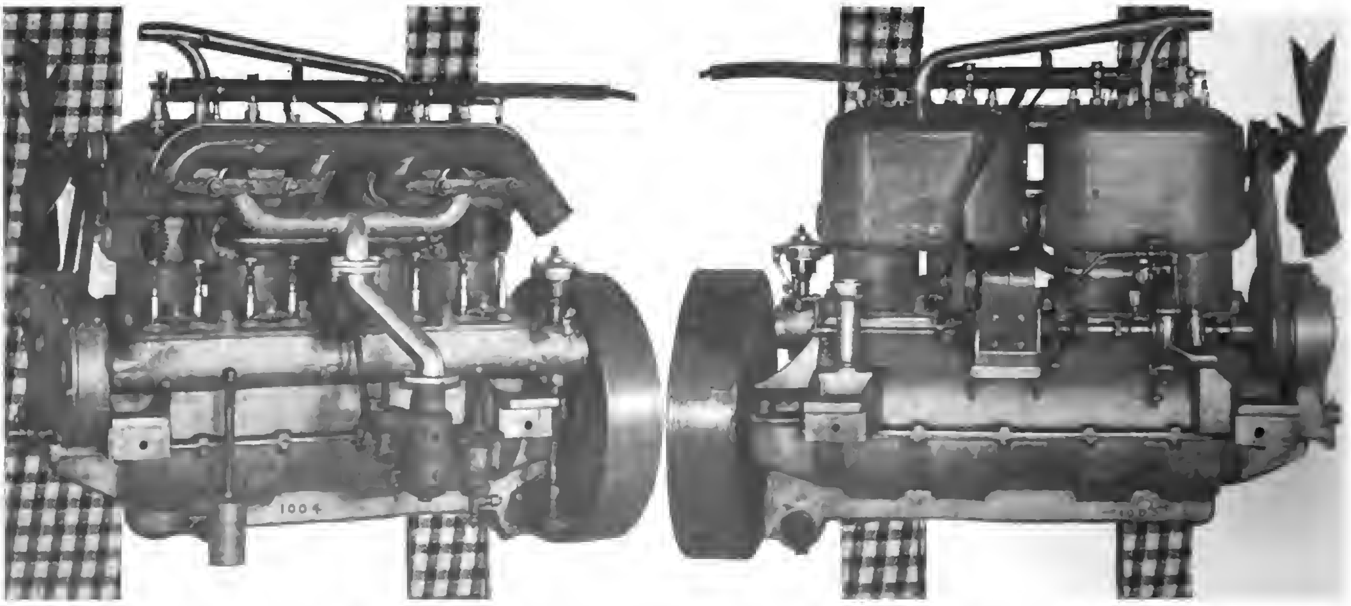
Cast in pairs	215
Cast separately	107
Cast en bloc (4)	26
Cast en bloc (3)	2

What was true at Chicago, comes near to holding for all the products of the year, although, as reported in THE AUTOMOBILE, there were some differences as between averages of the power plants as they were shown at the Palace, Garden, and at Chicago. As for the trend, it is difficult to reach fixed conclusions, but it is possible to say that, at the National Show, the count disclosed a falling off of air-cooled motors from 23 for the previous year to 14 as above recorded, which difference, in all probability, may be traced to the reduction of high-wheeled automobiles, in which type the air-cooled motor is much used.

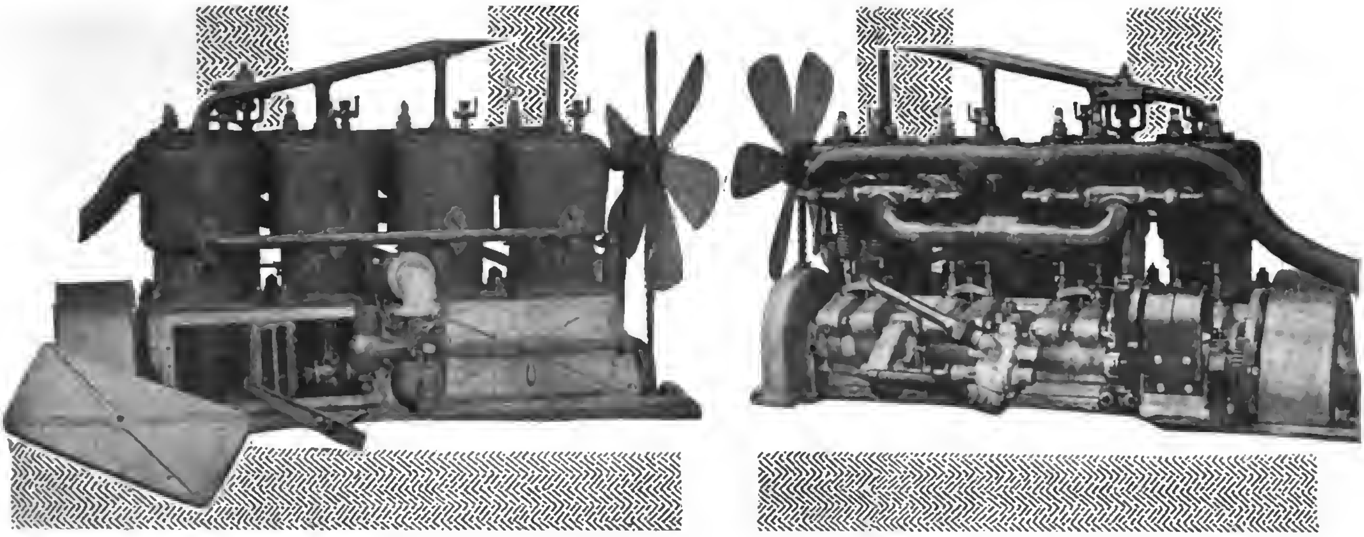
TWO-CYCLE MOTORS ON THE INCREASE

That the two-cycle motor is gaining ground is certain, and a count of the motors of this generic type for two years, shows that where there were ten in 1909, there were fifteen at Chicago.

The two-cycle idea, while it always seemed to be worthy of careful exploiting, had the misfortune to fall into the hands of



Built on Strictly Mechanical Lines, the Selden Motor Appeals to the Engineer More than to the Seeker for Novelty



Corbin, from New Britain, Conn., Believes in Having the Cylinder Stroke Shorter than the Bore

motor boat builders of the class who did low-priced work, and, despite the difference in service demanded in automobiles, these motor designs were retained in some cases, with the result that, while the motors did fairly well, they did not quite come up to the best expectation. The black eye thus administered, although unfair to the good motors which maintained the status of two-cycle work, did exert a retarding influence, and it was not until this year that the atmosphere cleared up sufficiently to enable autoists to judge of the fullest capabilities of this type of motor.

BALL-BEARING CRANKSHAFTS GOOD

It cannot be claimed that this type of crankshaft is being used very much, but the reason does not lie in lack of ability of the type. In every case involving the use of ball bearings, they proved capable, and it is because the plain bearings are also satisfactory that no greater headway has been recorded for the ball-bearing types—plain bearings are less costly.

As to the policy of employing the bearings of the least cost; it comes within the realm of good engineering; an engineer is a man whose skill permits him to get all there is in material, and accomplish the given task at the least possible cost. It is but half of the problem to make a thing work, and in commercial life, it is feared that an engineer without the ability to make material go as far as possible would fail.

PLAIN BEARINGS ARE CAPABLE

Plain bearing crankshafts are used in three ways: (a) With a bearing on each side of each throw; (b) three bearings for a four-throw crankshaft; (c) two bearings only.

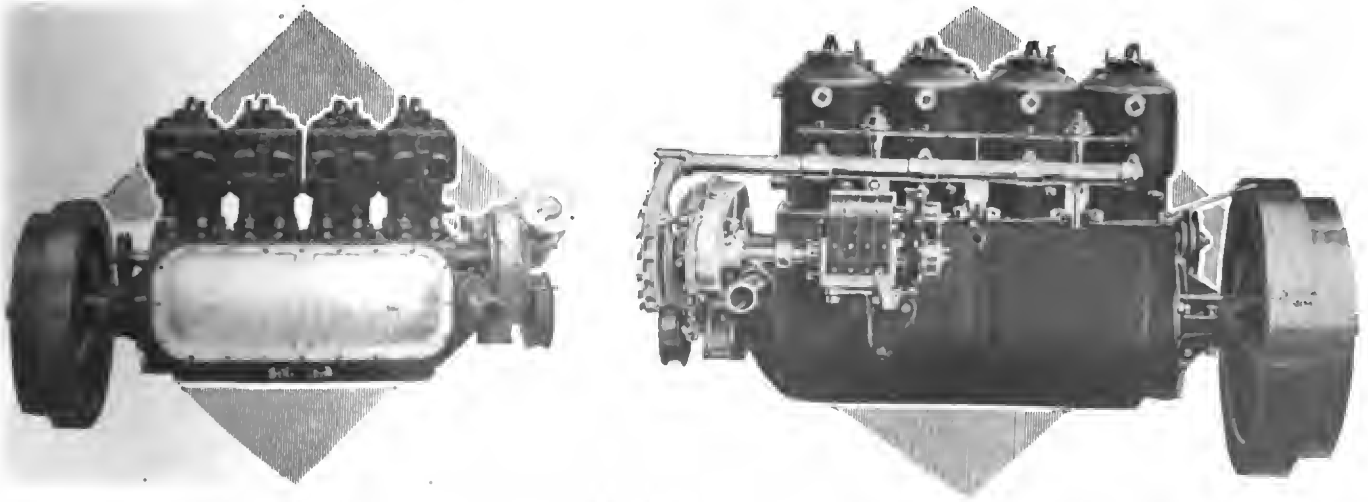
It is useless to argue that one of these types is better than the other without considering the quality of the material, design, and execution. The way to reason out this question is to note the character of the design and the other structural details, and to remember that, as in bridges, which are of divers designs, as cantilevers, suspensions, Howe truss, etc., if the designer takes all the factors into account, the results will be satisfactory.

CAMSHAFTS ARE MUCH IMPROVED

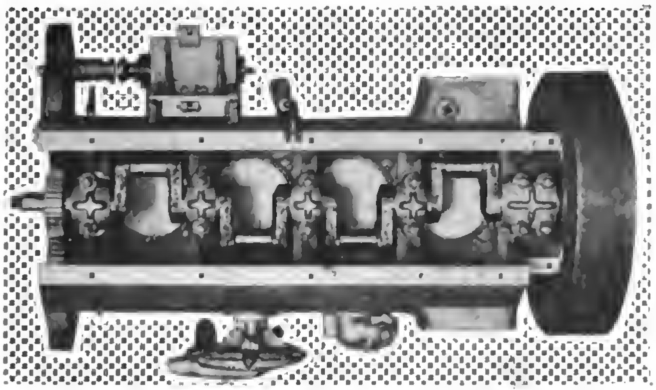
Accuracy of contour of cams, correct angular displacement of them, and matters of this sort, are of far greater importance than it is to have the cam-shapes conform to the constant velocity theory. It would be a nice idea were it possible to so design the cams that the gas would enter and exhaust at a constant velocity, but freak shapes are likely to result in noise and other troubles of a character which is beyond the skill of the autoist to cope with.

By taking advantage of camshaft grinders, which are now to be had, materials of the hardest character may be used. The process of heat treating and straightening may be conducted before the camshafts are finished. The great endurance of the material after hardening is no bar to quick and accurate finishing. It is just possible that the finishing may be hastened, owing to the rigid character of the material which is reason for its ability to stand back of the grinder in the final process, and the tools during machining.

In the setting of valves, overlapping is now practiced as never before, that is to say, the inlet valve is opened before the exhaust valve is closed, and in this way the inertia of the gas is taken



Rambler Secures Accessibility of the Cranks and Cams through an Unusually Large Hand Hole



Good Example of Five-Bearing Crankshaft Construction

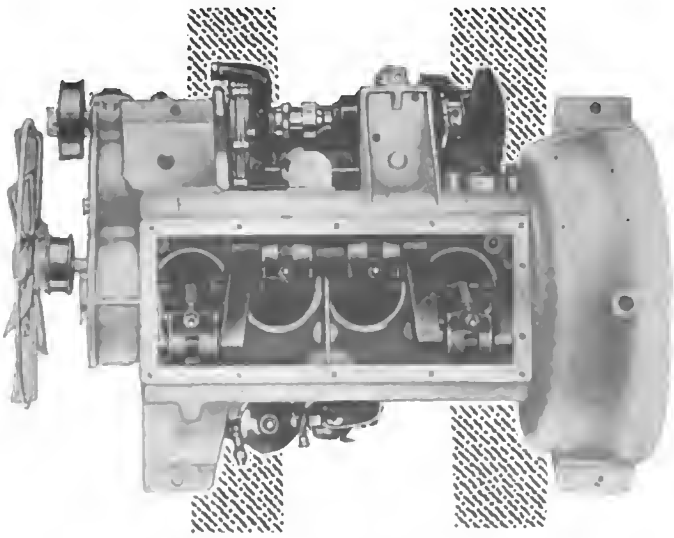
advantage of. This practice demands careful and nice designing, and the very fact that it is practiced is assurance of the growing quality of motors.

The sizes of valves are about on a par with last year; the designers who prefer the large valves make adequate provision to eliminate the noise which is likely to be induced, although, considering high compression, and high speed, which are companions to large valves, the power of the motors for a given bore and stroke, is greater. It is the general practice to so design motors (large valve types) that the valve diameters are equal to half the bore, and bevel seats for valves are prime favorites.

VALVES ARE VARIOUSLY LOCATED

In some of the earlier racing types of motors again in power resulted when the valves were located in the heads. The intense heat in this location made for trouble, but this tendency was counteracted, and it then became commercially possible to take advantage of the noted increase in power. This type of motor is conspicuous this year, and the reports from it are so thoroughly good that it promises to be perpetuated. In some of the designs of this type the valves are in cages, and they may be readily removed when it is found necessary to clean or grind in the valves. In the Knox type, which is a distinct and clever innovation, the head is separable, and when it is desired to clean out the combustion chamber, all that is necessary is to remove the nuts from the holding bolts and lift the heads off; room is then at hand in which to work a scraper.

When the valves are in cages, and with a view to thwarting the ills of excess heat, the cages fetch up on flat seats and have room to expand. The cages are made of cast gray iron of a grade which compares favorably with the iron used in the cylinders and pistons, and packing is done by grinding. The practice,



Chalmers "30" Has Two Bearings of the Annular Type

considering the T and L head cylinders, is not very different from last years; the compression may be a little lower considering a struck average, and the valves may be a little greater in diameter. It is just possible, too, that bushings are more freely employed for the stems to reciprocate in, but it is not admitted by many of the most advanced designers that this practice leads to any special advantage. The valve action seems to be satisfactory in either event, and as for the valves becoming too loose in the guides, there seems to be little chance of it. As an instance of the durability of cast gray iron under the conditions as here reflected, it is enough to point out that motors have been examined after eight years of service and when they were taken down to ascertain the extent of depreciation, the wear of the valve guides was found to be negligible.

Adjustment is more carefully provided than in earlier designs, and it is now the belief that the adjustment should be very nicely made, or the system should be without means. In the absence of a means of adjustment, there is nothing to jar loose. Valve springs are stronger than was formerly considered desirable; this advantage, for such it proves to be, is not attended with a great disadvantage in view of the quality of cams and rollers as now made. It has been determined that the quicker closing of the valves, due to the stronger springs used, adds materially to the power and efficiency of the motors. In some of the earlier types of motors it was nothing to observe a camshaft rotation of even 40 degrees during the seating of the valves. At the present time the camshaft rotation is, in the better examples, on the efficient side of 20 degrees.

RECIPROCATING PARTS ARE LIGHT

When a member is balanced, according to the popular conception, it will stay in any position in which it may be placed, but it is not generally appreciated that this condition of static balance is of no avail. Just so soon as rotation is set up in a member, it then partakes of kinetic properties, and, unless it is in a state of kinetic balance, vibration will set up, and this vibration is but the visible manifestation of a more serious condition—kinetic strains are induced in the member, and they increase as the square of the velocity.

It is this kinetic ill which is at the bottom of most of the crankshaft failures, and in any attempt to determine how good an automobile may be, it is necessary to observe the condition of kinetic balance. Makers, who value their reputation, can scarcely be expected to disregard this highly important matter, and it is this hidden structural consideration which has been attended to by the makers of the best automobiles of the year.

The best condition of the kinetic balance will be observed in the motors which are provided with well-designed reciprocating parts, and especially if each reciprocating part is to an exact standard of weight. Good material then nice design features, and finishing to exact drawing size, is what is aimed at.

TIGHT COMPRESSION DUE TO GRINDING

Cylinder grinding has been in vogue for several years. It was formerly looked upon as a process which was only resorted to in the manufacture of high-priced automobiles. This year, from an actual inspection of fifty-five plants devoted to the manufacture of automobiles, only one was found which was not equipped to grind cylinders. In this case the grinders were actually ordered and it was expected that they would be in hand for the year's work. Grinding is a quicker process, and for this reason alone it is adapted.

Grinding, besides reducing the time of finishing, is the best possible assurance that the bore will be of perfectly uniform diameter, even though there may be hard spots over the surfaces of the cylinders. In casting cylinders the metal will not be of equal hardness all over, and while all possible skill is utilized "chill" conditions will creep in, and white metal will gather at zones over the surfaces.

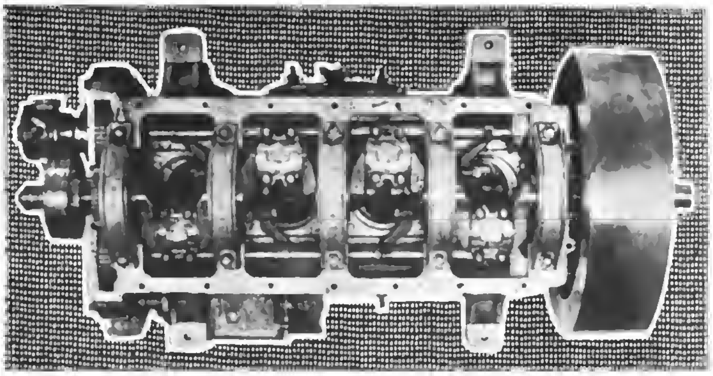
In addition to this condition of chill there is a certain proneness of the metal to remain soft in spots, and in boring the cutter will dig in deeper at soft and back off when hard spots are encountered. Grinding has none of these drawbacks; the surfaces are ground off at the same rate, irrespective of the hardness of the metal, and inequalities, although scarcely noticeable to an observer of little skill, will allow gas to leak by.

Since grinding is the quickest way to finish cylinders, it is the best possible guarantee that this process is followed in the low priced automobiles as well as in the more pretentious efforts. The cylinders are first wrought, bored, and then mounted in a fixture, or bolted to an angle plate on the platen of the grinder, where the final finishing is done. Pistons are also ground, and the allowance for expansion due to heat is very carefully cared for. Expansion allowance has not been reduced to a standard basis, and this, as well as a number of like details, will have to be given a little attention in the long run.

The piston rings, of which most motors are provided with four for each piston, are made of a special mixture of cast gray iron. The rings do not have to be of great section, and so fashioned as to press heavily against the walls of the cylinders. In some of the earlier designs of motors the "pumping losses" reached the enormous figure of 1 1-4 horsepower per piston ring used, and the mechanical losses were excessive.

In the absence of skill borne of experience, this condition is bound to creep in, and "paper experience" when it comes to matters of this sort, is worth very little. It is on account of this, and other similar matters, that motors, if they are given a displacement rating, will scarcely be on a fair basis of comparison. There is no way known to engineers by which the factor "skill" can be introduced into the formula, and in the absence of this, the accurate way to ascertain the true rating is to test it.

This, and many other reasons, are at the bottom of the problem which is bound to confront the man who goes in quest of an automobile nor is it likely that the time will ever come when the search may be conducted without having to allow for the personal equation. The nearer the approach to a standard, the less will be the hazard, and, while it cannot be claimed that automobile motors are even approximately on a standard basis, they are sufficiently perfected, taking them as a whole, to assure purchasers that the difference between the worst example and the best motor is nothing like what it was last year—each successive year brings its quota of refinement in this respect.

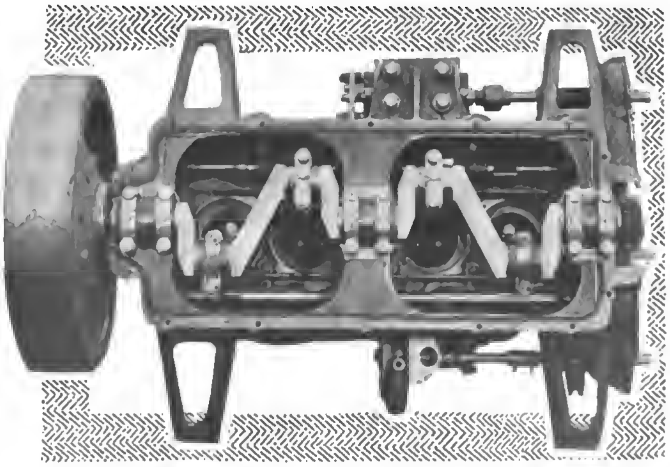


Crankshaft with Five Bearings of the Annular Ball Type

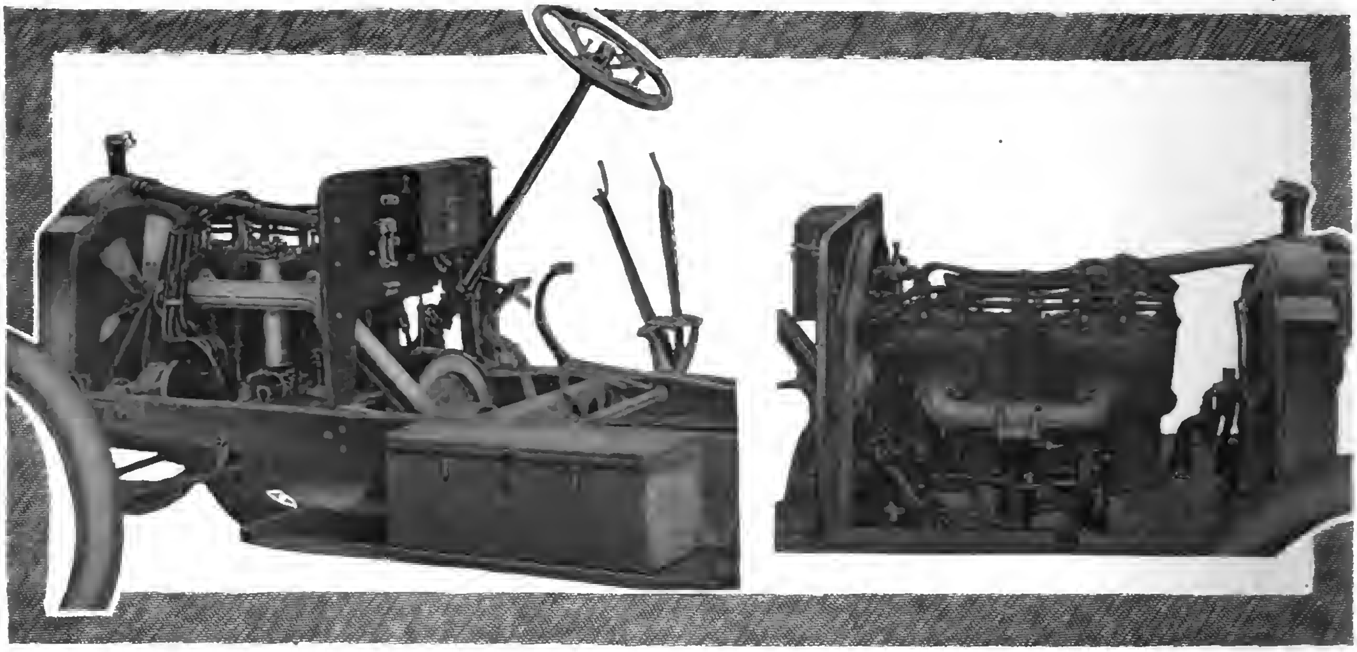
POINTS OF MERIT IN SELECTING A MOTOR

Were the whole matter put on a civil service basis, the points of merit might be approximated as follows:

Conditions to be considered.	Points.
For each year of service rendered	5
For a tight compression without an oil seal	10
For each 10 degrees reduction of the temperature of the cooling water below 212 degrees F. (to 170 degrees F.)	10
For each one per cent increase in thermal efficiency	10
For a straight line torque performance up to 1,000 feet per minute of piston travel	20
For accessibility, ease of adjustment, etc.	20
For each reduction of 1,000 pounds per square inch of extreme fiber strain due to secondary moments at 1,000 feet per minute of piston travel, measuring the strain at any point desired on the section of the crankshaft	20
For tight cylinders under a hydrostatic test of 500 pounds per square inch	20
For perfectly round and parallel cylinder bores	10
For noiseless performance	25
For absence of packed joints	10
Per pound per square inch of back pressure removed	20
Per pound of suction depression removed	30
For a securely fastened flywheel	20
For integral or equally secure cams	20
For a satisfactory wipespark system of ignition	20
For a satisfactory system of high tension magneto	20
For a satisfactory dual ignition system of ignition including a magneto	30
For a satisfactory double system of ignition, including magneto and a multi-coil	30
For a satisfactory double system of ignition with a magneto and a uni-sparker	30
For an ignition system in which the wiring is run in a proper conduit system	20
For a carbureter which will deliver gas of uniform density at all speeds of the motor	30
For a motor which can be assembled and taken down without having to use a special wrench or tool	30
For a motor which will not pop back in the carbureter under any condition of mixture	10
For a motor which will start on a quarter turn of the crank in zero weather repeatedly	100
For a motor which will start on the spark repeatedly after it is shut down for a period of 10 hours	100
For general appearance and exterior finish	20
Considering a given gear ratio; for a motor which will accelerate the car it is placed to drive, from a standstill to maximum speed in the shortest time	30
Considering a given gear ratio; for a motor which will drive the car it is placed to drive, up a ten per cent. grade, on "direct" at 1-4 (or better) of the best speed of the same car on a level	100
For a motor which is positively lubricated and capable of running 10 hours without having to be attended to (no addition of lubricating oil)	100
For a motor without any exterior oilholes to be cared for	40
For a motor which will not leak lubricating oil	10
For a motor which will not smoke	10
For an installation which is tight enough to exclude dust (a satisfactory system of pans)	100
For a motor which will deliver the power required on a gasoline consumption of one gallon for each ten miles	10
For each additional mile per gallon	10



Three-Bearing Type, Exemplified by Premier, a Standard



Front End of Packard Chassis, and Inlet Side of Motor; the Radiator Filling Cap Is the Only New Feature

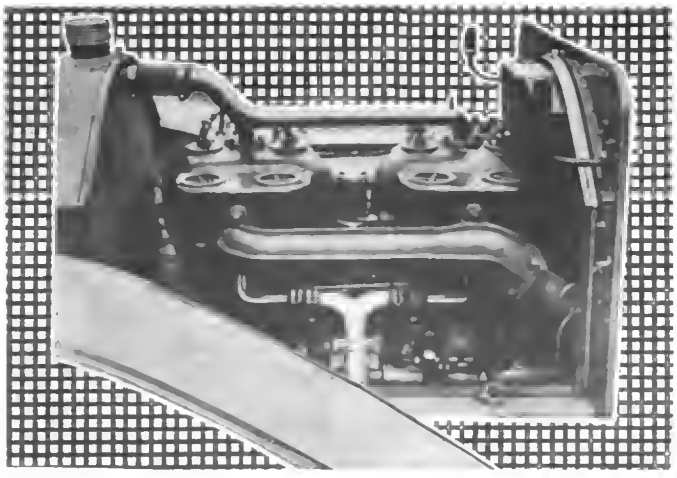
SELECTING A CAR IS A PROBLEM

The above system of rating a motor assumes grave complications; it will take considerable time to so develop it that it will be fairly representative of the true situation, and it is highly improbable that any two engineers would agree that a given number of points will truly represent any given condition. The idea, for illustration, of giving 100 points to positive unattended lubrication for 10 hours, and only 20 points for tight cylinders under a hydrostatic pressure of 500 pounds per square inch, would lead to discussion, and it might be the consensus of opinion that the rating should be reversed.

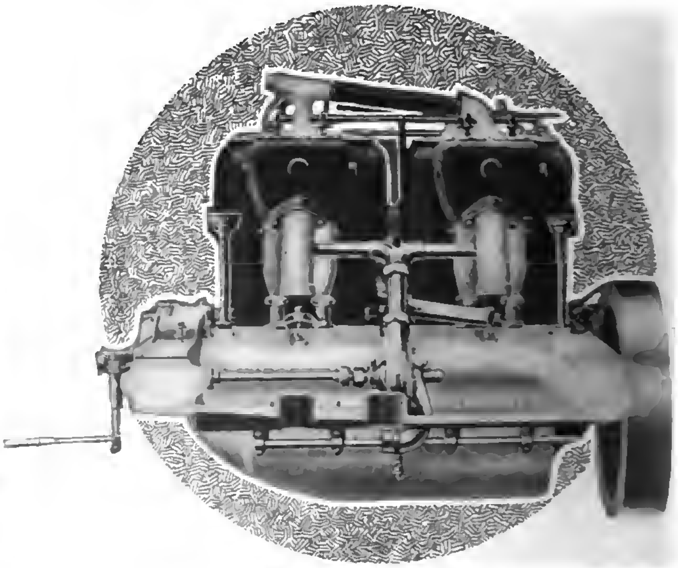
Considering the purchaser, however, he can ascertain for himself, if the lubricating oil will hold out for 10 hours, but he will not be in a position to note the tightness of the cylinders in a hydrostatic test. This being so, and in view of the importance of perfect lubrication, it does not seem out of place to make an arbitrary rating which will enable the purchaser to reach a conclusion which will reflect the life of the motor. The hydrostatic test is not so important to him, because he will be able to fall back on the makers' guarantee, if, after purchasing, the cylinders prove to be defective.

Noise, for illustration, is only rated at 25 points; this seems to be very low, and it would be, were the purchaser dull of hearing. If a motor is noisy the purchaser will be justified in the belief that it is far from mechanically perfect, and he would naturally not care to make an investment. Within certain limits, only, is a purchaser likely to deal in a noise problem, and considering this fact, the noise rating may be put down to a low level.

In the suggested system of ratings, the quality of material was not included. This would have been a very important matter two or three years ago, and from the makers' point of view it is always likely to be a serious matter. The purchaser, however, has no way of knowing the quality of the material used in a given motor, and he must be satisfied with the history of the make of car he decides to purchase, which history is represented in the five points allowed for each year of service the motor may have behind it. This allowance seems to be low, but the materials which can be purchased are all that can be used, no matter who builds the motors, and it is cheaper for the makers to use good selections rather than to risk reputation on the other kind.



Exhaust Side of Lozier Four-Cylinder Motor



Rainier Has Separately Enclosed Valve Springs

Material will have to be handled by the maker, and the purchaser will have to be satisfied to accept the maker's guarantee on this point. Under the circumstances, it would seem useless to include materials in the point system, unless the purchaser can induce the maker to state definitely what the character of the materials are, and in terms which will be understood.

The New Boston Branch of the B. F. Goodrich Company.

New Home of Maxwell and Austin Automobile Salesrooms. Entire Building occupied by Automobile concerns.

Alvan T. Fuller Services Depot, Boston.

Another New Building for Automobile Salesrooms, Rainier, Locomobile, and Thomas Agencies.

High-Vaulted Armory in Which Baltimore Show Was Held; in the Foreground Appear Mitchell and Stearns

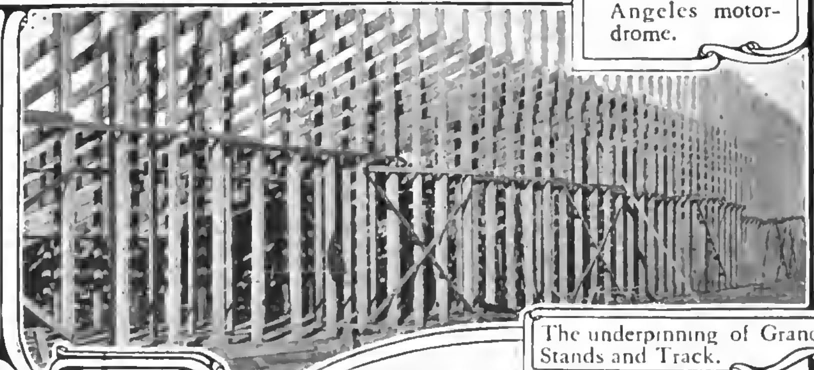
BALTIMORE, Feb. 27—The Baltimore Show, which closed last night after being the center of attraction for five nights and four days, will go down in the city's automobile history as the greatest event of the kind ever held in this locality. It is estimated that not less than 40,000 persons paid their way into the Fifth Regiment Armory to see the big display. And it should be said right here that by all the visiting tradespeople, as well as local automobilists and dealers who have attended shows elsewhere, the Fifth Regiment Armory is considered one of the most suitable buildings for holding a real successful show. Although the exact figures cannot be had because of the tendency of some dealers to keep their sales secret, it is declared by the show officials that they were close to the $250,000 mark.

Although there were only two airship exhibits at the show, they were a new feature here and attracted considerable attention. These were the monoplane of J. H. Smedley, of Connecticut, and the biplane of two Baltimoreans, Dr. Charles S. Evers and William W. Southhard.

Another View of the Baltimore Armory, Featuring the Exhibits of Pierce-Arrow and National Machines

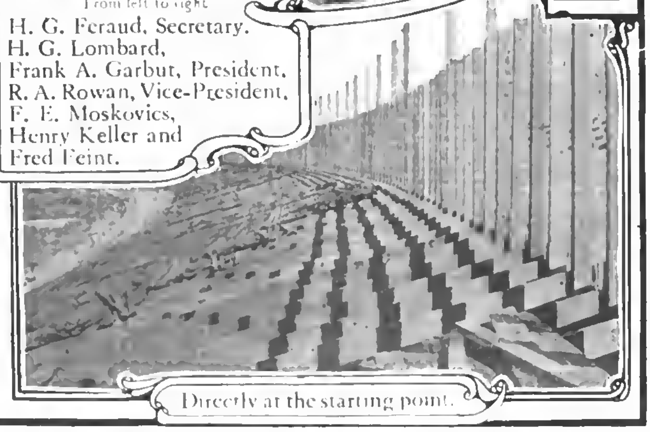
View showing section of Los Angeles motordrome.

Method of laying strips.



The underpinning of Grand Stands and Track.

Directors of the motordrome. From left to right
H. G. Feraud, Secretary.
H. G. Lombard,
Frank A. Garbut, President,
R. A. Rowan, Vice-President,
F. E. Moskovics,
Henry Keller and
Fred Feint.



Directly at the starting point.

Constructive Features of Los Angeles "Dish"

EXPERIENCE with circular tracks to unit radius is but slight, although the principle has been incorporated into bicycle track work, and has always obtained, to some extent, in connection with race tracks in general. It is anticipated that this phase of the circle idea will serve the ends better than will be possible under ordinary conditions, for the reason that the radius of the curve will be greater than that which obtains in tracks composed of curves and tangents.

This will only be true if the radius of curvature of the circle is actually greater than the radius of curvature of the turns in tracks in general. In this case, the track is one mile in circumference, so that the radius of curvature is 840 feet, approximately. This means, however, that the automobiles, when traveling on this track, will always be under the influence of centrifugal force, to whatever extent their weight and speed, considering this radius, will induce—it is probably but slight.

The Indianapolis Speedway differs from the Los Angeles "Dish" to the extent represented by a plan which includes four tangents and four curves. In the Indianapolis undertaking the radius of curvature is minimum at 840 feet. This information permits of making a comparison which will show one point, *i.e.*, the centrifugal force will be greater when a car is making a curve on a track the radius of which is 840 feet than it will be on a track the radius of which is 1,684 feet. This does not necessarily mean that the speed of travel will be very much restricted considering the track of the shorter radius, because the minimum radius considered may not be sufficiently short to seriously influence the car performance.

The illustrations here given are sufficient to clearly bring out the points of construction, and for the rest the banks are uniform for the entire distance of the course in which the vertical height of the outer circumference is 14 feet 6 inches above the dattum line. The surface is made of 2 x 4 scantlings laid on edge, running lengthwise, and quite securely bound. It was the aim of the designer to give to this surface construction the characteristics of a flattened arch, with the idea that the underpinning would scarcely play a part. It is claimed that the surface structure would remain in place, unaltered, and sustain the required weight, were the supports extended between bents.

The grandstands are elevated 4 feet above the track, and the intervening space is a strip 4 feet wide for the entire front distance. A heavy timber construction faces the grandstand, and every provision seems to have been made, not only from the point of view of the safety of spectators, but the contestants as well. The grandstand and bleachers are only five rows deep.

The construction is progressing quite as favorably as could be expected, in view of the difficulty involved in procuring lumber which comes from Vancouver. The illustrations will tell of the progress already made, but there is still a shortage of perhaps 500,000 feet of lumber, and Constructor Prince, with his army of carpenters, eats up each shipment of lumber as fast as it comes in.

CROSSING THE ATLANTIC WITH AN AUTOMOBILE

DIFFICULTIES in the way of transporting an automobile in running order across the Atlantic for a European tour were formerly regarded as almost insuperable; most persons preferred to buy or rent foreign cars after they had reached the other side. Part of these difficulties were due to the failure of the steamship lines to realize the importance of automobiles as an article of freight, and part to the ignorance of the private owners of the various formalities required in the conduct of international traffic. The steamship companies have thoroughly reformed, however, and now offer every facility. Customs formalities and others have been considerably mitigated, and, if desired, can be conducted through the agency of any one of several clubs and corporations.

Thousands of American cars are now taken abroad every year, and each automobilist who tours in this way one Summer is sure to send several others across the next. As a way of enjoyably spending a vacation, and as a means of seeing the countries visited, touring *en auto* needs no further commendation. This season is sure to bring forth more tourists than ever before, and those of the number who are making their first trip will doubtless be glad of all the information and advice that can be offered.

As to the first requisite of an automobile tour, the automobile, little need be said. It will be taken for granted that the machine in question is of proved reliability, and ready for the hardest usage. The perfect roads of France and many other European countries tempt those who like to have the throttle just a trifle wider open than the other fellow, and the strains of long-continued high speed are apt to prove more disastrous to engine and running gear than the roughest American travel. Unless the car is of one of the makes which maintain foreign branches, ample supplies of spares should be taken along, to be ready for any contingency. If it is new this season, delivery should be secured far enough in advance, not only to secure against possible delays, but to run the machine several hundred miles and so to become acquainted with it and its peculiarities.

Little trouble may be expected from the various regulations covering automobile construction. Safety from fire and explosion, effective steering, two sets of brakes and simplicity of control are features of every machine with which one would be likely to attempt a European tour. The driver must be not less than eighteen years of age, and must give satisfactory proof of his ability to handle the car. These are the international rules adopted last Fall by France, Germany, Italy, Belgium, Bulgaria, Roumania, Montenegro, Servia and Monaco. In England, which is conspicuously absent from the list, the regulations are practically the same as in most States of this country; that is, any car can be used, providing the necessary fee is paid and the number carried, and any one can secure a driving license, also on payment of the proper fee.

A single certificate is good in any of the countries listed above as using the international rules, and the certificate can be secured in any one of them convenient to the tourist. In most cases this will be France, both because this is convenient in position, and because of the assistance afforded to the tourist by the Touring Club de France. The various examinations cannot of course be taken until arrival, but through the intermediation of the Touring Club they can be arranged for and the minimum of time wasted.

The customs deposits required before entering various countries can also be made with the Touring Club, which issues international *triptyques,* or certificates. Further than these none of the European countries have any formalities which affect the transportation of automobiles. Unless care is taken to observe the American formalities, however, the tourist on his return will find himself held up for payment of duty before he is allowed to land in his home country.

Most likely to affect the pleasure of the automobilist after his arrival on the other side is the care taken in boxing the car on this side. Satisfactory work in this respect requires no little planning. Few people appreciate the rough treatment which crated articles are likely to receive in loading and unloading. The railroad "baggage-smasher" is a familiar example of what a single man can do to a trunk or similar article; the steamship packers, with the assistance of steam cranes and derricks, can accomplish much the same result with a two-ton automobile. The crating must be done with this in view.

The accompanying drawing shows in longitudinal and lateral section a crate of ample proportions; it will be observed that the framing is considerably more substantial than would be required in the case of a house or shed of similar size. Three heavy beams or skids form the foundation; of these the outer ones are 4 by 6 inches, and the middle one 4 by 4. These are united at each end by a 4 by 4 cross-piece, and by three or four 2 by 4 pieces spaced between, corresponding to the joists of a house.

The vertical risers, or studdings, are 4 by 4 timbers at each corner, and three 2 by 4 pieces on each side. These may be braced by one or more diagonals, if desired, though this is not shown in the drawing. The risers at each corner are joined by 4 by 4 timbers all around. Thus every edge of the crate is a 4 by 4, or heavier. The top has three or four 2 by 4 cross-pieces. Good firm lumber should be used.

For the covering of the crate nothing less than one inch planking will do; this may be in any suitable width. For the top, as shown, in the drawing, 1½-inch material may be used to advantage, in the event of heavy articles being dropped on the top. The bottom planking is protected by two sets of cross-pieces, which in this case are on the outside. In putting the crate together it is well to consider the possibility of using it for the return trip. By a little forethought it may be made possible to have the crate "knocked down" into compact form and stored during the trip. In most cases this will save considerable expense, but of course is not worth while if the return is to be made by a port very far distant from that of entry.

To this end the crate should be considered as composed of six separate pieces, each forming one side. The plank covering of each side can be nailed down to the beams of that side, thus uniting them. Where the beams are joined together, in assembling the several sides, through bolts should be used, both for the sake of strength and for ease in disassembling. This may add slightly to the cost of construction, and it is for the individual to decide whether this is justified in his particular case. In many places iron corner pieces can be used to advantage. The drawing shows the planking for the ends nailed directly to the end verticals; this can be avoided by the use of a couple of vertical planks joining the planking together. The ends can then be bolted on as a whole. This also facilitates removing the car when the destination is reached.

After the crate itself is constructed, the installation of the car is a matter in which no little ingenuity can be exercised. It is necessary to preclude absolutely the possibility of the car breaking loose, no matter to what treatment the crate is subjected. Many steamships have hatches too small to admit a large automobile right side up, and so must lower the crate end on. Not infrequently it is stored during the passage in the same position. The reasons for solid fastenings may then be appreciated.

The drawing shows a method which has been very successful, but individuals are cautioned against adopting it, as it is the subject of a United States patent granted to Edward Weinacht, of the Morris European Express Company, New York City, and used exclusively by that company for the crating of automobiles. The object here is to show the requirements of the case, in order that those who propose to do their own crating can act accordingly. According to this method, the wheels of the automobile are supported clear of the floor by blocks placed under the hub caps, and resting directly on the two main base pieces of the crate. The upper sides of the blocks are suitably recessed to take the hub caps, and are provided with heavy iron straps to bolt over them, thus securing the car. To add even greater security, diagonal pieces are wedged in between the axles of the car and the end cross-pieces of the crate.

For the automobilist who must devise his own method of fastening little advice can be given without the details of the car dimensions and construction. In most cases the plan must be worked out separately for each car. Knowing these requirements, namely, that the car must be so firmly supported as to become practically a part of the crate, a good carpenter can usually give a satisfactory solution.

Another method which is not patented, but the success of which depends largely on the car design, may also be described. Two pairs of internal cross-pieces are provided; one piece passes above and one below the frame of the car at both front and rear ends. The front frame extensions which form the spring hangers offer a convenient support at this end, the cross-pieces being passed between the spokes of the front wheels. The same method may usually be followed at the rear end, provided the car has semi-elliptic springs in the rear with long hangers. If not, the cross-pieces may be passed between the spokes of the wheels, one in front of and one behind the axle; the pieces being made of such width or so spaced that they are firmly wedged in. The cross-pieces both in front and rear may then be attached to the vertical studdings of the frame, which of course would be suitably spaced for this purpose. The cross-pieces, of course, should be padded where they come in contact with the car, so as to avoid marring the finish. This plan is merely a suggestion, but even if it cannot be adopted bodily it may help the individual in arriving at a satisfactory solution.

One highly desirable result is the support of the car weight clear of the tires. Standing in one spot for a week or two does not improve tires anyway, and many garages have arrangements for jacking up cars that are to stay more than a day or two. But in ocean travel the constant vibration and tossing of the ship is sure to develop a little looseness in the fastenings, and so cause the car to move to and fro slightly. This motion, if long continued, will chafe the tires in such a way as to weaken them materially, even if a blowout is not caused at the time.

Common sense requires that all moveable parts of the car should either be packed separately or so firmly fastened in place that there can be no danger of their coming loose. Seat cushions are especially offenders in this line, and are the more troublesome as few would suspect them. Tools, too, are apt to break loose. All gasoline and oil should of course be drained from the tanks before packing, as the steamship companies will not allow the former on board their vessels.

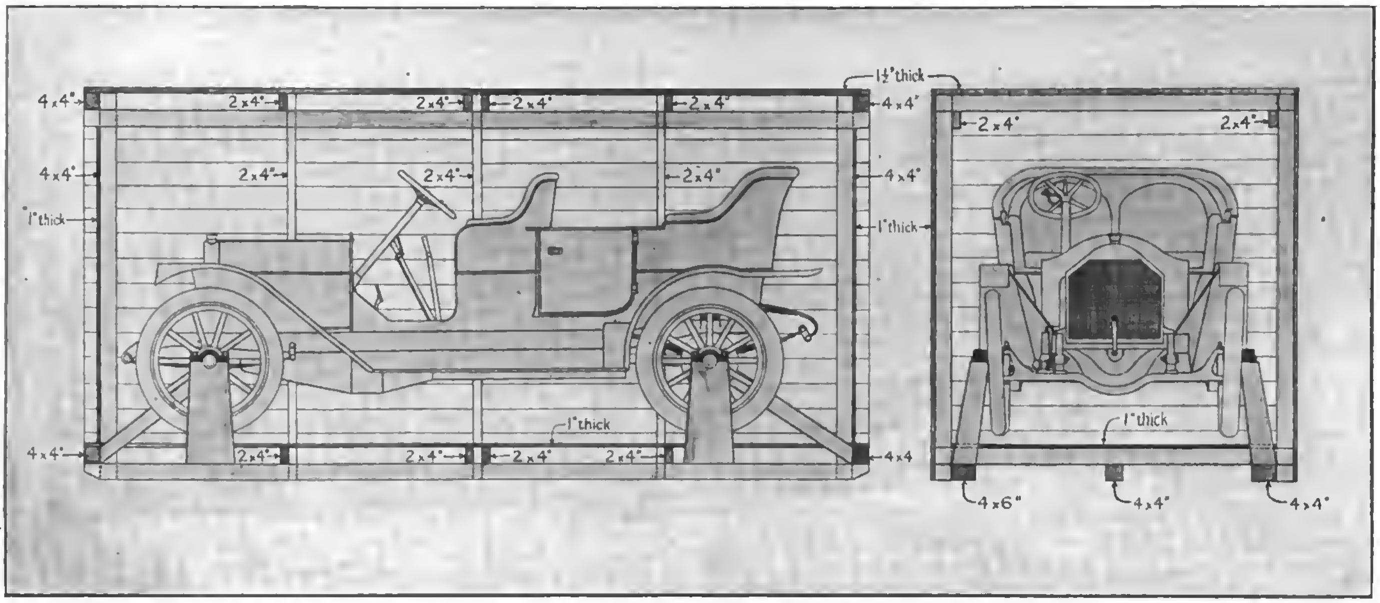
The dimensions of the crate naturally depend so much on those of the car that they cannot be indicated here. Tops and windshields should be taken off and packed as closely as possible. In general, for a car of about 120 inches wheelbase, the material required will be: 32 feet 4 by 6-inch timber; 104 feet 4 by 4-inch; 126 feet 2 by 4-inch; 434 feet (board measure) 1-inch planking, and 112 feet (board measure) 1½-inch planking.

The weight of the crate is a matter of indifference, for the reason that rates on automobile shipments are either made specially for the case, or else, under the "ship's option" privilege, are assessed not on tons of 2240 pounds, but on measurement tons of 40 cubic feet. On the latter basis the shipper will find himself rated at some 20 tons anyway, which leaves a pretty safe margin above the weight of the car itself.

One matter which should be called to the attention of those who intend to ship their cars by railroad to New York, there to be transferred to the steamer, is the custom of giving free lighterage on carload shipments. The railroad and steamship terminals at New York are so widely scattered that the cost of transfer between them often costs more than the freight itself. If an entire car is engaged for the railroad trip, which is often necessary anyway, the shipper is entitled to free transport or lighterage to any steamship pier in New York harbor.

The name and address of the shipper, and the destination, together with the words "touring automobile" or others equivalent, should be marked plainly on at least two adjacent sides of the crate. It is advisable not to mark them on with a brush, but to use a stencil with block letters clearly cut.

Nothing definite can be said about the freight rates which the prospective tourist will be called upon to pay, for the reason that these vary considerably from time to time. It will always be found advisable to have rates directly quoted by the steamship companies themselves, for an automobile of given over-all dimensions, and thus avoid misunderstandings.



Substantial Crate for Automobile Shipment, Showing Application of Weinacht Patent Car Supports Under Axles

FROM THE EUROPEAN MAIL

Flood Stops Work in French Shops

Paris, Feb. 21.—Seventy-five per cent. of the automobile factories in the neighborhood of Paris were entirely closed down by the overflowing of the River Seine or stopped for lack of pure water and light. In the majority of cases the stoppage was directly attributable to their buildings being entirely or partially under water. For ten days 15,000 to 16,000 workmen in the automobile industry alone were without employment, and the damage amounts to several thousands of dollars. The monetary loss is not confined to the manufacturers, but is shared by their workpeople also, most of whom live near the river banks and have lost clothing and furniture in the floods.

At the present time all danger appears to be past, the water having settled so much that work has been partially resumed in several factories and preparations made for driving out the floods in the others. Within Paris the only firms to entirely escape the floods are Panhard and Delahaye, both of whom have their works on high ground far removed from the river. Except for a shortage of pure water, nothing interfered with their normal working. Mors, within the city, had to close down for ten days, with a couple of feet of water in most of the shops; it was impossible to reach the factory entrance except by boat. Sizaire-Naudin, in the immediate neighborhood, had little water within the shops, but such a quantity at the entrance that no workpeople could enter and no finished goods depart.

Most of the factories are situated on the banks of the river just below Paris, and it was here that the greatest damage was done. Renault had to close down entirely, all the surrounding country being under water. The river has now retreated, leaving behind a certain amount of water and still more mud. This is being pumped out and cleaned away, and the shops are being opened up as they become fit.

Gobron-Brillié, having everything on the ground floor, and practically on the river level, had to go under to the depth of four or five feet. Darracq, Saurer, Unic, Mercedes and Charron, all grouped together by the river side, had water in their shops for ten days at a height varying from two to six feet. De Dion-Bouton sought to fight the flood with pumps and motors, but seeing that the task was impossible beat a hasty retreat, raising the dynamos onto temporary platforms, moving the chassis to the rearmost buildings, and carrying whatever machinery could be transported to upper stories. Then the water rushed in, covering most of the shops to a depth of five feet and throwing almost four thousand workpeople into temporary idleness.

Clément-Bayard had six feet of water along the new highway leading to its fine factory. As the river-front buildings, however, are mostly given up to the workmen on the ground floor, the damage was not considerable. One of the steam engines was put out of business, but by building up temporary walls the other was kept in condition and work carried on without much difficulty. Anzani had fortunately removed from the river side to larger premises further inland. The experimental plant and stock left behind were utterly ruined.

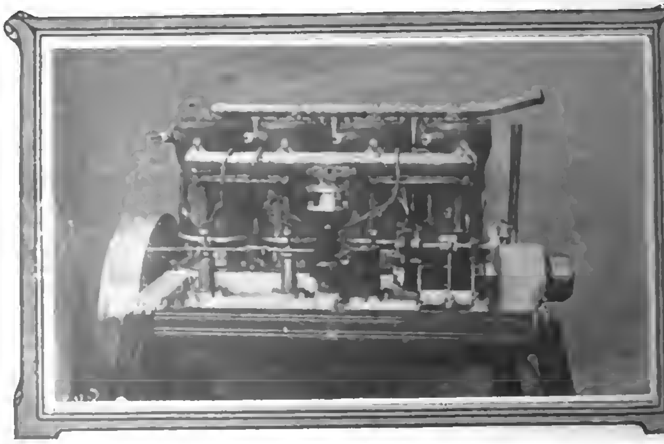
Further down stream, at the Hotchkiss, Delaunay-Belleville, and Aster establishments, considerable damage was done. The greatest sufferer, however, appears to have been Gnome, whose factories were completely submerged by the breaking of a dam. Many new American and English machine tools recently installed for the manufacture of aeronautical motors must have been almost entirely ruined by their fortnight's submersion. The Bosch magneto plant went under to such an extent that all business had to be transferred to the Lyons and other European factories. Nilmélior, among the magneto men, suffered badly, and Continental among the tiremakers.

Joint Auto and Aero Salon in Paris

Paris, Feb. 21.—In their determination to be free from the control of the Automobile Club of France, all the leading automobile constructors have decided to join with the aeronautical manufacturers in the holding of a joint automobile and aero show in the Grand Palais from October 15 to November 2. The aero salon was decided on and the date fixed several months ago, the event to be controlled, as last year, entirely by the manufacturers, without the assistance in any way of the Aero Club or other aeronautical associations.

The combination show is of recent date, and is the outcome of a failure of the automobile manufacturers to come to an understanding with the national club on the control of the annual salon. Possessed with the idea that the club did not adequately represent them as manufacturers, such leading firms as Panhard, Renault, Brasier, Grégoire, Delaunay-Belleville, Peugeot and Turcat-Méry broke away from a trade association under the tutelage of the Automobile Club of France and established the Syndicate of Constructors, to which only car constructors should be admitted, to the exclusion of accessory dealers, tiremakers, agents, body builders, etc.

This group had made a show in Paris impossible last year, but having learned that an annual exhibition is to their benefit, decided to hold one this year on reformed lines. They insisted that the joint committee responsible for the last eleven shows should be so transformed that the Automobile Club of France and its allied associations should be in a minority compared with the actual manufacturers. The club offered to retain only the same number of members as the new manufacturers' association, and to admit the cycle manufacturers, who would thus have a casting vote. The manufacturers refused to agree to anything less than the total submission of the club. This being refused, they approached the aeronautical constructors, who had already made arrangements for their show in the Grand Palais, and agreed to throw in their lot with them. Unless, therefore, the club consents to climb down and organize an automobile show on the lines dictated, this year's Grand Palais will be a combination salon



Germain (Belgian) 100-Horsepower Motor for Dirigibles

The manufacturers have nothing to lose by their persistence in refusing to hold a show with the Automobile Club, for, as they represent not less than 75 per cent of the industry, a rival organization is impossible. The Automobile Club, on the other hand, after relinquishing all effective hold on the industry, is in danger of losing the nominal control the manufacturers are still willing to bestow upon it. If the manufacturers' joint show committee scheme had been carried through, the club would have still furnished the president and figured in the eyes of the public as the leader, although in a minority regarding management and the sharing of profits of the undertaking.

A joint show is not altogether new, for in 1908 the Automobile Club and manufacturers, who were then working together, arranged for two distinct exhibitions, one for pleasure cars only, and a second one, following immediately after, for commercial vehicles and aeroplanes. The shows were a success, although the partners felt that they were not mutually helpful, truck users having little interest in flying machines and aeronautical enthusiasts finding little to interest them in wagons and stationary engines.

Last year's aeronautical exhibition, the first purely aero show in Paris, succeeded in filling half of the Grand Palais, the other half being artfully boarded off. Taking into account the increases of business in matters pertaining to the air, it is certain that the aero section cannot be crowded into less than half of the Grand Palais, leaving only one-half for the automobile section. As in previous years they have found the whole of the large building none too spacious for them, it is difficult to understand how they will all find standing room without the use of an annex.

Voiturette Stroke Again Unlimited

Paris, Feb. 21.—No limit will be placed on the stroke of the small cars taking part in the next voiturette race, scheduled to be held over a distance of 350 to 400 miles on Sunday, June 19. Two years ago the bore was fixed and stroke left unfettered, the result being that cars were produced with single-cylinder motors having a ratio of stroke to bore of 2 1-2 to 1, or 3.9 inches bore by 9.8 inches stroke. Believing that the reasonable limit of long stroke had been attained, the organizers last year limited both bore and stroke, although still maintaining the ratio of 2 1-2 to 1. The change displeased small car specialists, some of whom declared that there was no further incentive to progress, and declined to take part in the race.

This year the old rules have come into force again, the bore of the small racing cars being fixed at 3.9 inches for one cylinder, 3.1 for a twin, and 2.5 inches for a four. The weight limit has been slightly increased to 1,433 pounds, with two-seated body, but without gasoline, oil, water, or spares. Demountable rims and wheels can be employed, and the mechanic can relieve the driver during the race if desired. No outside help must be given.

The race, which has always been won by a single-cylinder of

Four-Cylinder Horizontal Aero Motor Made by Miesse

A Berliet Pumping Out Photographer Branger's Cellar

3.9 inches bore by 9.8 inches stroke, will probably this time be captured by a multiple-cylinder model. Designers are generally of the opinion that they have reached the limit in long-stroke single-cylinder models, but that there is still much to be learned in four-cylinder models with a ratio of stroke to bore that has not previously been thought practicable. Proof of this is found in the fact that one of the single-cylinder long-stroke specialists, who has been victorious in this race, is about to put on the market a commercial model having four cylinders of 2.7 inches bore by 6.6 inches stroke. This is practically a ratio of 2 1-2 to 1, hardly thought possible with racing cars two years ago.

If a motor with such a long stroke can be placed in the hands of the general public, what may be expected of the firm's racing models?

On the day following the race for the small speed monsters a speed test will be held over the same course for the same class of vehicle as sold in quantities to the public. The comparison will be interesting, for it will allow the public to judge of the respective merits of the special long-stroke cars and the medium standard models. If care is taken to see that the stock models are really assembled from series, it will give an excellent opportunity of comparing the special and the ordinary output of the firms competing.

French Imports and Exports Increase

Paris, Feb. 21.—Although French automobile business with the United States has been steadily diminishing for the past three years, the official returns show that 1909 has been a record year in the matter of exports, surpassing even the high-water mark of 1907. During the past year America cut her expenditure for French automobiles by $600,000, and diminished them by $800,000 as compared with 1906. The dimunition can only be attributed to the development of the home industry.

It is the increase of business with England, Russia, Argentine, Belgium and Germany which allowed France to reach the record figure of $29.323,000 for the 12 months of 1909. The figures for the past five years are are as follows:

Exports.		Imports.	
1905	$20,104,200	1905	$879,200
1906	27,570,800	1906	1,721,000
1907	29,072,800	1907	1,736,000
1908	25,459,800	1908	1,281,800
1909	29,323,000	1909	1,505,000

Although the exports have gone up, the imports, too, have increased, at least with relation to the preceding year. Germany and Italy, who formerly succeeded in selling a considerable number of cars in France, have given way to America, with Belgium and England in the rear.

MERITORIOUS IDEAS FROM ABROAD

Relation of Bore and Stroke

In the attempt—successful, by the way—to prove the absurdity of some of the catalog horsepower ratings in vogue in France, *Omnia* publishes an extensive list of cars on the French market, together with the bore and stroke of their cylinders. American readers, however, will be much more interested in the relations between the bore and stroke revealed by some of the figures.

Among the small four-cylinder cars rated at 10 horsepower are the Sinpar, cylinders 65 by 90 millimeters bore and stroke; Isotta, 65 x 100; Le Gui, 65 x 120; De Dion, 66 x 100; Hurtu, 70 x 90; Cottin-Desgouttes, 70 x 100; De Bazelaire, 70 x 110; Corre-La Licorne, 70 x 120; Cornilleau, 70 x 130; Luc Court, 70 x 140; Zedel, 72 x 110; Werner, 75 x 100; Vivinus, 75 x 110; Rapid, 80 x 130. Among the small six-cylinder cars are the Ariès, 60 x 110; Bazelaire, 70 x 110; Luc Court, 70 x 140; Delaunay-Belleville, 72 x 105; Bazelaire, 75 x 110; Ariès, 75 x 120; Peugeot, 80 x 110; De Diétrich, 80 x 120; C. G. V., 80 x 120; Clément-Bayard, 80 x 120; Cottin-Desgouttes, 80 x 120; Grégoire, 80 x 120; Napier, 82 x 127; Unic, 85 x 120; Delaunay-Belleville, 85 x 120; Brasier, 85 x 140.

Especially startling are the dimensions of the Luc Court, made in four- and six-cylinder models with cylinders of 70 millimeters bore by 140 millimeters stroke (2.76 by 5.52 inches). In the list of 58 six-cylinder cars there are but two in which the bore exceeds the stroke; namely, the 90-horsepower Napier, cylinders 6 by 5 inches, and the Rossel, with cylinders 120 by 110 millimeters. On three cars the bore and stroke are equal, the 110 by 110 Rossel, the 120 by 120 Darracq, and the 140 by 140 Itala. The longest stroke found on a six-cylinder car is 160 millimeters (6.3 inches), on the 50-horsepower, 100 by 160 Renault. Other examples of the long stroke are the 90 by 130 Panhard and Gladiator and the 90 by 140 Argyll (English).

Hydrogen for Dirigible Balloons

French military authorities have had a new problem brought before them: how can hydrogen be provided for the military dirigibles in case of war? *L'Automobile* of January 15 has a serious discussion of the question by Jean de Raicevich, parts of which are quoted:

"It has been suggested that the Government draw up a map of France, indicating the location of chemical plants which might, in case of need, furnish hydrogen for our dirigibles. We doubt whether many would be found. Even if there were quite a number, however, the problem would be far from solved, for between the generating of the hydrogen as the product of a chemical reaction and the compressing of it in the steel tubes used for transporting it there is a considerable gap. And after the hydrogen is suitably prepared a service of automobile trucks or railways will be necessary to carry it to the point where it is needed. Capazza affirms that such a service has been organized in Germany. It is possible, for the chemical industries are much better developed on the far side of the Rhine.

"Some figures will suffice to give an idea of the difficulty of transporting hydrogen. The steel bottles in which it is stored weigh about 9 kilograms to the cubic meter of gas (2-3 pound per cubic foot). It is easy to see at what result one would arrive for the reinflation of a dirigible of a capacity of some thousands of cubic meters. For the average dirigible about half a dozen five-ton trucks would be required to transport sufficient gas."

New French Alloy of Aluminum

A complex alloy of aluminum is described by the French journal *L'Electricien* which can be used as a bearing metal in place of brass and bronze. The ingredients are, besides aluminum, antimony, copper, tin, lead and zinc, and the following proportions are recommended: Copper, 1.2 per cent.; tin, 12 per cent.; lead, 0.8 per cent.; aluminum, 35 per cent.; antimony, 10 per cent., and zinc, 41 per cent. The extreme limits are: Copper, 0.4 to 1.25 per cent.; tin, 10 to 15 per cent.; lead, 0.6 to 0.85 per cent.; antimony, 6 to 10 per cent.; aluminum, 15 to 35 per cent., and zinc, 30 to 55 per cent.

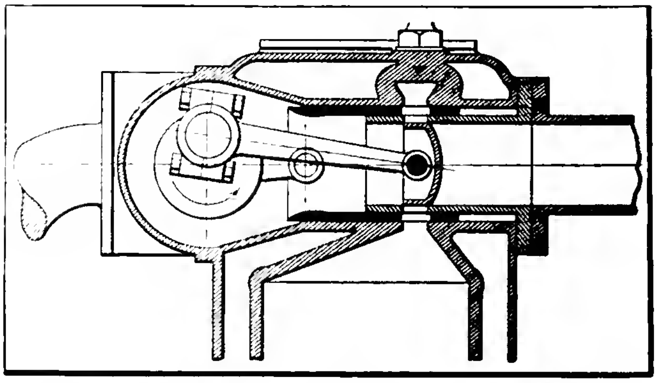
The mixing is accomplished by first melting the copper and adding the other metals one at a time. At each new addition the mixture must be stirred energetically with an iron bar and the fire allowed to go down a little. Toward the end of the operation the mixture is stirred no longer with the iron bar, but with a stick of willow or elder wood, which gives a more uniform mingling and accentuates the properties of the metal.

Drummond-Bostock Piston Valve

Another example of the ingenuity with which English inventors are attacking the valve problem is the system invented by C. E. Drummond and F. J. Bostock, described in *Automotor Journal*, February 5. This valve works in more than theory, for a De Dietrich car so fitted has been on the road since last June.

The valve for each separate cylinder consists of a piston and a sliding sleeve in which the piston works; they are disposed horizontally across the head of the cylinder, and are actuated by a miniature crankshaft lying alongside the cylinders. This shaft has two cranks for each cylinder, one connected with the piston and one with the sleeve. The sleeve cranks are about a quarter of a revolution ahead of the piston cranks. The inlet and exhaust gases pass through the same opening in the head; the combustion chamber is elongated so as to form an annular pocket surrounding the valve mechanism. The idea is that during the compression and expansion strokes the opening is made tight by the sleeve, which is then at the outer limit of its travel; during the exhaust and inlet strokes the sleeve opens a passage, and the direction taken by the gases is then determined by the position of the piston valve.

The housing of the valve crankshaft is utilized as the inlet manifold, the gas being drawn around the lower end of the piston valve, which is then on the outer part of its stroke. The exhaust passes out over the head of the piston valve directly into the exhaust manifold. It will be seen that to maintain tightness it



Drummond and Bostock Valve Idea, with Piston and Sleeve is only necessary to insure that this condition exists around the sleeve. To this end it is provided with external piston rings on its inner end, and internal rings on the outer end surrounding a stationary sleeve. But a very small amount of power is required for driving these valves; in the experimental car the valve shaft was connected with the crankshaft by a chain, and a 1-2 inch size was found perfectly satisfactory for this purpose.

Like most devices of the kind which have been brought out, this valve system lacks the cardinal virtue of simplicity. It has practically the same number of parts as the Knight valve, the difference being that one of the Knight sleeves becomes in this case a piston. The operating crankshaft and the connecting rods are exactly the same. In action it may be expected to be quite silent and to give ample valve openings.

Torbinia Hydraulic Transmission

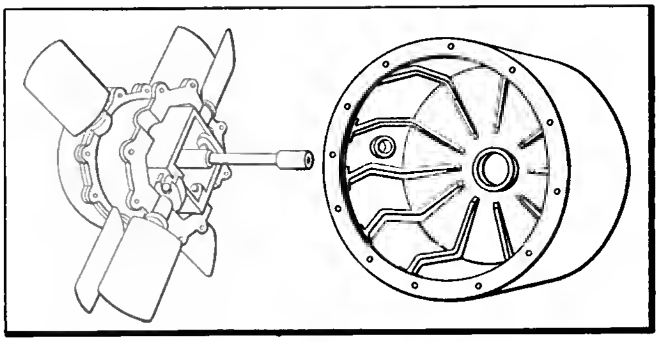
This new form of an old idea, which made its first appearance at the Olympia show at London, is the subject of an interesting article by T. C. Salsbury in *La France Automobile.* It is distinguished among similar devices by having neither pumps, pistons nor valves.

The principal elements of the device are a drum or cylindrical chamber of aluminum, provided on the inside with radial ribs, in which rotates a hub with a double series of blades which can take any pitch angle from zero to 90 degrees. Each set of the blades is practically the same as one of the reversible propellers commonly used on motor boats. When these parts are assembled the case is filled with a mixture of six parts of water to one of oil. The propellers being attached to the motor shaft and the drum to the drive shaft, the power is then transmitted by the drag of the liquid, set in motion by the propellers, on the ribs of the drum.

When the propeller blades are set at right angles to the axis of their shaft—with a pitch angle of zero, as it were—their movement is practically free, and the motor is running light. Giving the blades a slight pitch angle, by means of suitable linkage, enables them to set the liquid in motion, and so turn the drum and the drive shaft. When the blades are set at their maximum angle of 90 degrees, the adjacent edges of each pair meet, making one continuous blade or paddle. As the clearance between these paddles and the ribs of the drum is very small, this amounts practically to a positive direct drive.

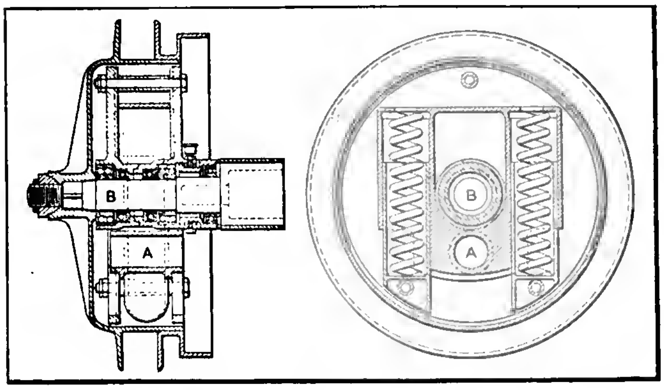
The great novelty and merit of the device is the arrangement of the propeller blades in pairs, with each of the pair working in the opposite direction from the other. In this way the end thrusts which would be set up by the movements of single blades are eliminated. At the same time the high-speed arrangement gives a more positive drive than has ever before been secured with such apparatus.

It is rather surprising, however, to learn that despite the excellence of the theory the makers of the "Torbinia" car, in which this device is used, have found it necessary to provide a low gear of the ordinary sliding type. They found that at low speeds the



Drum, and Paddles with Operating Mechanism, of Torbinia

friction of the blades, moving through the liquid with a very flat angle, absorbed so much power in proportion to the disturbance they set up that it was impossible for a car to pull out on a hill from a standing start.



Genillon Wheel, Rigid, but Flexibly Suspended from Hub

Genillon Spring-Suspended Wheel

This wheel, which is described in the French journal *Omnia,* issue of January 22, is distinctly not a spring wheel in the usual sense of the term. The wheel itself is perfectly rigid, or the usual construction, and is provided with a solid rubber tire. The flexibility and elasticity is all in the attachment of the wheel to the hub. As may be seen best from the drawings, it is in reality suspended, the hub being several inches below the center of the wheel. The load is carried by a pair of stout coil springs, acting in compression. This construction is particularly adapted to live-axle systems in which the weight is carried by a solid axle entirely separate from the driving mechanism, such as that of the De Dion cars.

M. André Walter explains the merits of the wheel as follows: "Every time a wheel meets an obstacle it undergoes a reaction, directed toward its center, which may be divided into horizontal and vertical components. With ordinary suspensions the vertical component alone results in a movement of the wheel, which surmounts the obstacle without slowing perceptibly its horizontal motion. This horizontal reaction is transmitted to the chassis, which by its weight immediately overcomes it. In reality, this horizontal component, the effects of which are not noticed by the passengers of the car unless the height of the obstacle is several inches, nevertheless has a very destructive effect on the wheel and its tire.

"With the Genillon wheel things are quite different. When the wheel meets an obstacle it checks its speed slightly, although the body of the car, by virtue of its inertia, continues at the same speed. This relative movement between the wheel and its hub, which continues with the body of the car, compresses the spring mountings, and when sufficient force is exerted, causes the wheel to leap quickly over the obstacle, coming down, not behind, but ahead of the hub. On account of the increased distance between the center of the wheel and the hub, the body of the car has a very slight vertical movement; its inertia carries it on in practically a straight line, irrespective of the movements of the wheel.

"There is one difficulty, however, when the wheel, meeting an obstacle, slows down with respect to the chassis, its speed of rotation must diminish quite noticeably for some moments, again becoming normal after having made up for lost time by a temporary acceleration. In the case of a front wheel, this makes little difference; but in the case of a driving wheel, the wheel must either slip or the motor and transmission system must follow the variations of speed, multiplied as they are by the gearing. In practice the wheel would probably slip, and the damaging effect of such action on the tires would compensate for any saving that might otherwise be secured. It is to be hoped that the inventor has foreseen this difficulty and provided against it by some means as ingenious as the very clever arrangement of the spring wheel itself. This arrangement should find favor for truck use."

Criticises T. K.'s Airship Scheme

Editor THE AUTOMOBILE:

[2,183]—In your issue of Jan. 20, containing letter number 2,143, T. K. Pittsburgh submits some ideas relative to aerial navigation worthy of study and investigation. In his over confidence, T. K. has taken for granted certain desired results, without reckoning the serious points of opposition. First, his idea of utilizing the combined effect of a horizontal rimbound propeller with adjustable blades for the purpose of raising and balancing the machine is well taken. The gyroscopic effect for balancing has been fully demonstrated in the monorail car. A single horizontal propeller of the diameter indicated in the sketch can never become practical—the great velocity required to lift the machine would cause the same to fly to pieces or twist loose from the hub. Another trouble would be the strong tendency of the large wheel to carry the entire machine around with its own revolutions (a case of the tail wagging the dog). He makes no provision for distributing the frame and forward propeller to equalize the weight to be carried. In my opinion, the forward horizontal and vertical planes should be larger and occupy a place in the rear, and should be operated as a rudder. To obviate the tendency of the machine to revolve with the overhead wheel, two or three smaller wheels, running in opposite directions, would no doubt eliminate the trouble. To obtain a sufficient thrust to lift the device and retain a safe balancing effect, great velocity is necessary. In the absence of large horizontal planes, the lifting propellers would necessarily need to be constructed slightly conical with spaces between the blades closed to get the effect of a parachute in making a descent. The details of T. K.'s sketch are vague and many points are entirely absent. Yet, after all, there is an idea implied that can be worked out for future navigators of the air to rise from the earth perpendicularly and also to be able to stop the machine in midair and retain their position long enough to exchange messages with each other. J. U. BAKER.

Stoutsville, O.

Some of the points are well taken, thus, the matter of rotary speed of the propeller as compared to the bursting speed of the rim. The latter may not attain a lineal speed of more than 6,000 ft. per minute, if of cast iron, and about 10,000 ft. per minute, if of steel. At the comparative size of the man and some other sizes which might be assumed with safety, the flywheel-gyroscope-lifting propeller appeared to be about 60 ft. in diameter, which would give it a circumference of 188.5 ft. Dividing the permissible speed by this, the speed of rotation which the material will allow is but 32 revolutions per minute for iron and 53 for steel. It is conceivable that this speed might possibly be of use somewhere at some time, by somebody, but for flying purposes it is out of the question.

As to the location of the forward propellers, either front or rear is recognized as good practice, the one used being simply dependent upon correct balancing, and changeable at will.

The Motor Jumps and Misses

Editor THE AUTOMOBILE:

[2,184]—Will you please tell me the cause of a puzzling case of missing in my engine. It is a four-cylinder, 15-horsepower motor, and knocks or pounds on all four cylinders when I advance the gas lever to the second notch. But, when I advance it further between the second and fifth notch, it skips, and the motor jumps. Then, to advance it still further than the fifth causes it to settle down to knocking on all four cylinders again. In this latter case, it is going at a speed that is dangerous for such a light weight car. J. T. C.

Bayonne, N. J.

The pounding might be caused by too rich a mixture, which after being fed to the cylinders for some length of time, would also result in missing, through the interior of the cylinders becoming coated with a deposit of carbon. The symptoms of further pounding with an advance beyond that which causes the greatest missing, is very hard to diagnose, but the first-mentioned trouble might well be caused by too rich a fuel supply as stated. To remedy this, loosen up on the spring of the auxiliary air valve. This will allow air to enter sooner, and at high speeds and in hard going, the engine will draw in a greater percentage of air. If after this change is made, the engine still keeps up the pounding and missing, it will be necessary to attend to the adjustment of the needle valve, so that less fuel may enter.

LETTERS INTERESTING

Cylinder Carburetion Troubles

Editor THE AUTOMOBILE:

[2,185]—Will you please answer the following questions? 1. Why is it that a carbureter which will work with an engine of one or two cylinders of say 5-in. bore will not work satisfactorily with an engine of three, four, or six cylinders of the same bore. The same carbureter will work with three and four cylinders of 4 3-4-in. bore and with six-cylinder engines of 4 1-4-in. bore. 2. Will the same carbureter work with both two and four-cycle engines of equal bore and stroke, provided a check valve is used for the two-cycle? ROY WOOD.

Toronto.

Carbureters can only be changed from one engine to another when the cubical capacity of the two engines are alike. The statement that a carbureter would work equally well on motors of three and four cylinders 4 3-4-in. bore, and six cylinders of 4 1-4-in. bore, is ridiculous. The cubical capacity of a four of 4 3-4-in. bore and, say, 5-in. stroke, is 354.4 cubic inches. For a six of 4 1-4-in. bore and 5-in. stroke the capacity is 425.7 cubic inches, an increase of over 20 per cent. Surely if the carbureter was right in the one case, it would be much too small in the other, and inversely if it was large enough for the six, it certainly would be too large for the four.

Actually what must be done is to equate the cubical capacity of the cylinders of the motors in question, as the same vaporizer should be able to supply the same amount of gas to two engines of similar capacity, being otherwise different in number of cylinders making no difference. Thus, if the carbureter was right for a four-cylinder engine of 4 3-4-in. bore and 5-in. stroke, it could be used on the following engines of differing cylinders, but of the same capacity, all fours: 3 3-4 bore by 8-in. stroke; 3 7-8 bore by 7 1-2 stroke; 4 bore by 7 stroke; 4 1-4 bore by 6 1-4 stroke; 4 1-2 by 5 3-8; 4 5-8 by 5 1-4; 4 7-8 by 4 3-4; 5 by 4 1-2; 5 1-8 by 4 1-4; 5 3-8 by 3 7-8; and 5 1-2 by 3 3-4.

Four-Cylinder Engine Power

Editor THE AUTOMOBILE:

[2,186]—Will you please tell me in your columns of "Letters Interesting, Answered and Discussed," how a certain company can get 60-horsepower out of a four-cylinder engine operated with an overhead camshaft and valves inclined at 45 degrees, set in opposite sides of the cylinder heads. Same engine having a 4 3-4-in. bore and 4 3-4-in. stroke, when an engine of such dimensions is rated at 36.4 horsepower? E. G. H.

St. Cloud, Minn.

In the matter of rating, any maker is free to rate his engine as he pleases. Thus, if a manufacturer so desired, he could rate an engine of this size (four cylinders, 4 3-4 by 4 3-4) at 100 horsepower. However, the formula rating method is meeting with much favor, and makers generally are finding out that it pays to rate according to formula. Then, if their engine through superior construction gives much higher power than the formula rating, the buyer is that much ahead, and is correspondingly better satisfied. Every satisfied purchaser becomes a good advertiser, so in the long run the maker giving the most for the money (which is what low or even formula rating amounts to) is the most successful.

As to the particular construction of which mention is made, it is generally admitted that overhead valves will result in superior power from a given size of cylinders, the rest of the construction being up to a fitting standard.

ANSWERED AND DISCUSSED

Adjustment of Air Valves

Editor THE AUTOMOBILE:

[2,187]—I am a subscriber to your valued journal and have gained knowledge far in advance of the subscription price from reading it, especially "Letters Interesting, Answered and Discussed," of which I would be glad to see more. I have had a little problem of my own, which I will ask you to help me out on. I have a Buick Model 10 (1909) on which is used a Schebler carbureter. A little while back the air valve worked loose and the stem and spring dropped down into the pan underneath the motor. In replacing this stem and spring, I am not sure whether I got it back as it was before, that is, the adjustment to give the best results. If possible, please tell me how to go about it to test or correct the setting of this valve. My car is equipped with a four-cylinder 3 3-4 by 3 3-4 motor, ignition is by storage battery for starting and magneto for running. I also notice sometimes that the radiator gets excessively hot and that steam will pass out through the overflow at the bottom, although the radiator has plenty of water. Please advise what causes such a high degree of heat. F. L. TORBERT.

La Fayette, Ala.

Air valves on carbureters should be adjusted to the high speed of the engine, the needle valve to the low speed. Having the latter set to your satisfaction, open the air valve wider and wider until the engine seems to lose speed. Mark this spot so that you can return to it readily, then turn the other way, closing down on the amount of air until your engine again begins to slow down. You will then have two marked points between which the engine runs well, but do not know the exact spot which will give the best all-around results. This will be a subject for further experimentation, and your best plan will be to take an arbitrary setting and try it out both as to speed on the level and pulling qualities, on hills and in heavy going, such as sand or mud. If you find this unsatisfactory under any or all of these conditions, make another trial. Note whether you decrease or increase the air, and if this improves the general average of the motor performance, go a little further in the same direction. If it does not improve it, but, on the contrary, makes it poorer, turn in the reverse direction. All other things being equal, as much air as possible is preferable, for this results not only in more power, but in an increased economy of running, provided the speed range be within that for which the valve is set.

An Old, Old Friend Turns Up

Editor THE AUTOMOBILE:

[2,188]—Will you kindly answer the following question in your columns "Letters Interesting, Answered and Discussed," if space permits? A discussion started here a few days ago as to which wheels of a car, the inside or the outside, would leave the ground in case a car takes a turn at a high enough speed. At first thought it would seem as if the outside wheels would be the ones, but on reasoning it out, it is seen that theoretically it should be the inside wheels that would leave. On the other hand, I think there is a picture of a Chalmers car taking a turn in the last Vanderbilt Cup Race, and the outside wheels are up in the air. Can you tell me if there is any condition under which the outside wheels would leave the ground, and also explain the picture if you know of it? F. W. SEAMAN.

Swarthmore, Pa.

The inside wheels must always rise, and the picture to which reference is made (shown on page 777 of The Automobile for November 4, 1909) shows this very clearly, and not, as suggested, the outer wheels rising from the ground. In this picture, the car is coming around from the far right, the left part of the picture showing the banking of the track at this point.

All About Piston Rings

Editor THE AUTOMOBILE:

[2,189]—What is the best way to remove piston rings from pistons? Is there much danger of breaking them in removing? What is the best way to "set out" the rings? How tight should they fit in the cylinder, when the bore is 3 5-8 in., stroke 3 1-2 in., air cooled? What is the best compression for four-cylinder motors of this size? I have set out large steam piston rings with pean hammer, but motor piston rings are so small, and being of cast iron, I have thought that they might be easily broken by this method. AMATEUR.

North Adams, Mass.

In removing piston rings, lay down on the surface of the piston three or four strips of very thin flat steel. Raise the first ring out of its groove, either by expanding it by means of special tongs or by simply picking it up as best you can. Then slide the flat strips of steel under this and slide the ring along on the strips until the top is reached, when it may be picked off. The reason for the strips of steel is, first, to allow the rings to slide easily, having a uniform surface to slide on, and, second, to prevent the second and later rings from dropping into the open grooves made by the first ring. It is not always convenient to take the bottom ring off first, and even if it were done there would be the other rings to pass over, which is just as difficult as passing over an open ring space.

Cast-iron piston rings may be set out by means of a pean hammer, just as was formerly done with steel steam rings. The only thing is that the work must be done more slowly and more carefully. There are machines on the market in which the rings are turned concentric, and then made elastic enough to spring out and hold against the cylinder walls by hand-peaning on one side of the ring. The number of examples of this are few in America, but a number of French car makers use it.

The tightness is hardly dependent upon the engine size, although the clearance allowed between the piston and walls is usually proportioned to size, a matter of expansion allowance.

Types of Rear Springs

Editor THE AUTOMOBILE:

[2,190]—Will you please advise me through your columns how many automobile manufacturers have adopted the reverse rear spring? Do you not think that in time this spring will be universally adopted, as its easy riding qualities are certainly more pronounced than any other type of spring? E. G.

Montreal.

The form of spring to which the writer above doubtless has reference is that usually known as the platform spring. The reason why this is taken as the one to which reference is had is that but one rear spring is referred to, which is the case in the platform spring, the cross spring being the reverse of that usually used, that is, what is called the opening of the spring is downward, not upward.

Some idea of the number of makers using this type of spring in preference to all others for the rear of the chassis (it is never used elsewhere) may be gleaned from a table of specifications. From such a one which is handy the following figures are taken: 123 makers, with 255 different car models, used 32 platform springs. As to cars, this is just 12.5 per cent., while as to makers, it is 26 per cent. The latter figure is, however, somewhat unfair, for many of the makers used this kind on one model and not on others, so that the real percentage of makers committed to this type as the *only* one would be much less than this; in fact, much closer to the other percentage figure. From this statement, as well as the percentages, the idea may be gathered that no one type of spring can be said with truth to be superior to all others. To state this as a fact, besides lacking proof, would be to insult the intelligence of the makers using other kinds, and using them for good and sufficient reason, too.

From the same table it really would appear as if the three-quarter scroll-ended elliptic spring is held in the highest esteem just now, although this is rather a late improvement, coming into vogue as it did about two years ago.

SOME COIL TROUBLES EXPLAINED

By Stillman Taylor

ALTHOUGH the autoist may at first have some little difficulty in diagnosing troubles which not infrequently result in the spark coil failure, these puzzling matters will soon be understood as one becomes acquainted with the electrical plant and familiar with the idiosyncrasies of the sparking circuit. Coil troubles are, as a general thing, caused by short circuits, and, while the source of the failure may be due to a defect or breakdown in the coil itself, the difficulty is more likely to be caused by poorly insulated wiring, loose terminals, or some other part of the electrical system outside of the coil proper. In fact, there are a number of probable causes which are certain to affect the proper action of the coil, as may be noted from the following list of symptoms and their causes:

Symptoms:—Irregular or intermittent buzzing of the contact breaker or vibrator, metallic clatter or "tinny" sound of vibrator, as distinguished from the usual moderately high-pitched musical buzz. Buzzing sound coming from inside the coil.

Causes:—Pitted or badly worn platinum contacts, loose contact studs, trembler blade adjusted too loose or too stiff, thus affording poor contact, contacts made of inferior platinum alloy, loose terminals, dirt on terminals or coil plates, moisture on plates, defective insulation in connecting wires, defective condenser, coil punctured (insulation broken down inside).

The most prolific cause of failure is due to pitted and improperly adjusted trembler contacts, and in cases of misfiring, evidently due to some failure of the ignition system, the contact breaker of the coil is the first point to be examined. If the contacts are pitted and uneven they should be carefully trimmed up level with a "dead smooth" jeweler's or manicurist's file. In adjusting the tension of the trembler blade, avoid a loose or too stiff tension, as the former will provide a slow contact, and the latter will interfere with the proper action of the coil, and likewise rapidly pit and wear away the platinum. Good coil service cannot be had unless the tremblers of all the units are adjusted as nearly alike as possible. This matter is not always given the attention it deserves, and while an "old hand" may be able to approximate this adjustment very closely by ear, the only exact method is to measure the current consumption of the coil by the aid of a special ammeter sold for this purpose. The manufacturer's directions should be explicitly followed, and each trembler adjusted to draw the recommended amount of current.

The accumulation of moisture or dirt on the terminals of the coil is frequently the cause of short circuits, and a short circuit may also be produced by a weak place in the insulated covering of the wires. Although not always the case, a short in the coil may often be located by excessive sparking at the contacts and in some instances the short will set up a buzzing inside the coil. Excessive sparking may be caused by poor adjustment of the trembler blades, inferior platinum, and less frequently traced to a defective condenser. Proper adjustment will prove a remedy in the first case, new platinum points in the second, while a new condenser or coil will be needed if the fault is in the coil itself.

In the event that the motor develops a case of misfiring, the autoist should first ascertain if all the vibrators are breaking the circuit properly on time. This may be quickly done by turning over the motor until it makes contact with the segment of the timer. If no buzz is forthcoming, examine the wiring and terminals. If the buzz is heard, locate the missing sylinder by cutting out each one until the "dead" cylinder is found. This may be located by the lower temperature, if the motor has been running for some time, or by inserting a bit of pasteboard between the points of all tremblers but the one to be tested. When located, the trouble will generally be found to be in the plug.

In case the primary winding of the coil is suspected to be injured, the defect may be easily located by connecting up the voltmeter to the battery terminals, and, after taking a reading, place one end of the instrument in contact with the terminal of the coil. This simple test will point out any defect in the primary winding, as the current must go through the primary winding before it registers the voltage, through the voltmeter. Short circuits in the winding of the coil are naturally more likely to occur in the high-tension of the secondary wiring, but as this winding is of considerable length, the exact location of the leak can only be determined in the testing room of the manufacturer.

Failure of the condenser is not a common trouble, yet the writer has upon several occasions traced excessive sparking at the points to a grounded condenser. As the autoist may know, the condenser is connected in a shunt in the primary circuit, and if the connections are faulty the condenser may become grounded by reason of the wiring coming into contact with another wire or other conducting body. The trouble may be in either the wire leading from condenser to trembler on one side, or in the connecting wire joining trembler and condenser, or from condenser to ground, on the other side. In cases of this kind, the current cannot reach the condenser, whose function is to absorb the spark, and it accordingly passes by way of the leak or short, thus causing excessive sparking at the tremblers. As the condenser connections are made with very light wires, and as this part of the coil is apt to look very complicated to the average driver, it is best to send the condenser to the makers, in case it has broken down through internal sparking.

Some Common Tire Fallacies Exploded*

ERRONEOUS would be the best word to characterize the common notion of the first point to be raised in connection with the pneumatic tire and the manner in which an automobile is carried by it. The ordinary view of this seems to be that the wheel rests on and is supported by the cushion of air below it—the air, in fact, compressed between the lower portion of the rim and the tread of the tire adjacent to the ground. The objection to this simple view, when one comes to consider it, is that the rim of the wheel is completely surrounded by the air enclosed within the tire. The compressed air not only presses on the under side of the rim, forcing it up, but also on the upper side of the rim, forcing it down; and as the air chamber within the tire is continuous the two pressures are equal. Similarly, the air pressure on the anterior face of the rim forcing it back is equal to that on the posterior face of the rim forcing it forward. Every square inch of the rim is exposed

* Short abstract of paper read before the Royal Automobile Club of Great Britain and Ireland, by D. W. Samways, M.D., D.Sc., M.A.

to an equal number of pounds of air pressure acting perpendicularly to its surface, while the pressure on any square inch is always opposed and balanced by that on the square inch of the bed of the rim diametrically opposite to it. It is manifest, therefore, that the wheel and rim cannot be supported by the pressure of air on the rim.

To illustrate this point, the following experiment was performed: The tire of one wheel of a car weighing with its load 600 lbs. was pumped up to a pressure of 70 lbs. per sq. in, the wheel having previously been jacked up, with the air valve placed in its lowest possible position. The wheel was then turned half round, so that the valve communicated with the air chamber above the wheel. The pressure was still 70 lbs., exactly as before. The wheel was then lowered, and the tire, with its load, rested on the ground. The pressure taken with the valve inferiority was now nearly 72 lbs., a rise of less than 2 lbs. per sq. in., when the air instead of the jack had to carry the load. The same pressure of 72 lbs. was recorded when the wheel was turned half round and the record was that of the pressure in the air chamber above the wheel. The increased pressure of 2 lbs. per sq. in. on the rim beneath the wheel pressing upwards could not possibly carry the wheel, and, moreover, was rendered neutral as a lifting force because the same increase of pressure occurred above the wheel, acting equally as a depressing force upon the rim beneath it.

Of other forces acting on the rim and wheel, there remain only the tensions of the tire walls, whose free borders are fixed under the beading of the rim. The tire is exerting an immense centrifugal pull on the rim. It is trying to burst away into space, and is only held back by its walls, which are anchored to the wheel. On a wheel 870 by 90 every linear inch of the tire wall fastened under the beading of the rim, when the tire is inflated to 70 lbs. pressure, is dragging centrifugally outwards with a force exceeding 100 lbs. When, however, the wheel and tire are jacked up, this pull is equal all round, and there is consequently no reason for the wheel to show any preference to the pull in any direction. If, however, the wheel and tire be rested on the ground, the centrifugal pull of the portion of tire resting on the ground is taken off the rim. The pressure on the tread touching the ground is transferred to the ground and supported by it, instead of as before by the adjacent tire walls which attach the tread to the rim and previously dragged downward on the rim. The effect, therefore, of the ground in carrying a pneumatic tire and its load is to slightly increase the pressure and consequent tensions in the tire, and to relieve more or less completely the vertical component of the tension in the tire walls immediately above the ground. Above the wheel the tire walls continue to pull upwards on the rim with undiminished and now unbalanced force; consequently they pull up the rim, and with it the wheel and car, whose total weight exactly equals the amount of downward tension taken off from the tire walls below the wheel. A motor wheel is, therefore, in all cases suspended from above by its inflated tire. The tire is supported on the ground below it, but the wheel is hung from the portion above it, and is not carried by the cushion of air from below.

If the wheel be hung from the tire arch above it, the next point is to consider what supports this arch. Now we have been told that the air pressure outwards on the whole tread of the tire is exactly equal to the air pressure inwards on the rim of the wheel, and that these balance one another. This obviously is not the case. The tread of the tire is part of a larger circle than the rim of the wheel, and consequently has a larger surface exposed to the pressure of the air within the tire. Thus on a wheel 870 by 90 the rim measures 3 ins. across, and about 88 ins. round. The whole rim has, therfiefore, a surface area of 264 sq. ins. The tire tread measured, not at its margin, but where it also is about 3 ins. across, is about 100 ins. in length, and has consequently a horizontally resolved surface area of about 300 sq. ins., *i. e.*, 36 sq. ins. more than the whole area of the bed of the rim. If the tire be pumped to a pressure of 70 lbs. per sq in, the tread will have to support a centrifugal air pressure of 36 by 70 = 2,520 lbs. more than the centripetal air pressure which the bed of the rim is called upon to support. Of this total excess pressure of 2,520 lbs. on the tread over that on the rim, one-half, *i. e.*, 1,260 lbs., is exerted on the tread above the wheel and the other half on the tread below the wheel.

Now, the air in the upper half of the tire communicates with the air in the lower half across the two sections of tire which unite them, one before and one behind the wheel. These sections have a transverse area of about 9 ins. each, and, therefore, transmit air columns of that section, every square inch of which columns exerts a pressure of 70 lbs. That is, each air column presses upward and downward with a force of 9 by 70=630 lbs. The two columns transmit, therefore, a force or pressure of 1,260 lbs. This coincides with the amount by which we found the pressure on the upper half or vault of the tire tread exceeded the pressure on the half rim of the wheel. In this pressure scheme the wheel itself is but a frame around which the tire is bound. The wheel receives an upthrust x from the air below it, and supports a down thrust x from the air above it, which in turn exerts an upthrust on the vault of the tire of the same amount x. The vault, in addition, receives from the two columns of air spoken of a total upthrust of 1,260 lbs., which is quite sufficient to more than carry the wheel and its load.

These remarks will explain the phenomenon so frequently observed of a tire bursting in its upper half. The foreman of one of the largest Paris garages, which always contains scores, and sometimes a hundred or more cars, told that in the garage tires burst almost always in the upper half. "I speak," said he, "not of ten, but of a thousand cases." The part of a tire least subjected to strain is that between the wheel and ground.

The second question to which attention is called relates to the advantages of a high tire over a low one, especially as regards its dust-raising properties. The Royal Automobile Club is constantly endeavoring to discover in what direction we must look to mitigate the dust nuisance, and the belief is that the encouragement of higher driving-wheels would be one step in the true direction. The tire round a wheel has to support the weight of the wheel and its load, and to do so, with a given pressure in the tire, a definite area of the tire tread must be in contact with the ground. If the length of the contact surface be short, as it necessarily must be with a small wheel, the width of contact must be increased. Hence, it has been found that the small wheels at present used, especially for driving wheels, must have very wide tires. Now, it is the width of contact, and not the length of the contact surface on the ground, which determines the amount of dust a wheel raises. A wide track obviously raises more dust than a narrow one. When the wheel is high, as in some of the cars originally made, the driving wheels can easily take tires as narrow as those on the front wheels. With a high wheel the contact surface is a long narrow oval, and with a low one it is a short wide oval for the same supporting area. One comparatively light car requires tires 810 by 100 on its driving wheels; otherwise they perpetually give trouble, especially through overheating. On a much heavier car exposed to much rougher usage, are tires of 1910 by 90, and though the width of the tires is less than in the lighter car, it behaves almost as if it were over-tired. At the same time it raises much less dust at the same speed, making, as it does, a narrower track. They run much more smoothly; the tire lasts longer, as it touches the ground less often; it probably heats less and certainly cools more freely.

The third problem relative to tires, one affecting us all, is how to prolong their life. The first essential is to have as high wheels as possible on our cars. Experience shows that the life of a tire, other things being equal, goes largely with the height of the wheel, for reasons some of which have been suggested. Tires on large wheels, moreover, support better the application of the brake than those on small ones, for the friction with the ground is along the long axis of the oval surface of contact, and a longer stretch of tire wall supports the strain.

SOME TRANSMISSION MECHANISMS

In

Modern Shaft-Driven Automobiles

By Forrest R. Jones, M. E.

IN modern shaft-driven gasoline automobiles, to which type the great majority of cars now belong, the tendency is to locate the transmission either at the rear axle as an integral part of the differential housing, or as a rigid extension of the crankcase of the motor, and to use only one universal joint or coupling between the motor and rear axle in connection with this arrangement of the transmission mechanisms.

The advantages and disadvantages of these two locations of the change-speed gears are decidedly marked in each case. The use of only one universal joint, as compared with the common earlier practice of using a pair of universal joints in proper relation to each other, is also an important feature, with its own advantages and disadvantages. In both cases the reduction in the number of parts, especially wearing parts, is an important item that should never be omitted in considering such a machine as an automobile, in which lightness and simplicity are of paramount importance, and in which wear is extremely rapid. The rapid wear is due to the lightness or smallness of the parts and the consequent high pressures and speeds to which they are subjected, aside from the dust and grit which reach parts unprotected from them. The absence of dust and grit protectors is not unusual in the less expensive cars. The wear due to dust and grit is notably rapid in automobiles as compared with other classes of transportation machinery. This rapidity of wear is because the automobile travels over roads which are generally dusty or muddy, and the road wheels move so rapidly that gritty substances are constantly stirred up and either drawn or splashed over the running gear, particularly the transmission mechanism, when it is not suitably protected.

When Two Universal Joints Are Used

When two universal joints are used in a shaft transmission, one joint near the rear axle and the other near the change-gear case, the shaft which carries the bevel pinion gear that meshes with the larger gear on the rear axle is necessarily short. This short pinion shaft of course requires the two bearings which support it is to be near together. When the two bearings, both on the same side of the pinion gear, are near together, the pressure on them is much greater than when they are at a considerable distance apart. This can be seen by the aid of Figs. 1, 2 and 3.

Fig. 1 shows a shaft A, to which a load, or side pressure, of 100 pounds is applied near one end at B. The shaft is supported at C and D. The distance between B and C is 2 inches, measured parallel to the length of the shaft; that between C and D is 4 inches, measured in the same manner. The shaft may be considered as a lever, with the fulcrum at C. The pressure, or force, at D, on the longer arm of the lever, bears a ratio to the force at B equal to the inverse ratio of the lengths of the lever arms, which lengths are 2 inches and 4 inches. This is the value of the force that is necessary to hold the shaft in place. The

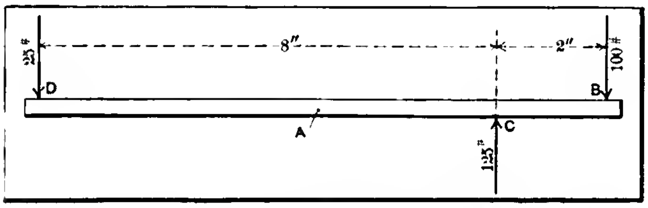


Fig. 1—Shaft with side pressure applied nearer to one end

force at D is therefore $\frac{2}{4}$ of that at B. Its numerical value is $\frac{2}{4} \times 100 = 50$ pounds. The force, or pressure, at C is the sum of those at B and D, and its numerical value is $100 + 50 = 150$ pounds.

By increasing the length of the longer lever arm of the shaft to 8 inches, as in Fig. 2, the pressure at D is decreased in the same proportion. It becomes equal to $\frac{2}{8} \times 100 = 25$ pounds; and the pressure at C is decreased by the same number of pounds as that at D. The numerical value of the pressure at C, Fig. 2, is $100 + 25 = 125$ pounds.

In Fig. 3 the longer lever arm is 40 inches in length. It is ten times as long as in Fig. 1. The pressure at the end of the longer arm is thus reduced to $\frac{2}{40} \times 100 = 5$ pounds; and the pressure at C is reduced to $100 + 5 = 105$ pounds.

The longer lever arm of 40 inches in Fig. 3 gives a pressure at the fulcrum C that is 30 per cent. less than that at the corresponding point in Fig. 1. Or, expressed in reverse order, the pressure at C in Fig. 1 for the short shaft, is more than 42 per cent. greater than that at C in Fig. 3 for the longest shaft. The pressure at D near the end of the shaft is ten times as great for the short shaft as for the long one.

The side pressures on the bearings of the pinion-gear shaft are affected in exactly the manner just given by changing the distance between the bearings which support the shaft when both of the two bearings are on the same side of the pinion. It is quite common, although not the universal practice, to place both bearings in front of the pinion bevel gear which drives the bevel gear on the rear axle, or on the differential case.

Lack of Alignment Worse Than Wear on Bearings

Even if the wear on the bearings of the short pinion shaft is exactly the same in amount as on those of a longer shaft with a greater distance between bearings, the short shaft is thrown out of proper alignment to a greater extent than the long one. This throwing out of alignment destroys proper meshing, or engagement, between the pinion and its mating bevel gear. The teeth of the pinion and gear are thus caused to bear against each other at and near only one end. Noisy running and rapid wear of the gear teeth are the result. It is extremely important that the bevel gears be kept in proper position relative to each other. Displacement from these proper positions has a far greater action to injure and destroy them than in the case of plain spur gears designed to run on shafts parallel to each other.

There are therefore two strong reasons against using a very short shaft for carrying the pinion gear that drives the large bevel gear mounted on the differential of the rear axle. These are, as just stated, the high pressure and consequent great wear that are brought on the bearings on account of the necessity of placing them near together on the short shaft, and the greater amount of displacement of the pinion gear from its proper position to mesh with its mate allowed by the shorter shaft, even when the amount of wear at the bearings is the same for both the short and the long shafts.

It certainly is well worth while to adopt a design which gives a low pressure on the bearings, provided such a design does not bring in other features that are more objectionable than heavy bearing pressures and improper meshing of the bevel gears.

Small Angle Reduces Rotary Irregularity

What may at first seem a very serious objection to the use of only one universal joint in the transmission system, as compared with the use of two such joints, is the uneven, or jerky, action of a single joint in transmitting rotation when the two shafts which it connects are not in line with each other, which is the usual condition. But the considerable length of propeller shaft between the rear axle and a universal joint located well forward toward the motor makes it possible to keep the angle between the propeller shaft and the one which drives it comparatively small, thus reducing to a minimum the irregularity of relative rotation of the two shafts thus connected. Aside from this it is desirable to keep the angle between the two shafts small in order to keep down wear in the joint itself. In fact, in well designed cars with only one universal joint, wear in the joint generally needs more consideration than the jerky motion of the driven shaft due to the action of the universal joint. This wear, as well as the irregularity of rotation, is greater whan the angle between the shafts is large than when it is small.

The long propeller shaft, if of as small a diameter as is allowable with high-grade steel, is elastic enough torsionally to yield by twisting slightly when the rotative effort acting upon it is momentarily increased by the irregular rotative action of the universal joint. This giving, or elastic yielding, of the propeller shaft prevents injuriously heavy stresses in the gears at the rear axle, as well as in all of the other parts of the transmission mechanism.

If the crankshaft of the motor rotates at a uniform speed, the propeller-shaft is driven at a higher speed of rotation than that of the crankshaft twice during each revolution of the propeller shaft, on account of the uneven action of the universal joint. It is during the periods in which the rotative speed of the propeller is increasing relative to that of the crankshaft that the strain comes on the transmission mechanism. The speed of the propeller shaft also drops behind that of the crankshaft twice during each revolution in order to compensate for the more rapid temporary speed. In the statements of this paragraph it is assumed for simplicity that the direct connection is in use between the crankshaft and propeller shaft, so that the average speed of rotation of the two shafts are the same.

Smallest Angle With Transmission on Rear Axle

When the change-speed gears are located just forward of the rear axle, the universal joint can be placed farther forward than when the change-speed gears are placed just in the rear of the motor and clutch. The universal joint can in fact be made a part of the clutch when the change-speed gears are just forward of the rear axle. The latter arrangement is therefore the one by which the angle at the universal coupling between the motor and propeller shaft is the smallest that can be obtained by any arrangement using only one universal coupling. In this arrangement the shafts in the change-gear case are parallel to the propeller shaft and are therefore inclined upward toward the front of the car.

If the propeller shaft makes direct connection with the pinion-gear shaft for high speed of car travel, as is the more usual practice, then the center line, or axis, of the propeller shaft must intersect the axis of the rear axle when the usual conical bevel gears are used at the rear axle part of the transmission system. The length of the inclined propeller shaft is then, in effect so far as its inclination is concerned, from the clutch to the axis of the rear axle. This extreme length of course gives the minimum inclination to the propeller shaft for given relative positions of the motor and rear axle.

The pinion-gear shaft can be made long enough, when the change-speed gears are just forward of the rear axle, to allow a distance between the bearings of the pinion shaft sufficient to keep the bearing pressures comparatively low, unless the form of change-speed gears is such that the gear case is very short, as may be the case with selective gears.

It may at first seem that a smaller diameter of propeller shaft can be used when the change-speed gears are at the rear axle than when they are near the motor. This would be true if the clutch would never grip hard so as to suddenly check the speed of the motor when the clutch is put into engagement to start the car. If the gears are set at high speed and the clutch is engaged while the motor is running fast, sudden seizure of the clutch will cause the road wheels to spin. The torque and stress brought upon the propeller shaft by such an action are the same as if the change-speed gears were near the motor and set at slow speed. A corresponding action occurs when the motor is allowed to stop while the car is descending a hill and the clutch is then engaged to start the motor; the limit of the stress on the propeller shaft is then determined by the skidding of the wheels.

One Disadvantage of Rear Location

A very serious disadvantage of the change-speed gears at the rear axle is the increased dead weight on the axle and wheels. This increase of dead weight varies from probably 50 per cent. to 100 per cent. or more of the dead weight on the rear wheels when the change-speed gears and their casing are carried on the frame of the chassis. Dead weight on the axle and wheels is far more injurious to the tires than the same amount of weight carried on springs. It is especially hard on the tires when both rear wheels strike an obstacle, or a gulley, at the same instant. Street crossings and railway tracks above the level of the road are not unusual, and gulleys are often found in country roads. It is a fixed rule in the older forms of transportation devices to keep dead weight off the axles as far as possible.

When the change-speed gears are located just in the rear of the motor, the distance between the universal joint and the rear axle is necessarily less than when the change-speed gears are at the rear axle. The angle at the universal joint is therefore grater when the change gears are located near the motor, which is a disadvantage. With planetary gears or a short gear case containing sliding gears of the selective type, the distance from the universal joint to the rear axle is not much less than when the change-speed gears are at the rear axle, however.

As a total, the advantages seem to lie in favor of the designs of transmission mechanisms in which short change-speed gears are located in the immediate rear of the motor.

It may also be noted that a motor with its cylinders cast en bloc and having a two-bearing crankshaft support is favorable to increasing the distance between the universal joint and the rear axle, and thus to reducing the angle at the universal joint, since such a motor is shorter than one with individual cylinders.

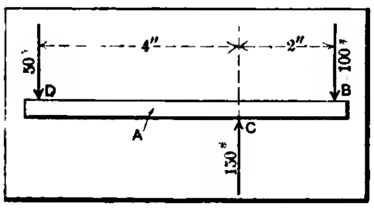


Fig. 2—Same with shorter arm

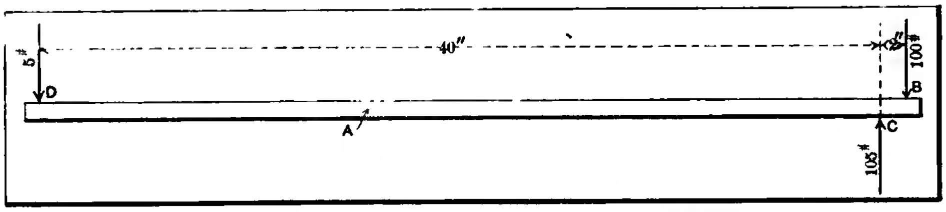


Fig. 3—Longer lever arm arrangement which reduces pressure at a given point

Minneapolis Draws Crowds From Northwest

MINNEAPOLIS, MINN., Feb. 21—A bigger and better automobile show describes Minneapolis' third annual show, which began last Saturday at the National Guard Armory and will continue a week. Visitors from Minnesota, Wisconsin, North and South Dakota, Montana and Western Canada, have been in attendance. There are a greater number of exhibits than have ever been shown before, 110 makes of cars being displayed, which is 50 more than last year. There are upwards of 20 exhibits of automobiles at the show that have never been sold in this territory before this year.

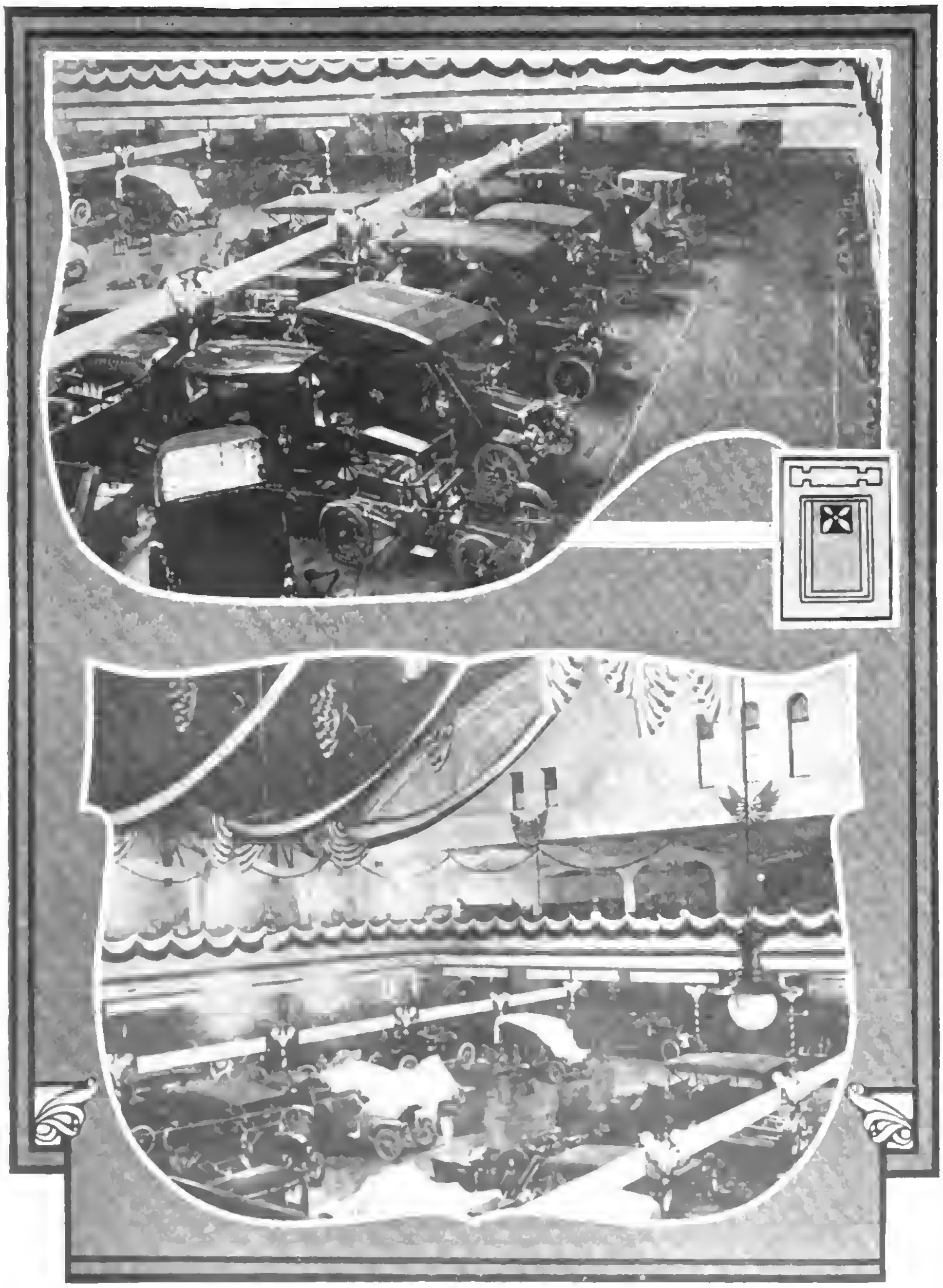
The lighting and decorative features are unusually elaborate. The main floor of the armory is ablaze with lights grouped in immense clusters on twelve posts and thousands of incandescent electric lights stud the ceiling and illumine every booth. Music is furnished afternoon and evening by the First Regiment band.

The liberal display of electric automobiles, commercial trucks and the overflow of pleasure cars are shown in the basement. Judging from the unusually large number of exhibitors, the management will be compelled to secure larger quarters for their show next year.

Walter R. Wilmot is manager of the show and the officers of the Minneapolis Automobile Association are Harry E. Pence of the Pence Auto Company, president; H. E. Wilcox of the H. E. Wilcox Motor Car Company, vice-president; F. E. Murphy, secretary and treasurer. Horace Lowry is president of the Minneapolis Automobile Club, and Reuben Warner of St. Paul is president of the State association.

The exhibitors and exhibits follow:

The Pence Auto Company has a unique exhibit of Buick, Oldsmobile and Oakland cars. It is also showing a collection of Buick trophies valued at $46,000. Louis Chevrolet, of the Buick team, accompanied the trophies to Minneapolis and is in attendance at the show. The Mich-Stair Company shows Overland and Knox 1910 models. The Knox four-passenger runabout and the Knox model R, with torpedo body, both fully equipped, are features of this display. The Knox tonneauette and the Knox six-cylinder, seven-passenger touring car are also being shown.



TOP—MINNEAPOLIS SHOW SEEN FROM THE GALLERY; WINTON IS PROMINENT
BOTTOM—LOFTY ROOF OF THE ARMORY, DRAPED WITH BUNTING AND FLAGS

The Columbus Buggy Company is exhibiting the Mora car, the Columbus electric in its various models and the Firestone Columbus touring car. The Northwestern Auto Company shows a Ford chassis, the engine of which is run by an electric motor. The Goosman & Johnson E-M-F. Company shows the E-M-F 30-horsepower roadster and the five-passenger E-M-F touring car. The Flanders "20" and a Speedwell touring car are also displayed.

The Deere & Webber Company shows a complete exhibit of the Velie "30," model D, 40-horsepower, model E roadster and model F top tonneau. The Northwestern Stearns Company is exhibiting a line of 1910 Stearns touring and roadster cars. The H. E. Wilcox Car Company show the 1910 models of the Wilcox pleasure cars. The Ramaley Auto Company, St. Paul, shows the 1910 models of the National cars.

The Great Northern Implement Company shows for the first time in Minneapolis the "Ohio" in its various models. The Whiting roadster, four-cylinder, 20-horsepower, with full equipment, is also on this stand. An attractive display, including the model 30 Limousine, is that of the Northwestern Cadillac Company. This concern's exhibit also includes a polished chassis with exposed engine. The Luverne Auto Company, Luverne, Minn., exhibits the Luverne "40," its leading model.

and a chassis. P. J. Downs & Company are exhibiting the new 1910 Rambler in three models.

The Tri-State Automobile Company, which recently took on the agency of the Paige-Detroit, has on display one or two models of this car and also the Inter-State four-cylinder car in three styles—baby tonneau, roadster and touring car. The Regal "30" 5-passenger touring car and also a chassis of the same make; the Pennsylvania model C, a six-cylinder chassis; model D, with toy tonneau are the cars which the Haynes Automobile Company has on view. In this booth also is shown the Pennsylvania sectional motor.

The Royal Auto Company has two booths, in which are exhibited the Royal Tourist four-cylinder, both in the limousine and touring car bodies, with chassis; the Glide four-cylinder, seven-passenger with the new 40-inch wheels, and also a chassis of this car with the mechanism of the engine exposed. Two booths are occupied by the Fawkes Auto Company, in which are exhibited three models of the Marmon with full equipment; a Matheson six-cylinder touring car and chassis; a Reo four-cylinder car and an American.

A striking exhibit has been put on by the Maxwell-Briscoe Company. The Hathaway-Stimpson Company has displays of the Hupmobile and the Detroit electric. Mr. Stimpson has made special arrangements to have shipped to have on view a four-passenger Detroit electric brougham done in pearl gray with pure white stripes and gray French whipcord upholstering. The W. H. McIntyre Company has on display model M-2, four-cylinder roadster; model M-4 four-cylinder touring car and a model A-1 runabout. Models of the Halladay are shown by the Heaney Automobile Company, the exhibit being one of the most complete in the entire show. In addition to nine Halladay models, a polished chassis and engine are displayed.

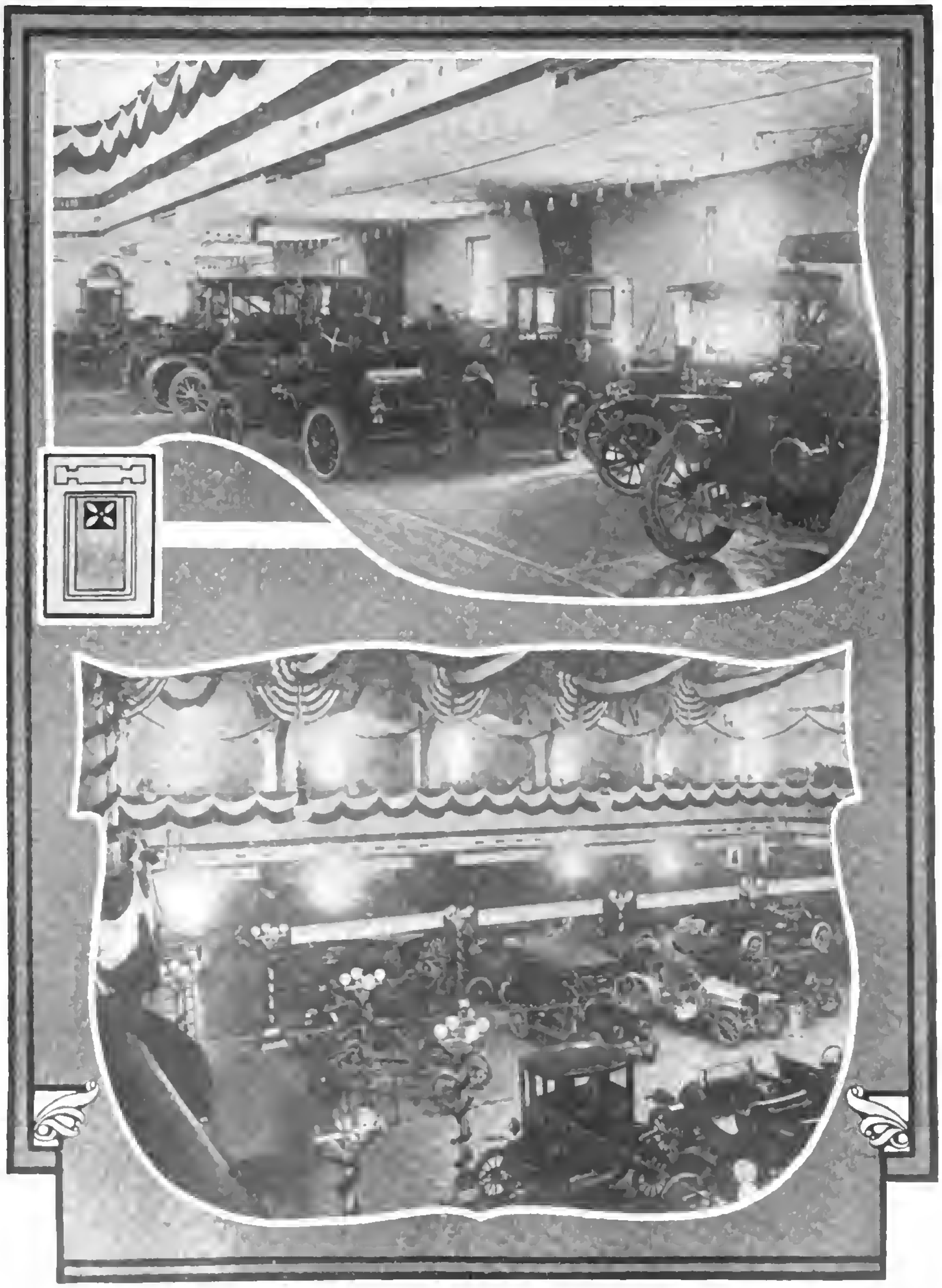
The Barclay Auto Company is displaying the Chalmers 30-horsepower touring car, also the Hudson in two models, the roadster and touring car. The Franklin and Baker electrics are featured by the Robertson Motor Company.

The MacArthur Zollars Company has in its array of cars new 1910 models of the Everett "30," the Corbin, the Anhut Six, the American Simplex, the Black-Crow and the Babcock electric. The Moore Carving Machine Company is showing four or five models of the Elmore, and another feature of this booth is the fine display of Woods electrics. Moore Brothers, Wimbledon, N. D., are showing three cars of their own make. The Pierce-Racine Company shows two models of the Pierce-Racine Model K, a close-coupled toy tonneau and a Pierce-Racine touring car. T. C. Peebles recently took the local agency.

A special exhibit of Peerless and Pope-Hartford cars shipped directly to Minneapolis from the Chicago show has been put on view by the T. M. Anderson Company. The Northland Motor Car Company is showing the Stoddard-Dayton model K, the toy tonneau F-A-L-Car and the Courier roadster.

Joy Brothers have on exhibition in various styles the Packard touring car and one of the new Packard commercial trucks. The Winton Six touring car, accompanied by a chassis and a toy tonneau, are in the booth reserved by the Winton Motor Carriage Company. The Electric Carriage & Battery Company is exhibiting several models of Rauch & Lang electrics. Handsome coupés, broughams and victorias are among those on view. A complete line of the renamed Maytag cars has been put on by the Maytag-Mason Company.

The White garage has three models of White cars on exhibition; two are steamers and one a White gasoline car. The Warren-Detroit Company is exhibiting the Warren-Detroit car in the booth with the Ranger Auto Company. The car is one of the recent makes to invade the Northwest. The Kemp Brothers Automobile Company is showing a complete line of Brush cars fresh from the factory. In its booth the Ranger Auto Company is showing the Auburn touring car.



TOP—KEMP BROTHERS AUTO CO.'S COMPLETE EXHIBIT OF BRUSH RUNABOUTS
BOTTOM—THE ARMORY WAS BRILLIANTLY LIGHTED BY CLUSTERED GLOBES

A. A. A. RACING BOARD PUTS FORTH ITS BEST EFFORT

TRACK, hillclimbing, and long-distance racing rules, as issued by Chairman Butler of the A. A. A., to govern events during the year 1910 differ from the rules which previously obtained. This year stock cars are defined by a percentage system, whereas last year 25 automobiles of a given model were all that had to be designed and constructed in order to bring the model within the classification designated as "stock cars." In the new percentage system, a company which has an annual output of a given model of 50 cars or less, the Commitee must see 25 automobiles, but if the output is 10,000 the minimum number, from the Committee point of view, will have to be 450.

The piston displacement classification remains as before, with the exception that 100 pounds have been dropped from the weight of each class. The options permitted for the stripped stock chassis is but slightly altered, it being provided that bonnet straps must be added, and that part of the dash enclosing the rear of the bonnet, together with all its customary equipment, muts be retained. Drivers will have to obtain a certificate, and be registered with the Contest Board.

Amateurs are defined as those who are not actively engaged, either in the automobile industry directly, or in the accessory business. The new rules seem to be most carefully drawn, and evidently reflect the experience of the last year, and Chairman Butler seems to have taken into account the points of demerit, to the extent that they are eliminated. The following is a brief résumé of the principal amendments of the 1910 contest rules as adopted by the Contest Board, and approved by the Board of Directors of the American Automobile Association, and the Manufacturers' Contest Association at Chicago, February 10, 1910:

Stock Car—"A motor car, the complete description of which, upon the official blank provided for the purpose, has been filed with the main office of the Technical Committee of the Contest Board at least 30 days prior to the date of the contest entered, the quantity production of which bears to the total yearly production of its manufacturer the ratio set forth in the following table, and which is on sale through the regular selling representatives of the manufacturer."

Official blanks for stock car description may he obtained from the chairman of the Contest Board, 437 Fifth avenue, New York City.

Computation in connection wtih the following table shall be based upon a period of time from July 1 to June 30 the following year.

In computing the annual output of a manufacturer, no account shall be taken of his production of taxicabs, delivery wagons or other vehicles designed for commercial use.

At the discretion of the Contest Board any competitor may be required to file a bond of $5,000 that the entry made by him is a bona fide stock car within the meaning of this definition:

Total Output.	Percentage.		Number of Same Model.
10,000 or more	4.5%	equaling	450 minimum
8,000 to 9,999	5.0%	equaling	400 minimum
6,000 to 7,999	6.0%	equaling	360 minimum
4,000 to 5,999	7.0%	equaling	280 minimum
2,000 to 3,999	8.0%	equaling	160 minimum
1,000 to 1,999	9.0%	equaling	90 minimum
500 to 999	10.0%	equaling	50 minimum
250 to 499	16.0%	equaling	40 minimum
100 to 249	30.0%	equaling	30 minimum
50 to 99	50.0%	equaling	25 minimum

Explanation—Percentages are calculated on actual total output. For example: If the total annual output of a manufacturer is 2,500 cars, at least 8 per cent. of said output, or 200 cars, must he of the same model in order to constitute such model a stock car under this definition. The required percentage of output shall in every case be in accordance with the above table and in no event shall it be fewer than 25 cars.

Rule 69. Motor Exhaust—The exhaust must be conducted outside of the bonnet and so directed as not to raise dust.

Rule 70. Loss of Bonnet—The bonnet must be carried throughout a contest. If the bonnet becomes detached or lost from a car, the driver shall be required to bring his car to a stop in the shortest possible distance consistent with safety and remain at a standstill until the bonnet has been recovered and replaced.

In a road race he shall not pass the judge's stand until the bonnet has been so recovered and replaced.

In contests on tracks and speedways, a bonnet lost in one lap may he recovered in the next succeeding lap.

Bona Fide Status of Stock Car—It is the intention of the rules relating to stock car and stock chassis competitions that such competitions shall be restricted to those cars identical in specification, material and design with the manufacturer's product which is manufactured in quantity and is offered for sale and sold in a bona fide manner to the public through the regular selling agencies of the manufacturer.

Evasion of Stock Car Definition—In the event of evasion on the part of entrants of the spirit of the stock car or stock chassis definition concerning points not definitely stated in these rules, the Contest Board shall have full power to render such decision as it may deem for the welfare of the sport and industry.

Technical Committee—In any case where it may be necessary to establish the status of any car alleged to be a stock car under the definition contained in these rules, the Technical Committee of the Contest Board shall have the right to visit the factory of the manufacturer of such car, who shall be required to submit to the committee such evidence as it may require to verify the allegation on which the stock status of the car is based.

The Technical Committee shall also have power to take possession of any competing car at the finish of its competition in any contest and make such examination thereof as may be necessary to establish its stock status.

CLASSIFICATIONS

Class A. Price Classification—The numbering of the divisions in this class has been reversed, division 1A being made the lowest priced cars and seven divisions are provided in this class, instead of six as heretofore:

Class A—Open to any gasoline motor car other than motor cars with solid tires, wheels 36 inches in diameter and over, which complies with the definition stock car, this class to be run in the following divisions:

Division 1A	$ 800 and under
Division 2A	801 to $1,200
Division 3A	1,201 to 1,600
Division 4A	1,601 to 2,000
Division 5A	2,001 to 3,000
Division 6A	3,001 to 4,000
Division 7A	4,000 and over

Extra or optional equipment, listed in the manufacturer's catalog as such, used upon a car competing under price classification, must have its list price added to the list price of the car, and this total price shall determine the classification of the car. No extra equipment shall be permitted other than that listed as such in the manufacturer's catalog.

No car shall compete in any class above that to which its price entitles it.

Class B. Piston Displacement and Minimum Weight Stock Cars—The numbering of the divisions in this class has been reversed. division 1B being made the smallest piston displacement, 160 cubic inches and under, and a sixth division has been added for the larger cars. It should also be noted that in this piston displacement class it is intended that cars should compete at their normal minimum chassis weights, the adding or attaching of any dead weight to the car as ballast to enable it to compete in any other division than that to which its normal chassis weights entitle it, being prohibited.

To meet this prohibition against ballast, the minimum chassis weights have been reduced 100 pounds in each of the six divisions.

Class B—Open to any chassis of a gasoline car which is in accordance with the definition of a stock chassis; to be governed by the following table of piston displacement and minimum chassis weights:

Division.	Piston displacement in cubic inches.	Minimum weight in pounds
1B	160 and under	1,100
2B	161 to 230	1,400
3B	231 to 300	1,700
4B	301 to 450	2,000
5B	451 to 600	2,300
6B	601 to 750	2,500

No car shall compete in any class above that to which its weight entitles it.

No dead weight of any description shall be added to a car or attached thereto in any manner as ballast.

Class C. Piston Displacement Without Minimum Weight Restrictions or Stock Car Qualifications—This class has been added to afford an opportunity for competition between motors of approximately equal size, six divisions being provided according to piston displacement but without stock car qualification or minimum weight restrictions.

This class might be considered the experimental or development class.

Class C—Open to any gasoline car or chassis made by a factory which has during the 12 months prior to the date of contest produced at least 50 motor cars, not necessarily of the same model. Eligible for entry under the piston displacement limitations of class B, but without minimum weight restrictions.

Division.	Piston displacement in cubic inches.
1C	160 and under
2C	161 to 230
3C	231 to 300
4C	301 to 450
5C	451 to 600
6C	601 to 750

No car shall compete in any class above that to which its piston displacement entitles it.

The other classes are amended as follows:

Class D—Open to any gasoline car which complies with the definition of a motor car without restriction as to piston displacement. weight, price or quantity produced. There may not be more than two events under class D upon a day's program without special permission of the Contest Board.

Class E—Special events other than those above specified held in connection with any motor car meet or contest, and approved by the Contest Board of which there may not be more than three upon a day's program without special permission of the Contest Board.

Class F—Open to gasoline stock cars of the high-wheeled, solid-tired buggy type, diameter of wheels 36 inches or over. Entries subject to price limitations of class A. There may not be more than two events under class F upon a day's program without special permission of the Contest Board.

Class G—Open to electric stock cars only. Subject to the price limitations of class A.

Class H—Open to commercial cars, cabs and trucks. Division limitations to be obtained from the Contest Board.

Match Races—Matches may be held as contests of any kind covered by any of these rules and may be run under any of the classes or divisions.

GENERAL AND SPECIAL RULES

The contest rules have been rearranged and classified into: (a) General rules applicable to all contests, and (b) special rules for each of the various forms of contests as follows: Special rules for road races. Special rules for track races. Special rules for long distance track and 24-hour track races. Special rules for hill-climbs. Special rules for reliability contests and tours.

GENERAL RULES

First—Provisions have been made for the appointment by the Contest Board of the referee for every contest, from a selected list of men of undoubted standing, familiarity with and ability to administer the contest rules, located in every locality where contests will be held and known to the promoting clubs and associations in those localities.

Second—To the further end of establishing and maintaining the strict compliance of all entrants with the stock car requirements of the rules, a technical committee is provided, of which the associate member of the A. A. A. Technical Committee in the district where the contest is held, shall be chairman, together with such other technical members as the promoter may appoint, to technically inspect all cars offered for competition and to prevent the entrance of other than bona fide stock cars.

Third—The third element to complete the organization of the Contest Board is found in the official representative of the board previously provided for, who will be in attendance at every contest to co-operate with the referee and the Technical Committee in the strict enforcement of all the Contest Board rules.

Entries—The promoter is prohibited, under pain of disqualification, from advertising the proposed competition of any entrant in a contest until his entry has been actually made. The promoter is also required to secure a signed entry blank and entry fee from a proposed entrant, in order to bring such entrant within the jurisdiction of the Contest Board's discipline in case of his failure to appear.

Supplementary Regulations—In order that the governmental functions and supervision of the Contest Board may extend to every form of contest, a promoter desiring to make regulations for some particular form of contest not included in the published rules of the Contest Board, may do so upon submitting such supplementary regulations to and receiving the approval of the Contest Board.

Certified Trials—To put the stamp of authenticity upon any special form of road trial or test of an individual motor car or accessory, the maker, owner, agent or dealer may secure from the Contest Board an official sanction for such trial, which will be carried on under the supervision of a representative of the Contest Board under the general rules and the special rules of the board in such case provided.

Advertising—To prevent the holding of contests which could not, in any way, redound to the benefit of the sport and idustry, the following rule has been adopted.

"Any owner, manufacturer, dealer, agent or driver taking part in or directly connected with any contest otherwise than under these rules, and obtaining extensive advertising therefrom, shall be deemed to be guilty of a breach of these rules."

Records—To prevent the indiscriminate advertising and improper comparison or performances or alleged records, all claims for records must be made to the Contest Board within 10 days of their accomplishment and no record shall be advertised until accepted and allowed by the Contest Board. The board may reject any claim which in its opinion would not promote the best interests of the sport.

No claim for a record at a distance under 1 mile and up to 5 miles will be allowed unless taken with a recording automatic timing device and the actual recorded evidence submitted.

Provision is made for a register of records to be kept by the Contest Board.

Racing Drivers' Register—All racing drivers are required to register with the Contest Board and receive a registration card, such registration expiring on December 31 of each year. A detailed record of each driver's participation in contests throughout the year will be kept. Drivers are required to exhibit their registration cards to the referee on demand at any meeting.

An unregistered driver may not compete in any sanctioned event.

Amateur Definition—The definition of an amateur is amended by adding an additional restriction so that "no one who is actively engaged in the motor car or accessory industry" may compete as an amateur.

Amateur Drivers' Register—For the protection of the amateur driver and to afford bona fide amateur competition, an amateur drivers' register has been established, requiring annual registration with the issuance of a registration card by the Contest Board.

An unregistered amateur may not compete in sanctioned events.

Amateur Entries—An amateur shall neither enter for nor drive in any contest a car which is the property of any person or corporation actively engaged in the motor car or accessory industry.

Powers of Referee—For the safety of all concerned, the referee's powers have been broadened, as follows:

He shall prohibit any driver or mechanic from entering or continuing in any contest who, in his opinion, is physically unfit.

He shall have the right to stop a race before its scheduled termination if emergency demand such action, and in such a case no award shall be made.

He may order the postponement of an event for any reason which, in his judgment, after consultation with the promoter and representative of the Contest Board, may be valid.

At his request, a driver or mechanic must furnish a physician's certificate as to his physical and optical fitness to enter a race, or may be required to submit to a test to determine such fitness.

The following provision has also been added to the duties of the referee:

"The referee may disqualify any driver, mechanic, entrant or entrant's representative who shows discourtesy toward any official."

Delivery of Prizes—In the event of a protest, or an appeal to the Contest Board from the decision of the referee, no prizes shall be delivered until an official decision is rendered.

Promoter's Liability—Promoters are required to use every precaution in the proper preparation of the track or course and the proper safeguarding of same during practice or the running of a contest, and shall be held responsible for any accidents resulting from their negligence in these matters.

Unadulterated Fuel Supply—Stringent regulations are provided for the testing of contestant's gasoline and to insure the use of a standard and unadulterated fuel supply. Disqualification of the owner, entrant, driver and car, or all of them, is the penalty.

SPECIAL RULES FOR ROAD RACES

The protection of the public and of the contestants being the paramount consideration in the running of a road race, the following rules have been adopted:

Permits to Use Road—Before official sanction will be granted for a road race, hill-climb or speed trial, or any other competition on the public highway, a promoter shall first obtain the properly authorized permission of any and all local authorities for the use of such highway and shall file the original or a certified copy of such permission with the Contest Board.

MILESTONES FOR THE AUTOMOBILIST

Feb. 24-Mar. 8...Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Mgr.

Feb. 28-Mar. 5...Omaha, Neb., Auditorium, Automobile Show, Omaha and Council Bluffs Automobile Dealers.

Feb. 28-Mar. 5...Kansas City, Convention Hall, Fourth Annual Automobile Show, Automobile Dealers' Ass'n.

Mar. 5-12.........Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park Square.

Mar. 5-12.........Cleveland, Central Armory, Cleveland Automobile Club, Eighth Annual Show.

Mar. 5-12.........Des Moines, Ia., Coliseum, First Annual Automobile Show, Des Moines Automobile Dealers' Ass'n.

Mar. 7-12.........Albany, N. Y., Armory, Automobile Show.

Mar. 15-19........Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

Mar. 15-19........Bridgeport, Conn., Automobile and Aeronautic Show, Bridgeport Automobile Dealers' Ass'n.

Mar. 17-19........Louisville, Ky., Automobile Show, Louisville Automobile Dealers' Association, in the Louisville Armory. Hubert Levy, Secretary.

Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 21-28........Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.

Mar. 26-Apr. 2....Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Mar. 26-Apr. 2...Montreal Automobile and Motor Boat Show, Official Motor and Sportsmen's Show Committee of the Automobile and Aero Club of Canada, in the Coliseum. E. M. Wilcox, Manager, 123 Bay St., Toronto.

Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

RACES, HILL-CLIMBS, ETC.

Feb. 19-20.......Los Angeles, Ascot Park Track, Track Races of Los Angeles Motor Racing Association.

Feb. 22..........Oakland, Cal., Hill Climb, Auto Trades Association of Oakland and Alameda County, Cal.

Mar. 5...........New York to Boston, Voting Trophy Contest, T. F. Moore, Manager, 91 West 103d St., New York City.

Mar. 19..........Altadena, Cal., Hill Climb, Licensed Motor Car Dealers' Association, Los Angeles, Cal.

FOREIGN SHOWS AND RACES

Feb. 18-26........Manchester, England, Automobile Show.

Feb. 20-23........Swedish Automobile Races and Trials.

Mar. 19-Apr. 3...Berlin Automobile Show.

Mar. 22..........Monte Carlo Elegance Competition.

Mar. 27-Apr. 4...Prague, Austria, Hungary, Automobile Show.

Mar. 28..........Brooklands, England, Easter Meeting.

Mar. 31-Apr. 8...French Spring Wheel Competition.

Apr. 2-24........Turin, Italy, Automobile Show.

Apr. 27-28........Brooklands, England, Two-Day Meeting.

May 1-Oct. 1.....Vienna, Austria,-Hungary, Automobile and Aviation Exposition.

May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.

June 2-8.........Prince Henry (German) Touring Competition.

THE AUTOMOBILE

Vol. XXII Thursday, March 3, 1910 No. 9

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager

231-241 West 39th Street, New York City

EDITORIAL DEPARTMENT

THOS. J. FAY, Managing Editor
MORRIS A. HALL GEORGE H. GODLEY
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ADVERTISING DEPARTMENT

W. I. RALPH, 1035 Old South Bldg., Boston
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Cable Address - - - - - - - - - - - - - - - - Autoland, New York
Long Distance Telephone - - - - - - - - - - - 2046 Bryant, New York

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United States and Mexico - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Union, including Canada - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Autoing in foreign lands presents the advantage to one of becoming ultimately acquainted with the byways, the natives in their simple aspect, and the vagaries of the countryside. It is a pleasureable pastime, and as remote from the boredom of conventional forms of doing other lands as anything can be.

The anticipation of pleasure in this form is not in the absence of other and equally attention-drawing phases. If reliance is placed upon "cars to hire" in the industrial haunts of the many lands, it demands self-restraint almost in excess, to keep down the qualms which foreshadow remorse, and, in the long run, the cost is likely to be overmuch.

If the automobile is to be taken along, it may, or may not, be necessary to include a chauffeur; the skill and inclination of the owner will settle this important phase. At all events, the automobile must be properly boxed for transportation, and this essential is so frequently left to a carpenter of no enterprise, that the end is plainly not pleasant to contemplate. To be sure that an automobile will survive a voyage, is to box it properly, and a man of some knowledge and experience should be entrusted with the undertaking.

Insurance must be taken out, with permission to go abroad, and this is not a detail which can be disposed of offhand. Insurance underwriters are disinclined to act in haste.

Custom requirements differ in the several countries, and tariff regulations must be observed on the frontier of every principality. In the absence of knowledge of the laws, customs, and inclination of the "natives," it is a task of moment; the score will mount up, and the pleasure which should attend a tour, will be dimmed by sad experiences. As a rule, courtesy and firmness will make headway against the bickerings of an obdurate official, but firmness is only to be fortified when knowledge is a companion.

Autoists, after they run an automobile through its second season, perhaps are, in quite a number of instances, conscious of a something which falls short of due explanation. The original sweet-running qualities lapse, and scrubbing the carbon from off the combustion chamber surfaces fails to effect a cure. After a few trips to the repair shop, the discovery is made that it is the cooling system which must be corrected, and how to rehabilitate the same is a problem. A little investigation in proper channels is enough to disclose a condition of incrustation, and, within the confines of a radiator the hard crust persists despite treatment. There is no room for a scraper, and there seems to be no other way to remove the coating. This form of trouble is least in radiators which are of sufficient area to keep the water well below the boiling point, and autoists, if they will not run on a retarded spark, will lengthen the useful life of the cooling system.

When an automobile is to be left unused, by the curb, to stop the motor is advisable, not only because it is economical of fuel, but in order to prevent overheating of the cooling water.

There should be some way of aiding autoists, or those who desire to purchase, which would enable them to reach conclusions which would be in accord with the facts and in harmony with their respective situations. As it is, they are prone to take too much time discussing "selling points" and very little time consulting their own needs. The real situation is that the needs are first and the supply must satisfy the demand. If a system of "points" could be devised on a basis which would serve the needs of the mechanically disinclined, it would be a relatively easy matter for the budding autoist to go into a show and examine such of the several hundred models as would promise to come within the requirements.

There are two angles to take, however, and the point system would have to be so contrived as to satisfy the situation bearing this matter in mind. The man who has a limited amount of money wants an automobile with a limit to its first cost and he naturally will be interested in the cost of maintenance. Since the speed of a car will largely influence the cost of maintenance (independent of the quality of the material and workmanship to a considerable extent) the system to use is one which will allow for speed as it induces depreciation, and at the same time reflect the presence of material as it is good, or otherwise, and appropriateness of design from the point of view of the prospective user considering his needs. The average intending purchaser is very prone to think that a design is not very good, if, in his judgment, it falls short of his own particular needs, and in thus hastily reaching a conclusion, he fails to remember that some other possible user will find what he may want in the very automobile so hastily judged.

LOCAL SHOWS FLOURISH THE COUNTRY OVER

CINCINNATI SHOW REPORTS MANY SALES

Cincinnati, Feb. 27—Music Hall closed its doors at 11 o'clock last night on the most successful automobile show ever held in this vicinity, after a jollification in which Anna Held and her company played a prominent part. There can be no doubt that henceforth the automobile shows under the auspices of the Cincinnati Automobile Club will be held annually.

It was the most complete exhibition of cars the residents of the city and its neighborhood have ever seen, and the decorations enhanced the effect. An army of out-of-town salesmen was here, and all found time to compliment the management on its work. As most of them had made the round of New York, Buffalo and Chicago, their judgment should be valuable.

It would be hard to give the exact number of sales made during the week, but the records would speak well for everybody. The Jungclas Automobile Company, which is the local agent for the Mitchell, showed the signatures of 36 actual buyers, 16 of them credited to subagencies. The Enger Company, a new manufacturing firm of this city, sold 50 cars in one day to subagencies, besides making a number of individual sales. The Cadillac Company reports that it sold 16 cars during the week. The Cino and Ohio, other new local products, also disposed of a large number. Powel Crosley, of the Haberer Company, which makes the Cino, booked an agency in Indianapolis which has contracted for 25 cars. The Cino will be exhibited at the Kansas City, Mo., show, and the Ohio is on exhibition at Cleveland and Boston.

MILWAUKEE'S SHOW TAXED TO CAPACITY

Milwaukee, Wis., Feb. 28—Milwaukee has again outdone her former achievements in the matter of an automobile show which opened there on February 22 under the auspices of the Milwaukee Automobile Club, and, according to consensus of opinion, this exhibition is said to have been a fine and most varied exposition of the automobile industries.

The show practically opened in the afternoon, when General Manager Clarke S. Drake and the show committee, consisting of M. C. Moore, Christ Schlotka, L. A. Dearholt, O. F. Fishedick, Dr. Louis Fuldner, gave a reception to members of the Milwaukee Automobile Club and a number of guests. This function took the form of a "private view" and was followed by a luncheon.

This exhibition covered about 40,000 square feet of floor space, and the auditorium in which the show was held was beautifully decorated. All of the sixty-two boxes encircling the arena was occupied by Milwaukee and Wisconsin society people, while the 4,000 seats in parquet and balcony were free to visitors at all times.

In the matter of exhibitions, it is said that applications for space far exceeded the capacity of the auditorium and every nook and corner was utilized by the exhibitors.

PORTLAND MADE GOOD WITH 1910 SHOW

Portland, Me., Feb. 28—The show ended Saturday to the entire satisfaction of the management, and will be reserved in the minds of local automobile enthusiasts for a considerable time to come as one of the real situations, portraying a condition of stability, and the healthy growth of the automobile industry. The auditorium in which the show was held was appropriately spruced up for the occasion, and it was common accord among the visitors that Frederick M. Prescott has reached a point in his managerial career where experience and acumen is scarcely to be enlarged upon. The attendance seems to have been on a sufficient basis to infringe upon comfort, a condition, by the way, which is scarcely to be counted when confronted by the enthusiasm which was displayed by the veteran autoists who have always lent support to Portland's effort, and the keenness of the prospectives who hovered over the automobiles which reached more nearly to the level of their respective ideals. The exhibitors, a number of which represented important local industries, included in their wares a class of cars which measure up to the exacting requirements of the keen New Englanders.

THE EXHIBITORS AND THEIR WARES AT PORTLAND

Apperson	Russell & Company
Buick	Buick Motor Company
Cadillac	Mank-Stuart Motor Company
Elmore	F. R. Parker & Company
E-M-F	Maine Motor Carriage Company
Ford	Spear Auto Company
Flanders "20"	Maine Motor Carriage Company
Fuller	Fuller Auto Company
Grout	Portland Motor Mart
Inter-State	Portland Motor Mart
Knox	The Portland Company
Maxwell	Stoughton-Folkins Company
Marion	Frank F. Wentworth
Mitchell	L. C. Gilson Automobile Company
Oakland	Stoughton-Folkins Company
Overland	Frank F. Wentworth
Oldsmobile	Stoughton-Folkins Company
Palmer-Singer	Taxicab Cab Company of Maine
Paterson "30"	W. A. Paterson Company
Peerless	Maine Motor Carriage Company
Pope-Hartford	Maine Motor Carriage Company
Premier	L. C. Gilson Automobile Company
Rambler	Stoughton-Folkins Company
Regal	Portland Motor Mart
Reo	F. Burgess
Selden	F. A. Nickerson Company
Stanley	L. C. Gilson Automobile Company
Speedwell	Portland Motor Mart
Stevens-Duryea	Maine Motor Carriage Company
Studebaker	Bullock-Goodwin Company
Velie	Pine Tree Auto Company
White	Portland Motor Mart
Warren-Detroit	Harrison & Tenney

BIG EASTER SHOW FOR PITTSBURG

The fact that the fourth automobile show in Pittsburg will be an Easter event has led the committee to provide a unique feature in the opening ceremony. A monstrous Easter egg suspended in the middle of the great auditorium and on the stroke of eight on opening night Mayor William A. Magee will pull a string opening the Easter egg and showering Easter blossoms on the crowd.

This show given under the auspices of the Automobile Club of Pittsburg opens in Duquesne Garden, Saturday, March 26, and indications point to the most successful exhibition of this kind ever held in smoky city. The committee in charge will spend more than the usual amount for lighting purposes alone, and the brilliancy of the Garden will surpass any previous illuminating effect. Entries for the show to date are large, 36 automobile firms have engaged space and about 30 accessory exhibitors will be taken care of. Following is a complete list:

Arlington Automobile Company, Center avenue, Pittsburg; Buick Motor Car Company, Baum street, Pittsburg; East End Automobile Company, Baum street, Pittsburg; Ford Motor Car Company, Highland avenue, Pittsburg; Fort Pitt Motor Manufacturing Company, New Kensington, Pa.; Franklin Automobile Company, Baum street, Pittsburg; L. Giesenkamp Company, Penn avenue, Pittsburg; the Hiland Automobile Company, Center avenue, Pittsburg; Inter-State Sales Agency, Center avenue, Pittsburg; Keystone Automobile Company, Center avenue, Pittsburg; Kline-Kar Motor Company, Hay street, Williamsburg, Pa.; H. Lang Wagon Company, S. St. Clair street, Pittsburg; Larimer & Lowry, West Newton, Pa.; Liberty Automobile Company, Center avenue, Pittsburg; Martin & Mars, Forbes street, Pittsburg; Maxwell-Briscoe Company, Forbes, and Meyran avenue, Pittsburg; Mutual Motor Car Company, 5518 Walnut street, Pittsburg; McAlister Brothers, Penn avenue, Pittsburg; McCurdy-May Automobile Company, Baum street, Pittsburg; Pennwood Auto Supply Company, Fulton Building, Pittsburg; Pioneer Auto Company, Baum street, Pittsburg; Pittsburg Automobile Company, Grant boulevard, Pittsburg; Pittsburg-Mitchell Company, Baum street, Pittsburg; Pittsburg Speedway Motor Company, Ltd., Wilkinsburg, Pa.; Premier Sales Company, Beatty street, Pittsburg; Pullman Motor Car Company, York, Pa.; Sebring Motor Car Company, Sebring, O.; Speedwell Automobile Company, Center avenue, Pittsburg; Standard Automobile Company, Baum street, Pittsburg; Studebaker Auto Company, Forbes Field, Pittsburg; E. J. Thompson & Company, Penn avenue, Pittsburg; Urling & Company, Center avenue, Pittsburg; Vestal Motor Car Company, Highland avenue, Pittsburg; The White Company, Beatty street, Pittsburg; Wilkinsburg Auto Garage, Wilkinsburg, Pa.; the Winton Company, Beatty street, Pittsburg.

CHALMERS OFFICIAL GLIDDEN PATHFINDER

After a careful consideration of the competitive proposals submitted by a number of manufacturers for the privilege of furnishing the Official Pathfinding Car for the 1910 Glidden Tour, the Contest Board has awarded this privilege to the Chalmers Motor Company, of Detroit.

The Chalmers car which is to lay out the route will commence its work sometime during the month of April, as soon as the roads are in a fit condition to determine the most practicable route.

The futility of the efforts of a car of another make than the Chalmers, now attempting to go unofficially over the road, and the unreliability of the road information which such car can obtain at this season of the year is self-evident. The roads over the proposed route of the tour are in such condition at the present time that the route which any car would have to take would of necessity include many detours and be entirely at variance with the route which will be selected by the Chalmers Official Pathfinding Car when it goes over the territory in the proper season.

Intending entrants in the tour should not be misled by the road reports from any self-appointed or unofficial pathfinding car making an unseasonable run, but should wait for the reliable and authentic information which will be contained in the reports of the "official pathfinder."

The Contest Board also contemplates the changing of the tentative route in some of its important particulars.

Contest Board, American Automobile Association,
S. M. Butler,
February 28, 1910. Chairman.

WISCONSIN STATE A. A. TOUR

The Wisconsin State Automobile Association is planning for the first annual state tour, with President Moore as a leading promoter. The American Automobile Association has granted the Wisconsin State Automobile Association an official sanction. The tour will probably start at the Public Library, Milwaukee, thence to Whitewater, and along the north shore of Lake Geneva to Beloit, where the first night control will be established. The second day's run is from Beloit through Janesville, Monroe to Madison for overnight stop. Madison to La Crosse is planned for the third day's run. Eau Claire to Chippewa Falls on the fourth day; thence to Marshfield to Wausau, Merrill on the fifth; the sixth to Appleton; thence from Appleton to Green Bay, Manitowoc, Sheboygan to Milwaukee on the seventh. This tour is to be open to private owners as well as dealers and manufacturers and the profit derived will be used exclusively for measuring roads, placing signboards and marking turns, also for working up legislation, prosecution of reckless drivers, protection of members and the creation of a legal fund.

IMPORTANT R.R. SHIPPING CONCESSION

In the matter of automobile shipment, J. S. Marvin, general traffic manager of the National Association of Automobile Manufacturers, announces a change in the rules which will simplify matters considerably in securing cars at the factories for automobile transportation.

It is known that many factories require freight cars no longer than 36 feet; also that railroads frequently supply 40-foot cars with a proportionately higher charge. Rather than wait indefinitely for 36-foot cars, many manufacturers, to effect prompt delivery, have used 40-foot cars at considerable additional expense in the matter of freight charges. The new ruling effective April 1, 1910, provides that when factories order 36-foot cars and the railroads are unable to furnish cars of that length said railroads will send instead 40-foot cars, with freight charges computed on the 36-foot basis, provided, of course, that machines loaded in the 40-foot cars are small enough to have been shipped inside of a 36-foot car.

BUDLONG ACCEPTS HEAD OF N.Y. DEALERS

At a special interview with M. J. Budlong, president of the Packard Automobile Company of New York, the representative from The Automobile ascertained that the delay on the part of Mr. Budlong in accepting the presidency of the Licensed Automobile Dealers' Association of New York was due to press of business, and the aggregate of private interests, which, as Mr. Budlong stated, absorbed so much of his time that he felt called upon to explain to his associates that he would have to more or less neglect important matters, were he to accept the presidency of the association. Events proved too strong for Mr. Budlong, and the unaminous demand on the part of the members of the association, which was vigorously supported by the committee, resulted in his reconsideration of the situation and the final acceptance of the presidency of the association. It is too early in the life of this new member of the association family to expect action which could be construed as anything more than routine, and from what the new president states, it is logical to conclude that the good of the industry will be consulted, in every case, before a serious campaign will be inaugurated.

George W. Bennett, New York manager of the White Company, has been made vice-president; C. P. Skinner, New York agent for the Mitchell car was elected secretary and treasurer.

N. Y. AUTO TRADE ASS'N EXPANDS

Plans were launched for a very material expansion in the membership and scope of the New York Automobile Trade Association at the meeting of the board of directors, held recently, and a vigorous campaign has been started to bring the membership up to the standard and in keeping with the number of concerns handling automobiles and supplies and operating garages in New York City. It is expected that 40 or 50 concerns will become members during the next few weeks. The association's credit department will be enlarged and broader plans are on foot for making more effective standardization of the garage division. In this latter work, a special committee in charge has plans under way to standardize the prices of garage charges, in the matter of storing cars and the prices of gasoline oil and other supplies.

An auxiliary committee will be established for the purpose of correcting many abuses and will work with the city authorities to stop irregularities, and to secure proper legislation on matters of interest in the automobile fraternity.

NUCKOLS TO BE PRESIDENT OF E. V. CO.

The latest inside report from Hartford, which, however, is not officially confirmed, gives to H. W. Nuckols the presidency of the Electric Vehicle Company, which concern, it will be remembered, recently joined the coterie which made up the United States Motor Company with an aggregate capitalization of $16,000,000. Mr. Nuckols has been with the E. V. Company from its inception, and occupied the position of treasurer and secretary up to the time of the receivership, and was appointed receiver, in which position his skill and efficiency brought the company out of the woods. Benjamin Briscoe, president of the Maxwell-Briscoe Company, and the prime mover in the big United States corporation, was not to be reached before going to press, but he will no doubt come out with an official statement confirming the above within a short time.

STREET CAR STRIKE KEEPS AUTOS BUSY

The automobile is again proving its worth in Philadelphia, where, for a time, the entire stoppage of the trolley service—due to the strike—practically tied up the city. Not alone were the police officials and roundsmen transferred from point to point, but the taxicab service was worked to the limit night and day; in fact, aside from the use of several hundreds of horse-drawn vehicles, automobiles were practically the only means in transportation service that turned a wheel.

GOODRICH IS WELL HOUSED IN BOSTON

In the commercial progress of New England during the past ten years the tire and rubber business has undergone a wonderful development, and a shining example of the individual prosperity of one firm is shown in the remarkable growth of the business of the B. F. Goodrich Company, which has recently taken possession of its new six-story building at 851-857 Boylston street. The home of the B. F. Goodrich Company is in Akron, Ohio, and throughout the United States it maintains a number of central distributing plants with Boston as a base of supplies for New England territory. When the automobile industry was in its infancy about nine years ago, Howard Limric came to Boston in charge of the Goodrich branch, which was then located on the second floor of a business block on Kingston street and the entire force of the tire department consisted of four men. As the automobile began to grow in popularity there was a corresponding increase in the demand for Goodrich tires and with the increase in business the company moved to Columbus avenue where it soon outgrew its facilities for doing business and finally made plans for the erection of a building designed for its particular branch of trade. The little acorn planted on Kingston street has now grown to be one of the giants in its line employing a force of sixty men in the handsomely new appointed building which with its six floors and basement gives a total of 30,000 square feet of floor space. The building has a 44 foot front on Boylston street and is 97 feet deep with a 15 foot sidewalk set back. The building is of reinforced concrete with granolithic floors and is as near fireproof as up-to-date construction methods will permit. In general design the building is after the modern French style and the architects, Kendall & Taylor, have worked out a very pleasing front of white glazed terra cotta and a rich effect is produced by the use of marble dados for the two entrances. The salesroom is on the first floor, taking up almost the entire width of the building. This salesroom is finished with an eight foot wainscoting of Central America mahogany and the floor covering is of rubber interlocking tiling. It is a very pretentious looking salesroom and no expense has been spared in its equipment. In the rear of the salesroom is the shipping room which is so arranged that all deliveries are made through one door and the goods received come in by another door so as to avoid any confusion. In the delivery department the express company messengers receive their goods from individual compartments and in order to facilitate matters a private shipping court runs into the building affording ample room for automobiles and express wagons without blocking the alleyway in the rear of the building. The general office and private offices are located on the second floor. These rooms are finely equipped for the purposes for which they are intended and in the private offices the furniture is of fumed oak.

The third and fourth floors are used exclusively for the storing of tires. The different sizes are kept on separate racks and these are adjustable so that they can be used for any size of tire. These floors have a capacity for storing 9,000 tires.

The fifth floor is a huge storeroom for the extensive line of mechanical and specialty rubber goods manufactured by the B. F. Goodrich Company. These articles include most everything made of rubber except mackintoshes. The top floor is used for a repair and adjustment department with an equipment that meets the requirements of the business in a very satisfactory manner. The basement of the building is used for bicycle and automobile sundries with a complete list of articles that come under the classification of accessories. In designing the building the architects have sought to produce the best of facilities for the handling of this business and the elevator service is all that could be wished for with an electric passenger elevator in the front of the building and a freight elevator in the rear, in addition to an electric lift.

BIG MILEAGES IN WESTERN BAD LANDS

From New Mexico comes the story of James Stocker, a mailman, of Torrence, New Mexico. Stocker has three 1905 two-cylinder opposed horizontal engined Buicks with which he claims to make the 110 miles between Torrence and Rockwell, New Mexico, every day with the Government mails. He says that from January 15, 1906, to the present these three cars have missed but three days and have always been on time. According to Stocker's story, the only time the cars were ever tied up was during a three-day blizzard when the snow became too deep for anything but snow-shoes or skis. Stocker has a government mail contract and his cars run every day having each made 165,000 miles since being placed in commission.

BRIDGEPORT CLIMB TO HAVE MORE ENTRIES

At Bridgeport, Conn., will occur the fifth annual hill climbing contest of the Automobile Club of Bridgeport on May 30. Preparations are being made to have this event more elaborate than ever before, and additional safeguards will be provided for both spectators and contestants, with the State Militia to guard the course. The McMurty electric timing system will be used as before, and along the rack, at 1/8 mile intervals telephones will be placed. It is expected that there will be one hundred entries for this event—at least fifty more than last year.

Farewell banquet given at Yates Hotel by Automobile Dealers' Association of Syracuse on occasion of departure of F. R. Bump, sales manager of the H. H. Franklin Mfg. Company to become sales manager of the Owen Motor Car Company, of Detroit, Mich.

WITH THE AGENCIES

One of the cars of which Massachusetts is proud; a Grout car, under the guidance of William Adams, chief tester of the Grout Automobile Company, Orange, Mass. The snow almost hub-deep makes little difference to this sturdy and powerful car.

The Swinehart Tire & Rubber Company have just opened a new branch in Philadelphia at 1437 Vine street, with D. Thos. Keenan as manager. A complete line of solid and pneumatic tires will be carried in stock at the new branch, and Mr. Keenan is well known, having been identified with the automobile and accessory business for several years. With its increased factory facilities the Swinehart Company will be able to handle a large volume of business during the year of 1910, and some good contracts have been received by the company from manufacturers located in the Philadelphia territory.

George B. Craven, formerly of Detroit, has been appointed distributor of the E-M-F and the Flanders cars. He will have headquarters at Cleveland. Twenty-one E-M-F cars have been received by the branch and these will be placed on exhibition in one of the most commodious salesrooms in Cleveland. Mr. Craven has been connected with the automobile industry since its inception, and for some time was a member of the staff of the General Motors Company at Detroit.

Chase motor wagons have entered the San Francisco market. William H. Durphy, formerly sales manager of the Chase Company, has opened an agency in that city. In this connection it is said that A. M. Chase, president of the Chase Motor Truck Company, reports that it has closed a deal with Leyland Motors, Ltd., of London, England, for 1,200 Chase wagons, to be taken in five years.

Fred R. Hill and Harry Weber are now connected with the Stewart & Clark Mfg. Co. traveling forces. Mr. Hill will make his headquarters in Philadelphia, covering Pennsylvania and Southern territory. Mr. Weber will be in Kansas City to cover the Southwest in the matter of handling Stewart speedometers. Both were formerly with Herz & Company.

Edward Miller has opened a salesroom at 705 Ann street, Columbus, O., where he handles the Premier. Mr. Miller was formerly associated with W. K. Mathews in the Miller-Mathews Company which handled the Jackson and Premier. After the partnership was dissolved the O. G. Roberts Company took the Central Ohio agency for the Jackson.

The Seamless Rubber Co., of New Haven, Conn., has just opened a New York branch office, located at 2002 Broadway, where a full line of this company's goods will be handled. Principally the Bragg stitched tire will be handled, or at least pushed, this tire having made a big hit at the recent New York shows.

The Ohio Auto Sales Company is the name of a new sales agency for Columbus, O., which has established a temporary office at 27 West Russell street. Later it will move into a room at Goodale and Front streets. W. B. Zimmerman is general manager, and the company is Central Ohio agent for the Ford.

The Automobile Accessories Company, of Pittsburgh, is opening at Centre avenue and Beatty street. This concern has the exclusive agency for the Pennsylvania tire in the Pittsburgh district. Wm. B. Yoder is manager.

The Weaver-Ebling Automobile Company, 2230 Broadway, New York, have taken an agency for the Harley-Davidson motorcycle. Their territory includes New York, Long Island, Staten Island, Westchester and vicinity.

H. C. Whittaker, president of the Wheeling Corrugating Company, has taken the agency for the Rainier car in the northwestern section of West Virginia and the southeastern section of Ohio, with headquarters in Wheeling.

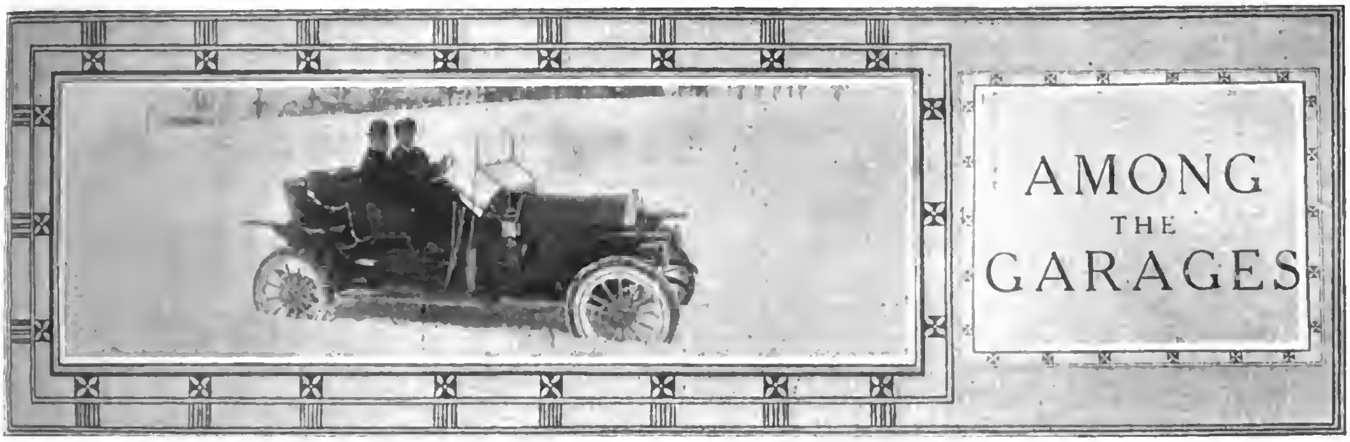
The Early Automobile Company, of Columbus, O., added two more agencies to its line by taking the Southern Ohio rights for the Whiting and the Warren-Detroit. Delaware County is also included in the territory.

George D. Knox, local agent for the Peerless and the Hudson in Hartford, Conn., has completed alterations in the general offices, 210 Pearl street, which will permit of the display of cars on the office floor.

The Way-Mitchell-Rigden Company, Cleveland, Ohio, agents for Republic tires and Stromberg carbureters, has secured the agency for Harris oils.

Wayne Davis, well known in the Philadelphia trade, has secured the agency for the Everitt "30."

J. Fortesque, secretary of the Bay State Automobile Association, one of the men who have helped it to its present success.



A typical Winter scene, in which a Speedwell roadster plays a prominent part. Automobiling is coming more and more into prominence as a Winter sport, and the number of owners who lay up their cars during this season is diminishing every year.

Mobile, Ala., has a new garage, conducted by the Ross Motor Company. Alfred G. Ross, the manager, has been with Bloch Brothers and the Mobile Auto Company for the past four years, so is no stranger to the selling end. He is also the secretary of the Mobile Automobile Club and vice-president of the Alabama Automobile Association. The Ross Company has an up-to-date garage, and will handle the Moon and the Rapid commercials.

Halladay automobiles will be handled in Georgia by Boyd-Patterson Company, with headquarters at 287 Edgewood street, Atlanta. The Streator Motor Car Company, maker of this well-known automobile, is pushing out, and in selecting this company as distributor, wisdom has been displayed. The establishment in Atlanta is well equipped with every facility, including tools, mechanics, and a wealth of experience.

The new garage building for the Ford Automobile Agency, of Wichita, Kansas, now in course of construction, will measure 140 ft deep by 50 ft. wide, and three stories high. The first floor will be the salesroom for cars and accessories, while the second will be storage and machine shop, this being very complete. The top floor will be for general repairs and painting.

The garage and salesrooms of A. Vernon Hart, Rochester, N. Y., were badly damaged by fire recently, and several cars were scorched and otherwise injured. The estimated loss is $10,000. Mr. Hart handles the Thomas Flyer, Oakland and Columbus electric.

David J. Post, president of the Post & Lester Company and treasurer of the Veeder Mfg. Co., both of Hartford, Conn.

Kaeser & Wilbur, of West Hartford, Conn., have taken the agency for that vicinity of the Empire 20. The firm is located in a large garage on Farmington avenue, and has already made some desirable sales.

F. W. Conrad, of the Pacific Garage, Montesano, Wash., states that he used Diamond tires on a six-cylinder Franklin car, with an average considerably over nine thousand miles per tire.

PERSONAL TRADE MENTION

The Carpenter Steel Company announces that Fred A. Bigelow, formerly its representative in New England, has assumed charge of its Cleveland branch at 1304 West Sixth street. This is to be taken as a sign of much activity around Cleveland, especially in connection with steel as it is used in automobile work.

Tom Moore, formerly secretary of the Cleveland park department, has become connected with the Vail Motor Sales Company, of Cleveland, and will have personal charge of the selling end of the Clark car, for which the company has just taken the agency. The Vail Company is also Cleveland agent for the Empire.

P. D. Wagoner has been elected president of the General Vehicle Company, Long Island City, N. Y., succeeding Howard Hanson, who has withdrawn from the company. Mr. Wagoner brings to his new work a wide experience in engineering and commercial affairs, and under his administration the outlook for the future of the General Vehicle Company appears very bright.

Albert L. Bennett has joined the Colt-Stratton Company, Broadway and Sixty-eighth street, New York City, in the capacity of sales manager. He will direct the sales of the Cole "30" and Paige-Detroit, both represented in this territory by the Colt-Stratton Company.

G. W. Stephens, formerly advertising manager of the G & J Tire Company, of Indianapolis, has severed his connection with that company, and will enter business for himself in Chicago. Mr. Stephens will handle tires and accessories, possibly locating on Michigan avenue.

T. C. Whitcomb, formerly Rambler agent at Cleveland, has accepted a position with the Overland Motor Car Company, at Toledo. He will become assistant to General Sales Manager F. A. Barker.

E. C. Johnson, formerly sales manager of the Philadelphia branch of the White and Packard companies, will become general sales manager of the Bergdoll Motor Car Company on March 15. Mr. Johnson is at present in Jamaica.

C. H. Foster, patentee of articles manufactured by the Gabriel Horn Mfg. Co., of Cleveland, will be succeeded by H. D. Preston as sales manager. Mr. Foster finds it necessary to devote more time to the manufacturing end of this increasing business.

REALM OF THE MAKERS

The Knox Automobile Company has a large, modern plant in the suburbs of Springfield, Mass., a hustling Bay State town, which is celebrated for manufactures. The Knox factory is one of which any city, even Detroit, might be proud

Following a record month of production, in which not only the monthly but also the daily and every other Chalmers manufacturing record was broken, General Superintendent Reddig, of the Chalmers Motor Company, Thursday evening, tendered a dinner to 22 foremen and inspectors of the production dept.

The affair was a complete surprise to the men. Thursday morning H. L. Bill, assistant superintendent, spoke to each of the men, telling them to report in the office at 6 o'clock for a lecture from Mr. Redding. All were told to send word to their families that they might be kept late. Then, when all were assembled, they were led to waiting automobiles and whirled to Dobson's roadhouse, Grosse Pointe, where the dinner was served at 6:30.

Hugh Chalmers, president and general manager of the company, was called out of the city and so could not attend the dinner. A letter from him to the men was read by Mr. Reddig.

"The car luxurious"—a strikingly handsome landaulet body mounted on the 15-30 horsepower Stearns chassis, was one of the most attractive features of the immense automobile show in the Coliseum at Chicago recently. The comfortable and roomy body, attractively finished in whipcord, contained all the little luxuries so desired by those of good taste. Speaking tube, clock, note pad, cigar lighter, ash tray, interior electric light (Tungsten burner), toilet set, vanity case and other little conveniences united in producing one of the handsomest landaulets ever exhibited in the Windy City. This car, being a landaulet, opens in Summer, providing an ideal car for fair weather use. Practically the same body is furnished in the limousine type. The Stearns exhibit also embraced touring cars, toy tonneau runabouts and polished chassis of both the 15-30 and 30-60 models.

George Pope, treasurer of the Pope Mfg. Co., which makes the Pope-Hartford, a well-known New England product.

A two-cylinder Maxwell Junior climbed the front steps of the Tarrant County court house, Fort Worth, Tex., went through and glided down the north steps, in the presence of a crowd of 500 people, passing through the severe test without even a flattened tire, scratch or break of any kind. Tom Abbott, of the Mulkey Auto Company, drove the car and he with one passenger pronounced the climb and steep descent pleasant and comfortable. It is said that no other car has ever performed this feat, although a four-cylinder machine mounted the front steps, but stopped there.

The Thomas Motor Cab Co., Buffalo, is in full possession of the new plant at 1738 Elmwood avenue, which is devoted entirely to the manufacture of Thomas taxicabs. It is reported that the demand for Model G taxicabs is so pressing that the new facilities are just in time, and, under the better conditions now available, it is expected that the output will maintain some kind of a pace with the strong demand.

The Gabriel Auto Company has been incorporated under the laws of Ohio, and in addition to making a thirty-horsepower car, to be known as the Gabriel, will act as state agents for the K-R-I-T. The Grabowsky truck will also be added to the line. The company is an outgrowth of the W. H. Gabriel Carriage & Wagon Company, which has operated a large plant in Cleveland for years.

On or about June 1 the Fal Motor Co., of Chicago, will have a new factory ready for occupancy. This will give the company 250,000 square feet of much-needed floor space, with its own power plant, and, best of all, a half-mile testing track. When the new factory is occupied the company will gradually work into the manufacture of all parts going to make up the Fal-Car.

O. B. Henderson, sales manager of the Baker Motor Vehicle Company, states that sales for 1910 delivery show the greatest increase in the history of the business. The new shaft-drive models are the most popular, and it is said that agents for this car have nearly doubled their orders for 1910 over 1909.

The Pierce-Arrow Motor Car Company, of Buffalo, contrary to its custom, announces the placing on the market of the new model soon after the beginning of the year. It is said that owing to the necessity of time for the manufacturing of these cars, orders for them will not be accepted after April 1.

It is said that during the coming year George Robertson, the noted racing pilot, will use Continental tires and demountable rims on various cars he will drive.

Systematic and economical organization is the keynote in all modern automobile plants, and is necessary no less in the administrative offices than in the workshops. This is a view of the Goodrich Boston branch.

Members of the Maryland Legislature have taken a number of exceptions to the automobile bill prepared by Col. Sherlock Swann for the Automobile Commission. A number of the legislators object to the provision for the Motor Vehicle Commissioner at $3,000 a year. It is said that these objections are made upon the ground that it seems that the salary of the Secretary of State, who they believe to be a greatly underpaid official, should be increased, and by amending the bill this can be done, provided no Motor Vehicle Commissioner is appointed.

From Los Angeles comes a report that arrangements have been made whereby Ralph De Palma will in the future pilot a 200-horsepower Fiat car owned by W. C. Arnold. The next appearance of the speed monster with De Palma at the wheel will be at the inaugural meet of the new board motordrome near Los Angeles. In view of this, it is possible that Oldfield and his Benz may be matched with the Fiat, although, as previously noted, negotiations in this direction are for the time being suspended.

Lieutenant Shackleton, the British South Pole seeker, is an ardent motorist. During his recent journey into the unknown South he used an automobile, and in a coming lecture in New York he expects to make public some of the details in this particular. Benj. Briscoe, president of the Maxwell-Briscoe Motor Company, has expressed a desire to build for the lieutenant a car which will surmount all possible difficulties of the polar journey.

The Delaware Aero Club has been incorporated under the laws of Delaware, with a capital of $100,000, by the following: David Snellenburg, George W. Crowe, Grantley P. Posteles, William L. Dockstader, John A. Montgomery, John G. Gray and Robie Seidlinger, all of Wilmington. Mr. Seidlinger has invented an aeroplane which it is proposed to build and test, and if it proves a success it will be exploited.

The Folsom Manufacturing Company, South Bend, Ind., maker of automobile accessories, has contracts with the Moon Motor Company, of St. Louis; Haynes, of Kokomo; Buckeye, Rider-Lewis and a number of other companies. for under-pans, tanks, and other sheet metal work for automobiles.

A. Leubner & Son, liverymen at Wausau, Wis., have decided to add several automobiles to their equipment, realizing that the horse-drawn vehicle is fast passing. Two cars are being used at the start, but the demand for the self-propelled vehicles is so great that more must be added.

The Pittsburg Automobile Academy is a new school for drivers at 6211 Howe street. W. H. Schmitz, president of the company, is an old Pittsburg automobile dealer, and H. P. Johnston, former automobile editor of the Pittsburg *Press*, is also connected with the school.

The Todd Rubber Company, Hartford, Conn., has removed from 30 Church street to 279 Trumbull street to more commodious and central quarters. Aside from the repair of tires a general accessory business is done.

The Silent-Motor Car Company, of Pittsburg, Pa., has been formed by Carl C. Conkle, Pittsburg, Pa.; Julius Sturtevant, New Kensington, Pa.; John W. Maesch, Beaver Falls, Pa., and G. W. Dorsey, Jr., of Wilmington, Del. It has a capital of $300,000, and will manufacture automobile parts.

The Great Western "30" will be entered in a large number of track races and hill climbs during the coming season. F. B. Thornburgh, the representative of Wheeler & Schebler, will drive.

The Pittsburg Auto Equipment Company, of Pittsburg, has bought the entire plant of the Union Auto Repair Company, on Collins avenue, East End, whose wind shield it has been selling for six months.

The Derain Motor Company, of Cleveland, has increased its capital stock from $40,000 to $60,000 by papers filed with the Secretary of State recently.

The Schoellkopf Auto Radiator Company, of Cleveland, has been incorporated with a capital stock of $25,000 by William Schoellkopf and others.

The Queen City Motor Car Company, of Cincinnati, has been incorporated with a capital stock of $10,000 by F. M. Bering and others.

The Cleveland Auto Trading Company, of Cleveland, has been incorporated with a capital of $5,000 by C. K. Halle and others.

Alfred Reeves, late of the American Motor Car Manufacturers' Association, now general manager of the A. L. A. M.

PROMINENT ACCESSORIES

The Diamond Chain & Mfg. Co. calls attention to the new method of housing and adjusting the douhle Diamond chain drives of 1910 Chadwick cars as a most practical arrangement for making chains give good service.

The radius rod, which is a manganese hronze casting, forms the greater portion of the inside of the case and is provided with a slide to permit chain adjustment. The centers of the radius rod are respectively the centers of the jack shaft and rear axle, so that there is no tightening or loosening of the chain from the up-and-down spring movement, and the chain can be correctly adjusted at any position of the springs. This construction has another advantage in that the case can be built very narrow without the danger of side slapping and its attendant noise.


Link of Diamond chain

A special Diamond chrome nickel steel chain is used and the sprockets are shaped to avoid "huzz" as the chain rollers strike the teeth. This noise is usually caused hy insufficient luhrication after the chain has become filled with dust and dirt. The chains of a Chadwick car are first adjusted to make the drive as nearly noiseless as possihle and are then luhricated with a heavy grease, which the case retains.

The addition of the aluminum cases tends to muffle the noise still further. A felt washer where the case encloses the rear wheel drum further prevents dust from reaching the chains.

The chain drives of Chadwick cars enahle the use of an I-heam section rear axle which is enormously strong and very light in weight, the differential heing placed up in the car in order to load the springs and promote easy riding. With this construction the heavy dead weight of the differential is not directly supported by the rear tires, a feature which materially decreases tire trouhles and expense.

The direct forward pull from the top of the sprockets on each side also gives easier riding qualities than the tipping action in shaft-driven cars. Further it is impossihle for road shocks or ohstructions to throw the rear axle out of alignment, which may happen in shaft-driven cars with a consequent power loss.

DeLuxe gas tip burner

Prominent among the acetylene hurners on the market is the Alco, which is not connected with the automobile of that name, hut is the product of the American Lava Company, of Chattanooga, Tenn. This embodies the usual principles of acetylene hurners; that is. it is forked in shape, with a passage for the gas in each branch, so arranged that the two streams of gas impinge on each other to give a fan-shaped flame. The gas passages are slightly enlarged at their ends and have holes drilled in to admit air, so that the gas is diluted or mixed with part of the air necessary before it issues from the nozzles.

The pillars of the jets are turned from solid hrass, heavily nickel plated. The hurner proper, the branched part, is screwed into the pillar and is cemented in place, so as to make leaks absolutely impossihle. The hurner is made of genuine Nuremberg steatite, which is the hest and most reliable material for the purpose.


Volier horn, a new variety

The 1910 models of the Volier horns, formerly handled by the American Brass Products Company, of Hartford, Conn., are now made by that company in its American factory in accordance with French methods. This horn is claimed hy the maker to mark the perfection of graceful design; in both finish and workmanship it is equal to the hest French product.

The most favored model is the double-turn horn, the double-turn feature of design making the note very deep and musical. This quality makes them a dangerous competitor of the recently invented mechanical horns and sirens, which otherwise would have a clear field for automohiles intended for touring. It takes a good loud noise to clear the road in many cases, and the douhle-turn horn is the only one of the hulh-operated variety that is capable of producing it. All Volier horns are fitted with chemically cured hulbs and with reeds of a special non-corrosive metal. The horn proper is of spun hrass of sufficiently heavy section, and the five pieces are securely joined together. The horn is made in the usual styles, with or without the flexihle tube.


E. E. Sweet, engineer for the Cadillac Motor Car Company

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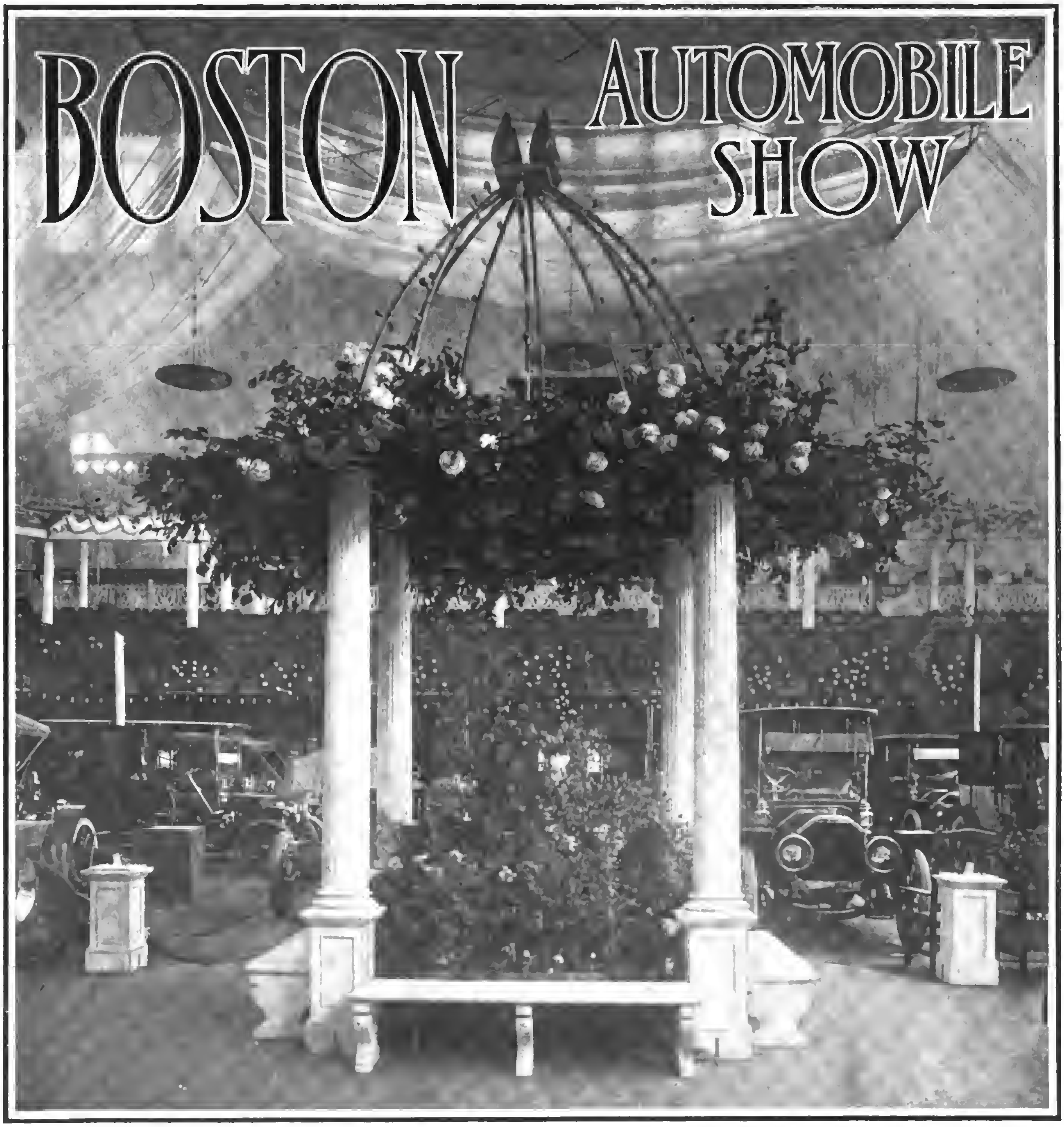
THE AUTOMOBILE

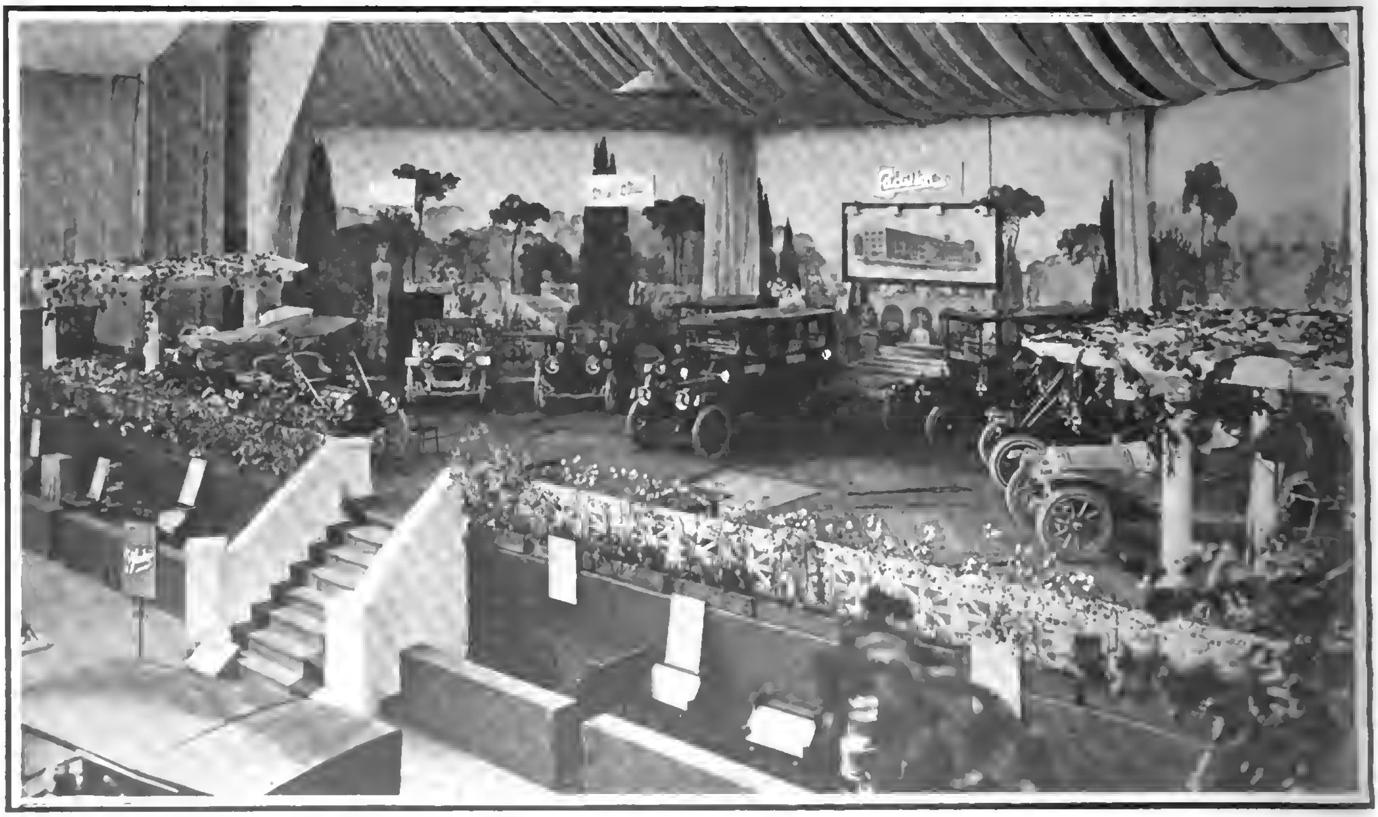


BOSTON welcomed the Eighth Annual Automobile Show which is being run under the auspices of the Boston Automobile Dealers' Association, under the direct management of Chester I. Campbell, whose success last year as a show manager was so marked that he was given carte blanche by the Board of Directors, when it was decided to make this year's event an epoch-making example. It was thought last year that the show decorations, since they were modeled after an art motif which

Two Paths through the Apple Orchard; Beneath the Blossoms and Leafy Branches Appears the Selden Exhibit

was selected from abroad after a long and painstaking search, were scarcely to be exceeded, but the transplanted motif, however good it may have been, falls flat in the face of the effort this year. New England scenery in the Springtime offers many advantages, and in accepting it as the art motif, Manager Campbell, with his native instinct, struck the responsive chord and added the atmosphere, as it were, which brought an apparent illusion up to the standard of a reality.

The spectators, as they pass the entrance, come into view of an old New England apple orchard which was improvised by the simple expedient of transferring the bark of old apple trees to the columns which support the Hall, and the limbs of the trees were fastened to the columns in a way to complete the illusion. It took a hundred thousand clusters of apple blossoms, which look so real that one can scarcely tell that they were improvised. The old rail fences which were brought down from New England farms, complete the spectacle, but the daffodils which were in much profusion, arranged in boxes at points of vantage, added the finishing touch to the Springtime scenic undertaking. There were other floral effects and decorations to



Alvan T. Fuller, Showing the Packard and Cadillac, Occupied the Stage with Some Handsome Machines match, and each of the halls were given a sufficient dash of variation to induce mingled feelings of surprise and pleasurable anticipation to the enthusiastic and large audience, which awaited the opening promptly at 8 o'clock P. M. on Saturday, March 5, without formality, so that the spectators were wholly unprepared for what is now counted, by the show veterans of the greatest experience, as being a demonstration in force of the elegance which comes from simplicity and appropriateness, responding to the directions of the master hand.

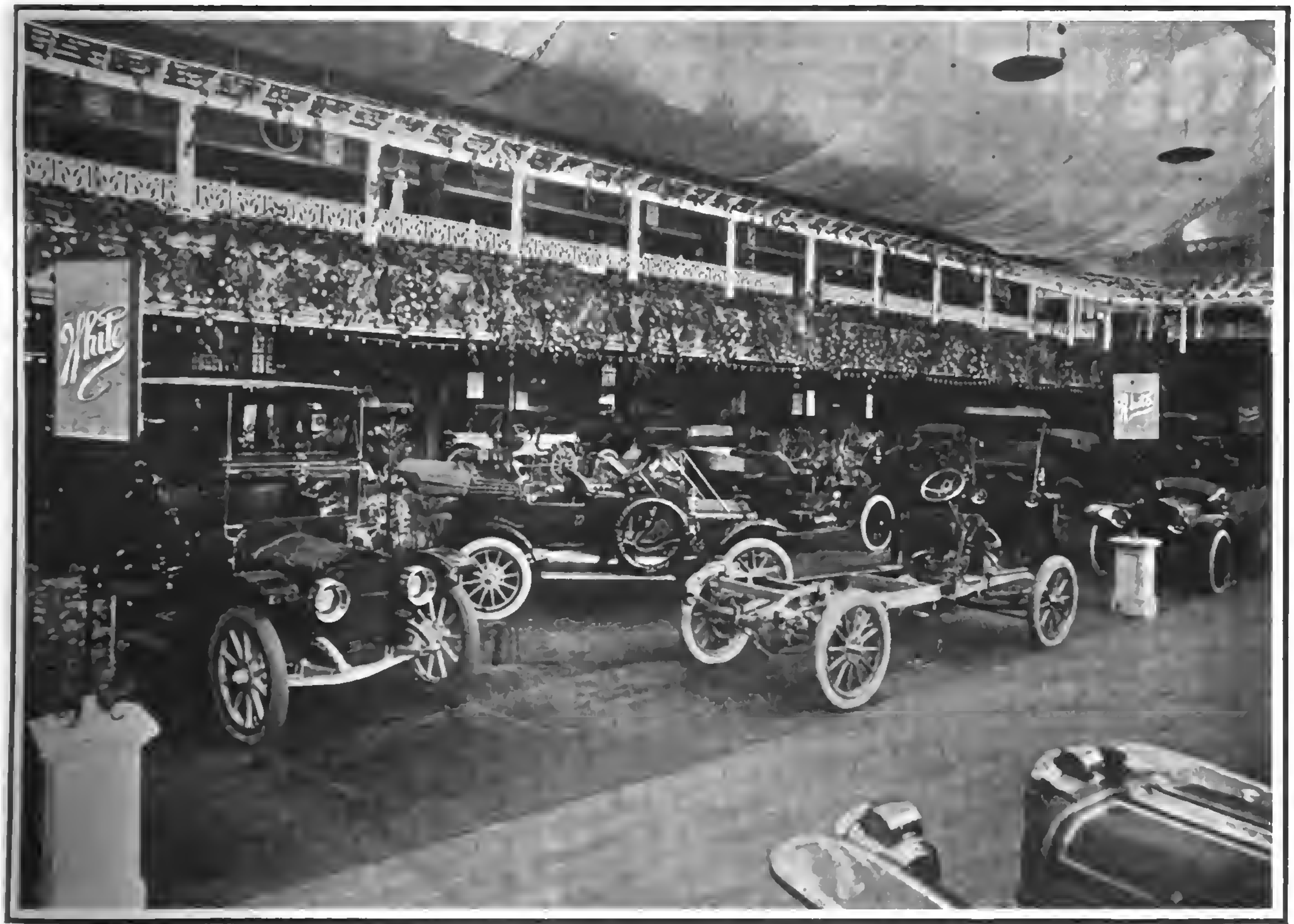
NEW ENGLANDERS OF NOTE OFFICIATE

To illustrate the breadth of character of the management of the Boston Automobile Dealers' Association, it is only necessary to point out that while the show is on, thus enabling the management to contact intimately with the respective makers and their agents, an organized effort is being made to borrow enough automobiles. drawing upon demonstrating cars heavily, to give all the poor children in Boston and its suburbs a ride which will survive in juvenile memory until prosperity overtakes the juveniles, when they may be able to ride in their own automobiles. It is this broad and varied effort on the part of the Dealers' Association and its members which has attracted public notice, and which resulted in a patronage on Saturday night when the show opened, that covered every foot of available space, and represented the substantials of this metropolitan community. Not only that, which was somewhat to be expected, but on later days the attendance was fully up to expectations.

The Board of Directors of the Boston Automobile Trade Association comprise: J. H. MacAlman, president; J. S. Hathaway, vice-president; A. F. Hinchliff, treasurer; Chas. E. Fay, director; J. W. Maguire, director; C. F. Whitney, director; E. A. Gilmore, director; F. E. Wing, director; A. P. Underhill, director; Chester I. Campbell, general manager.

There are 31 active members in the association: J. H. MacAlman, J. S. Hathaway, F. A. Hinchliff, George H. Lowe, Harry Fosdick, J. W. Maguire, Charles E. Fay, K. M. Blake, John L. Snow, Fred S. Smith, L. B. Butler, A. P. Underhill, F. E. Wing, A. T. Fuller, W. M. Jenkins, F. J. Tyler, J. M. Linscott, N. S. H. Sanders, C. F. Whitney, E. D. Dodge, J. W. Bowman, E. A. Gilmore, S. H. Baker, R. W. Daniels, Paul R. Curtis, Henry L. Johnson, A. B. Henley, Roy A. Faye, C. P. Rockwell and V. A. Charles.

The association was formed in 1902 and its first president was Kenneth A. Skinner. The first year resulted in a substantial foundation, and when J. H. MacAlman was elected to the presidency, the policy of the association was so crystallized that it has obtained in substantial form from that day to this, resulting in much good to the automobile industry, besides inspiring confidence. It is the policy of the association to maintain its membership strictly among dealers, and this policy is so rigidly enforced that prominence is never a sufficient excuse for membership—the first requisite lies in being a dealer. The obligations imposed upon the members are such that the public is adequately protected from every point of view.



The White Exhibit As Seen from the Stage, with a Gasoline Limousine and Chassis in the Foreground

AUTOMOBILES EXHIBITED AT BOSTON

On the opening night when the doors were swung back, an eager throng, rapidly filled the several Exhibition Halls and the 116 separate models of automobiles which were then ready for inspection became the main centers of attraction. The New England makes of automobiles were the first to be examined, among which the Columbia assumed extra importance, in

Looking Diagonally Across the Main Hall; the Galleries Were Pergolas Half-Hidden with Rose Blossoms

view of the recent combination of this make of car with the Maxwell and the other interests which form the United States Motor Company. The Locomobile from Bridgeport had its coterie of adherents, and the Knox, both in the commercial as well as in the pleasure section, was thoroughly engaged. Then, there was the Corbin of "full jewel" fame, and the Pope-Hartford besides.

The Alco exhibit created much favorable comment, due to the refinements which have been steadily going on despite the original high character of the Berliet, from which the Alco sprung.

View of Main Hall in the Direction of the Stage, with the Peerless Closed Cars in the Foreground

The two-cycle contingent made pilgrimage to the section occupied by the Atlas Company, where they were entertained sufficiently to gratify their desires. In the meantime the Stevens-Duryea booth was the center of attention of the many who take a particular fancy to the unit power plant, three point suspension, flywheel in front, and the perfect symmetry of the crankcase and extension which naturally follows. There was still a large number of the admirers of New England makes of automobiles and they gathered around the Metz booth where they were entertained instructively; the Metz is an unassembled product, and the company furnished everything necessary to the automobile enthusiast who prefers to be his own mechanic. So much for the product of the New England factories.

Excepting for the Anderson car which was listed to be exhibited but which failed to put in appearance in the Kline Kar booth up to the time of going to press, and the Morse, which is described elsewhere at some length, there were none which had not already been seen at New York or Chicago. That the showing was truly representative of the industry may be seen from the following list of the various classes. The automobiles actually on exhibition, counting makes, are as follows:

ELECTRIC PLEASURE CARS

Baker, Bailey, Columbia, Detroit, Firestone-Columbus, Rauch & Lang, Studebaker and Waverley.

STEAM PLEASURE CARS

White and Stanley.

GASOLINE PLEASURE CARS

Alco, Allen-Kingston, Autocar, Apperson, American, Austin, Atlas, American Simplex, Abbot-Detroit, Buick, Berkshire, British Napier, Black-Crow, Brush, Cadillac, Chalmers, Columbia, Corbin, DeMot, Paige-Detroit, Everitt, E-M-F and Flanders "20," Elmore, Empire, Fuller, Fiat, Ford, Franklin, Garford, Grout, Hudson, Haynes, Hupmobile, Herreshoff, Inter-State, Isotta, Jackson, KisselKar, Krit, Kline Kar, Locomobile, Lancia, Lozier, Lambert, Mercer, Mitchell, Mora, Matheson, Maxwell, Marmon, Marion, Morse, McCue, Midland, Ohio, Oldsmobile, Oakland, Overland, Packard, Pope-Hartford, Peerless, Pierce-Arrow, Premier, Pierce-Racine, Palmer-Singer, Paterson, Pullman, Royal Tourist, Rambler, Rainier, Reo, Regal, Renault, Stevens-Duryea, Studebaker, Stearns, Selden, Speedwell, Simplex, Schacht, Standard, Stoddard-Dayton, Thomas Flyer, Velie, Warren-Detroit, Welch, Winton, and White.

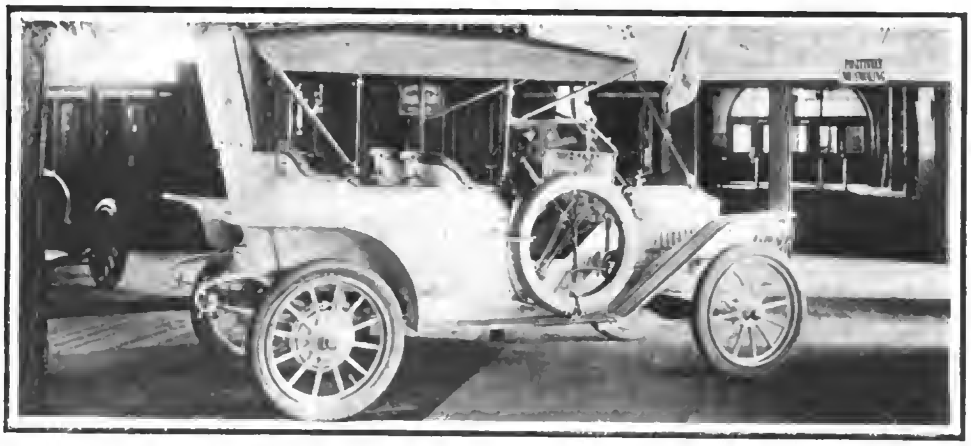
COMMERCIAL AUTOMOBILES

Alco, Autocar, Brush, Buick, Butler, Buffalo, Chase, Couple-Gear, Electric Commercial, Fuller, Frayer-Miller, Gramm, Garford, Grabowsky, General Vehicle, Hart-Kraft, Knox, Martin, Morgan, Pope-Hartford, Randolph, Rapid, Reliance, Studebaker, Sampson, and White.

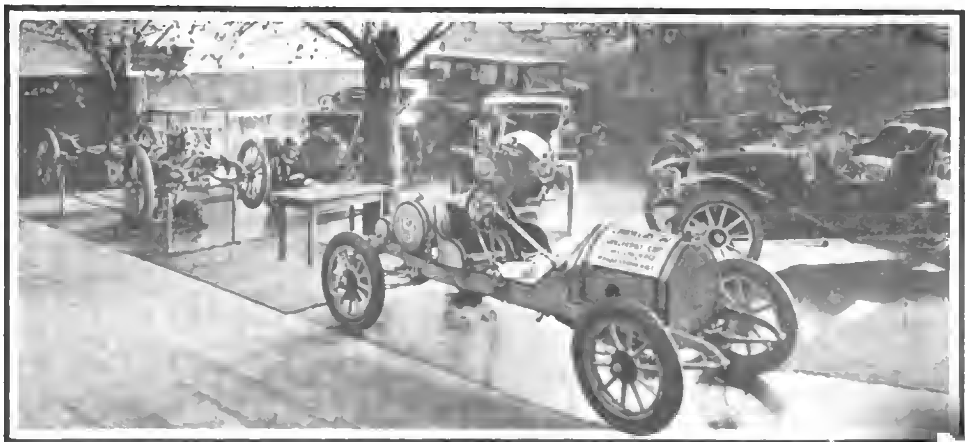
In addition to the automobiles as above enumerated, there were twelve makes of motor cycles on exhibition, as follows: American Simplex, American, Crouch, Emblem, Excelsior, Indian, Merkel, Light, Pierce, Racycle, Reading Standard, Thor and Yale.

Marmon Exhibit Included Various Types of Torpedo, Touring Car and Roadster

In the Main Hall, Pierce-Arrow Exhibited a Chassis, besides Complete Cars

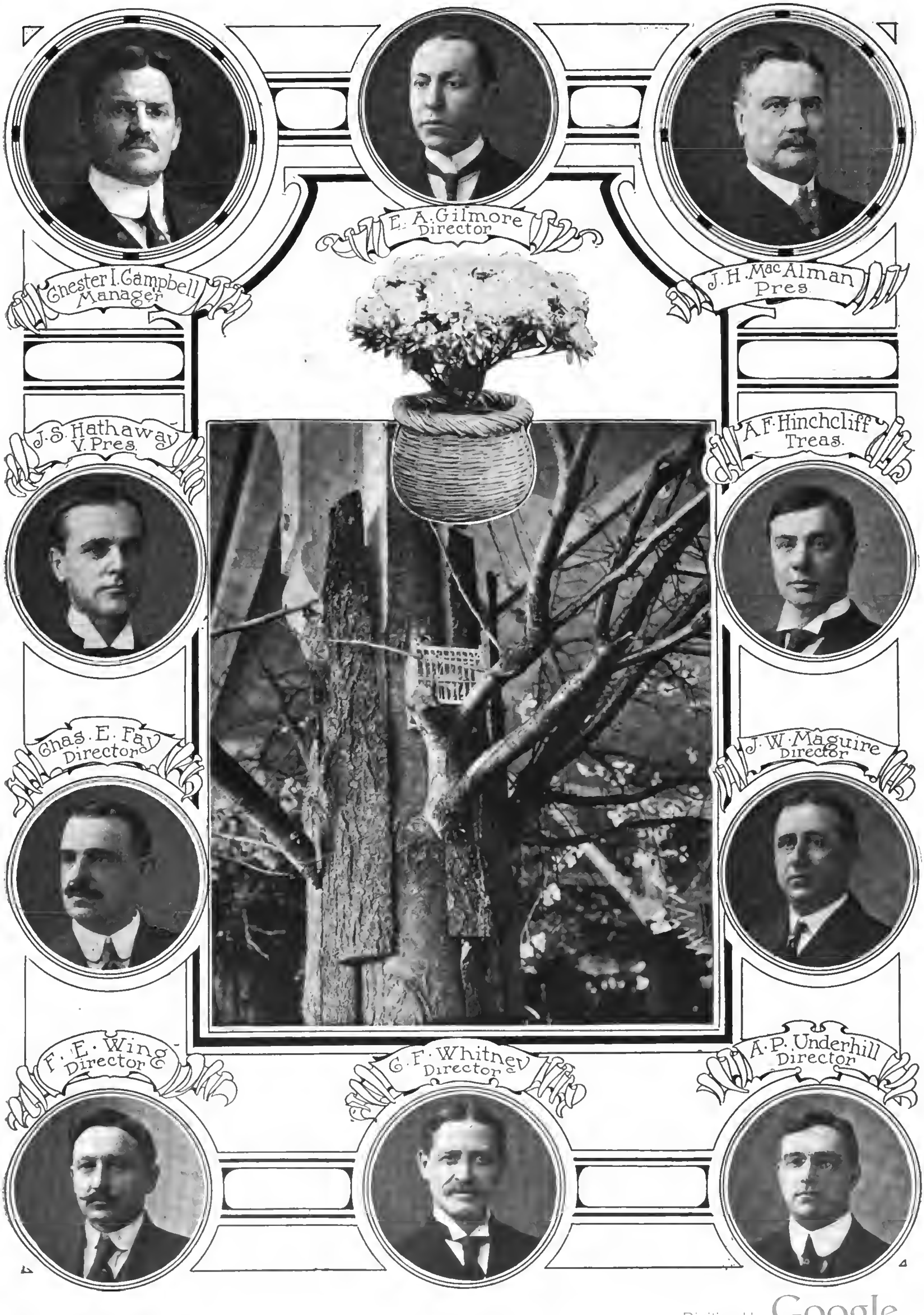


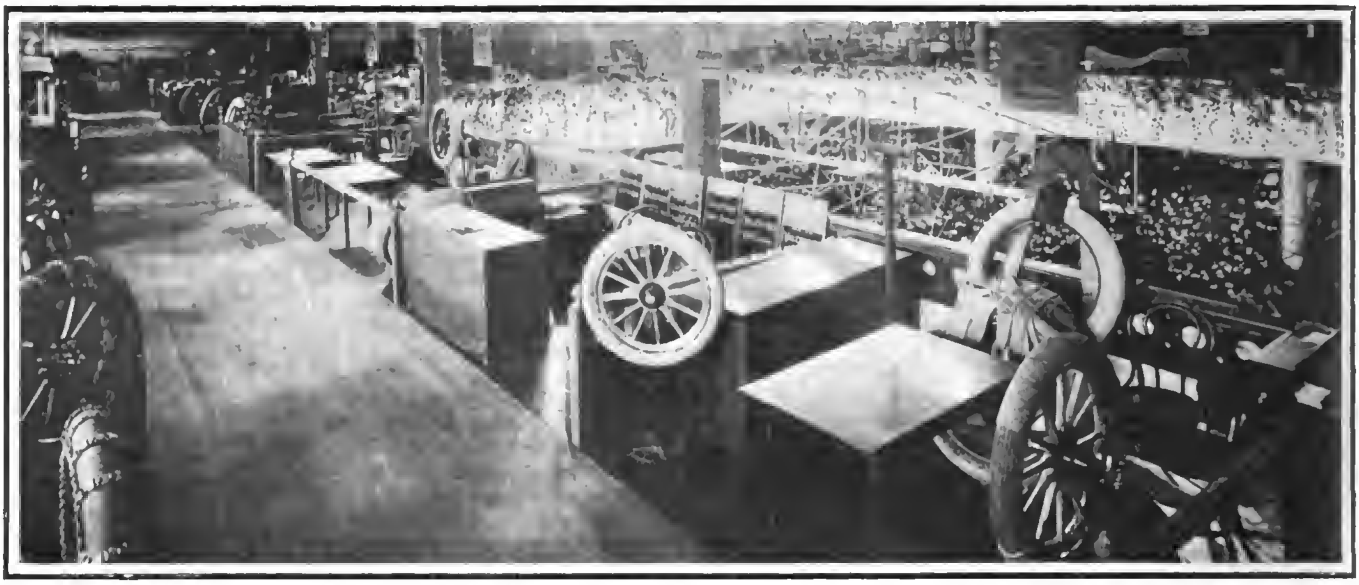
Attractive Maxwell in Pure White with Striping and Seat Covers in Soft Gray



Chalmers and Hudson Exhibit, Including the "Bluebird," Massapequa Winner


White
Commercials come next.


Chester I. Campbell
Manager
E. A. Gilmore
Director
J. H. MacAlman
Pres.
J. S. Hathaway
V. Pres.
A. F. Hinchcliff
Treas.
Chas. E. Fay
Director
J. W. Maguire
Director
F. E. Wing
Director
G. F. Whitney
Director
A. P. Underhill
Director



Around the Galleries, Where Many Tire Manufacturers Exhibited; Foreground Occupied by Bragg

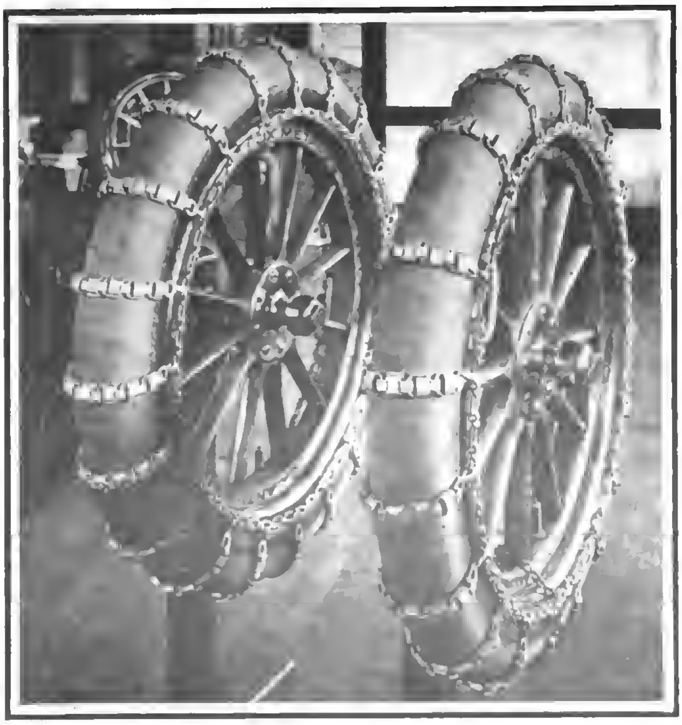
Accessories Occupy a Prominent Place

THE statistics of the automobile industry, excepting in a limited way, have been compiled with a view to picturing the automobiles complete, and little has been said about the accessory makers, who depend upon the automobile proper for returns. The makers number slightly under 300, not counting a hundred or more embryo propositions. Neglecting the embryos it may be stated that the 300 makers of cars on a more or less large scale support accessory companies about as follows:

ACCESSORY MAKERS SUPPORTED BY AUTOMOBILES

Tops, 140; Spark Plugs, 133; Aluminum and Brass Castings, 160; Bodies, 172; Axles, 55; Ball and Roller Bearings, 152; Brake Linings, 24; Batteries (dry), 61; Batteries (storage), 104; Bumpers, 22; Carburetors, 84; Chains (sprocket), 11; Non-skid Chains, 24; Clutches, 30; Spark Coils, 52; Commutators, 14; Crankshafts, 35; Dashboards, 40; Fans, 20; Carburetor Parts, 12; Drop Forgings, 98; Frames (chassis), 14; Gear Blanks and like parts, 35; Transmission Systems, 72; Mudguards, Aprons, etc., 60; Tire Holders, 52; Lamps (gas), 36; Lamps (oil), 28; Lamps (electric), 12; Mechanical Oilers, 18; Magnetos (some imported), 63; Motors, 80; Mufflers, 32; Foot Pedals and like parts, 19; Radiators, 32; Suspension Springs, 45; Valves and Mechanism, 42; Road Wheels (wood), 24.

The above list is an approximation which does not include a great many manufacturers in a small way who confine their efforts to work which is farmed out. It would be impossible to state the percentage of the total work which is accomplished by the farming process and which keeps many small shops constantly engaged, but it might be reasonable to assume that 20 per cent of all the accessory work is done in this way. It is all accomplished by sub-contractors who do not resort to publicity.



Tire Chains Shown by the Fox Metallic Tire Belt Company

Kelly-Springfield Sectional Rubber Tire for Heavy Duty

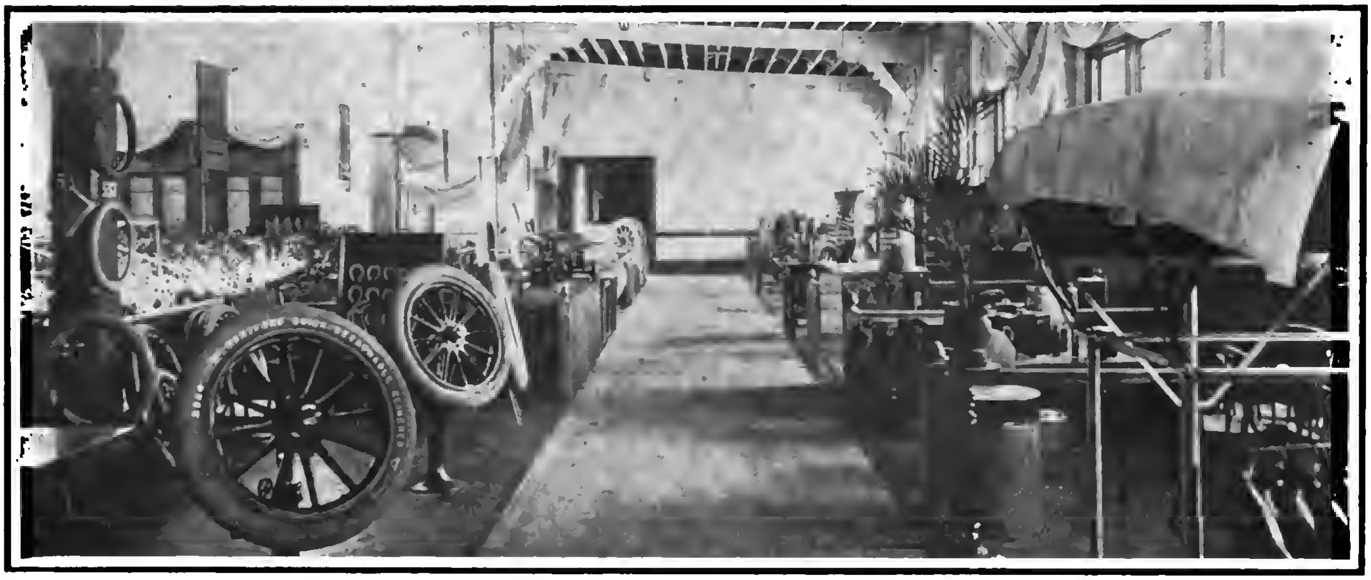
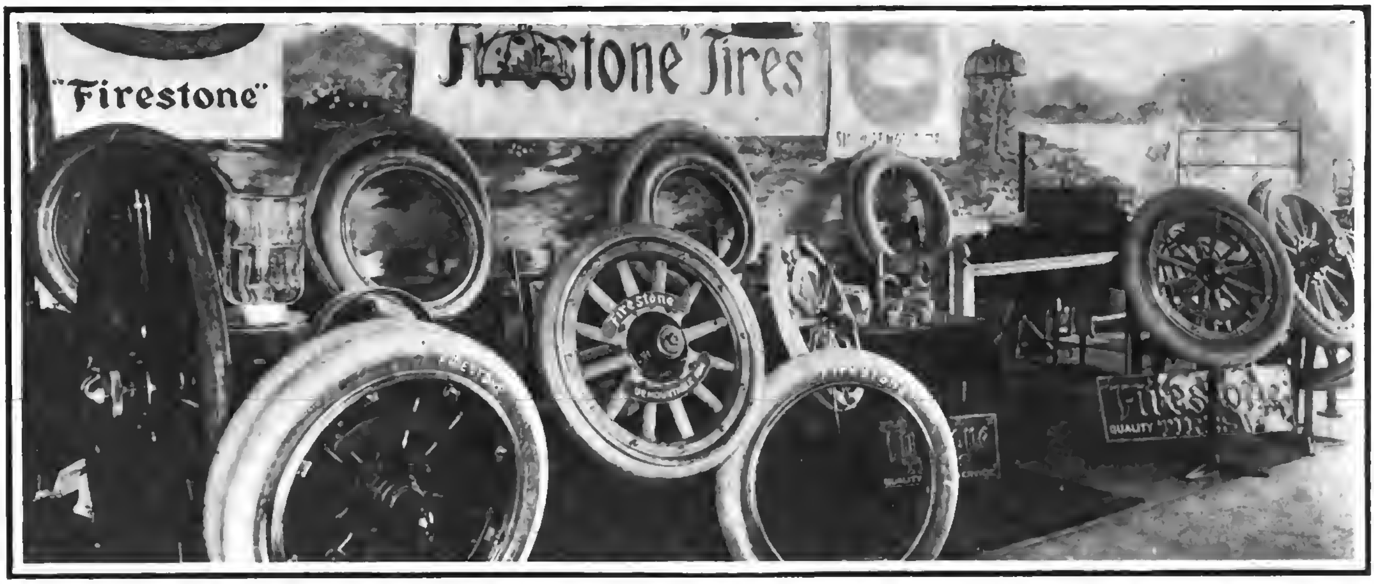
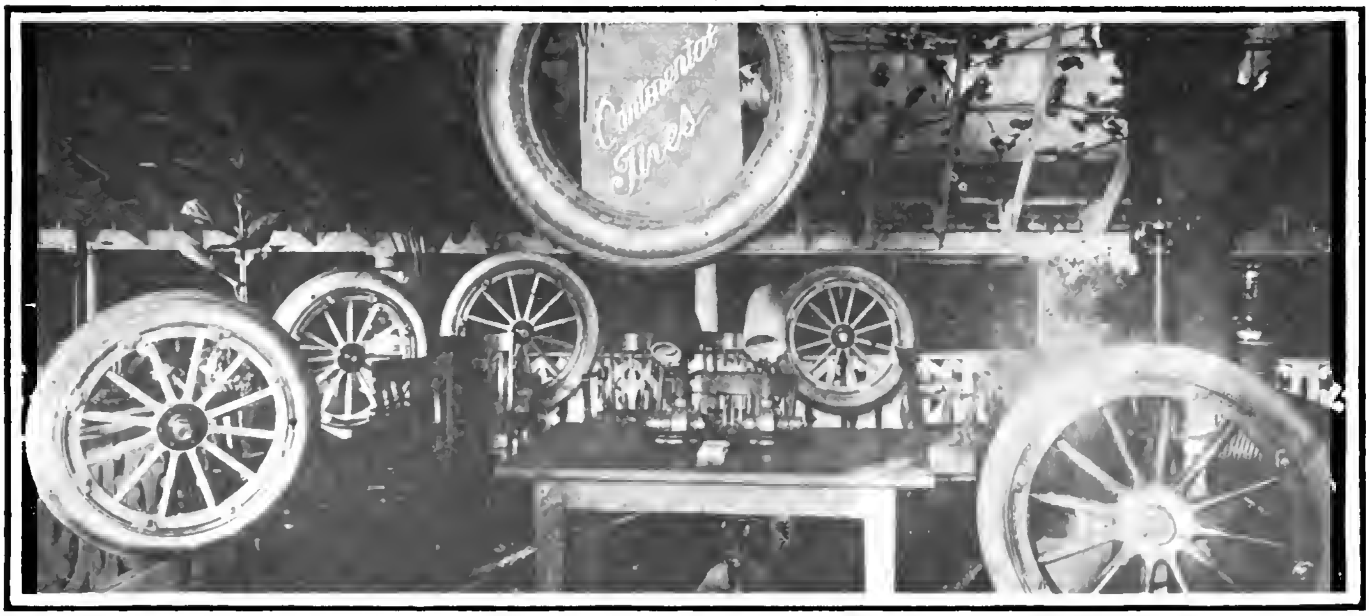


Exhibit of Hartford Tires Comprised Various Kinds of Detachables and Demountables, Besides Sections



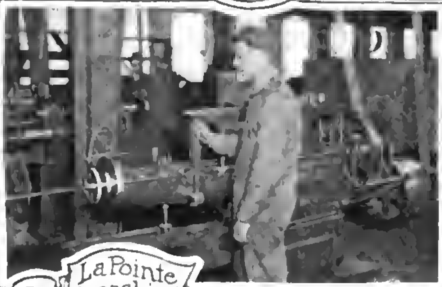
The New Demountable Rim Was the Central Feature of the Firestone Stand, Surrounded by Other Types



Continental Tires Had to be Hung from the Ceiling to Find Space for Them All; Sections Also Appear

Seen in BOSTON FACTORIES

Machining Kilgore parts



La Pointe Broaching Tool at work

Assembling room in Dover plant

Turning up parts for Hoffecker Speedometers

In Hoffecker finishing room

Flentje machine shop packing piston rods

Preparing Boston Show exhibit in Kilgore factory

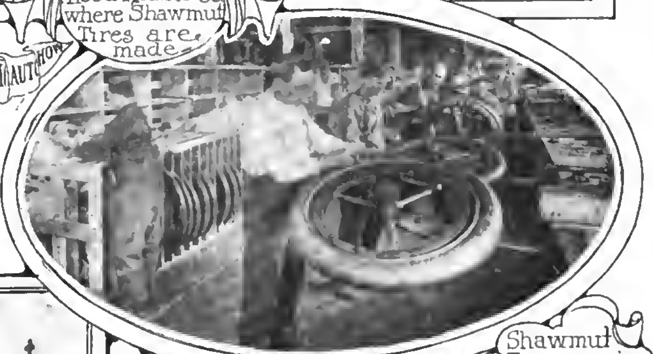
Sewing and packing Chase Robes and Dusters

New plant of Hopewell Bros and L.C. Chase Co

Curing carcasses of Shawmut Tires

Hood Rubber Co where Shawmut Tires are made

Cutting material for Hopewell Tire Covers



Shawmut Tires in various stages of completion

Four of Dover Company's seven buildings

Presses and Dies in the Dover stamping plant

BOSTON and its encircling cities and suburbs produce many articles which the automobilist uses daily. True, the Hub was never named with regard to the automobile industry, and to many it may seem strange to think of the city of culture as a center of busy factories and salesrooms. The visitor will soon learn his mistake. Automobile row, on Boylston street, will not suffer by comparison with the other automobile rows on Broadway and Michigan avenue; and in the number and importance of its manufacturing plants the Bay State capital assumes a high rank.

Twenty minutes' ride by trolley from Mechanics Hall, in Cambridgeport, is the plant of the Dover Stamping & Manufacturing Company, from which come funnels, oil cans, tanks, drip pans and many other manufactures of sheet metal. Every housewife knows the Dover egg beater, and the Dover line of automobile accessories is almost as proverbial in its excellence.

Back in 1833 the Dover Stamping & Manufacturing Company was first organized in Dover, N. H., taking its name from its native town. Successive enlargements finally ended in the establishment of the present plant in Cambridgeport, on Putnam avenue. It occupies a group of seven buildings. The largest, which houses most of the heavy machinery, is a three-story brick structure 43 by 155 feet, standing on the corner of the block. Extending in line with this are two other frame buildings, one of two stories, 40 by 125 feet, and one of one story, 32 by 82 feet, used for galvanizing. At the side of the main building is the office, and in the angle thus formed is the power plant, 45 by 42 feet; a brick tinning room, 61 by 31 feet; a three-story brick forge shop, 73 by 30 feet, and stables and sheds.

On the first floor of the main building are several presses, each approaching 15 tons in weight, for drawing sheet metal into various forms. These are capable of shaping a bowl two feet in diameter and eight or ten inches deep out of a single piece of flat sheet metal, the resulting product being without seam and smooth and flawless in its texture. Here, too, are a half-ton drop hammer for stamping out parts which in general contour are flat, and a multitude of cutting dies for those articles which must be built up of several pieces.

The roughly formed parts are taken from their dies and presses to the assembling room on the second floor. Many ingenious machines form the equipment of this room. There is a seamer which will take the stamped-out bottom piece of a gasoline pail or a graduated can and apply it to the body of the vessel far more quickly and neatly than the most skilled hand worker. Another binds the stiffening wires around the tops of pails and funnels, and turns the sheet metal back smoothly over them.

Monarch Shock Absorber Applied to a Packard Car

Other machines, resembling ordinary lathes, but with blunted tools, true up the cylindrical and conical parts. Finally the pails and funnels are taken to the finishing room to have their handles and spouts applied.

Although the product of the Dover works, as intimated above, is by no means confined to automobile accessories, the attention which the company is paying to this end of its line may well be demonstrated by the ingenuity and novelty of the articles for automobile use. Pails and funnels in themselves are simple things, but the Dover company has a combined pail and funnel which does away with one pouring of the gasoline. It is a funnel provided with an automatic valve, which is normally closed, but opens when the funnel is set into the filling hole of the tank. A ball, which seats in the bottom of the funnel, with a stem projecting through the nozzle, and a spider on the end of the stem, with arms bent back over the outside of the nozzle, so that the funnel rests on them while in the filling hole—these do the trick. Incidentally, they provide an air vent, and so still further facilitate filling.

For garage use there are funnels of a bowl-like shape, a foot or more in diameter, and holding a couple of gallons. Their particular beauty is that the chamois strainer in the bottom is the full diameter of the bowl, and as the speed with which a tank can be filled depends usually on the rate the gasoline strains

Inspecting Room of the Hopewell Brothers' Factory at Newton, Where Hopewell Tire Covers Are Made

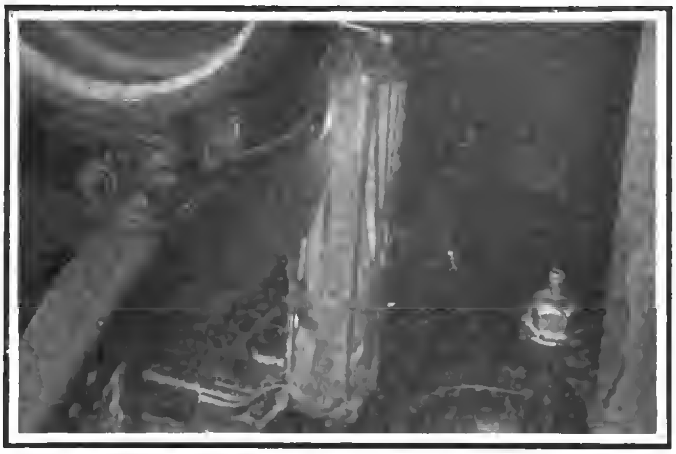
After 65,000 Miles on Flentje Shock Absorbers

through the chamois, time is economized still further. Space does not permit description of the many other funnels, gasoline cans, oilers and such articles from the Dover plant, save only an offset funnel which will be found useful on many cars with gasoline tanks hung from the frame in the rear. For the rest, the automobilist may be assured that anything else in this line can be had with the Dover trademark.

Turn now to another article of an importance best realized when a tire bursts miles from a garage—as tires still will do. When this misfortune befalls, lucky is the automobilist who has carried his spare shoe in a waterproof case, and so has it firm and sound to take the place of the one that has failed. Tire cases, and especially waterproof ones, are the province of Hopewell Brothers, who have just moved into the new factory in Newton, which they occupy in conjunction with L. C. Chase & Company's robe manufacturing department.

In the equipment of this new brick building no trouble was spared to secure the most modern tools and appliances. Electricity is used throughout, both for lighting and as motive power. One ingenious application of the electric current is found in the knives by which the fabric for the tire cases is cut according to pattern. These work vertically, being reciprocated by the little motor on top of the device; under the guiding hand of their operators they eat their way through 40 thicknesses of the heavy coated fabric as easily as a tailor cuts his cloth. The fabric comes in such lengths that five of the circular halves can be cut from each piece, and as 40 pieces are cut at once by a single movement of the knife, that means 200 halves, or 100 complete cases.

A whole battery of sewing machines is employed to sew together the halves and hem their edges with the endless coil springs in place in each hem. These springs are the feature of the Hopewell case which makes it waterproof. It will be understood that the finished case is but a single piece, without straps or flaps; it is simply a cylindrical piece of fabric with a slender coil spring on each edge tending to draw it into the annular shape of a tire. When it is wrapped around a tire, the coil springs draw the fabric down on all sides with an even tension, smoothing out all wrinkles and making their overlap waterproof.



How the Kilgore Shock Absorber Looks on a Matheson

Springs for these cases are quite an item in themselves. These are about a quarter of an inch in diameter, and of lengths suitable to the size of the tire which the case is to fit. The springs for each case weigh about half a pound, and some idea of the quantity of the output can be gained from the fact that 2,500 pounds of springs are used in a week. Half a mile of fabric is cut up in the course of a normal working day.

After the cases are finished they pass through a rigid inspection, both for finish and for dimensions. In cutting the fabric, the pattern is followed within an eighth of an inch. The case, after being sewn up, must be within a quarter of an inch of the correct circumferential length. Slight errors, of course, are taken up naturally by the springs; and besides, the dimensions of

Shawmut Tires, Both Shoes and Inner Tubes, Undergo a Rigid Inspection Before Leaving the Factory

Finishing Room of the Dover Plant, Where Spouts and Handles Are Fitted to the Buckets and Funnels

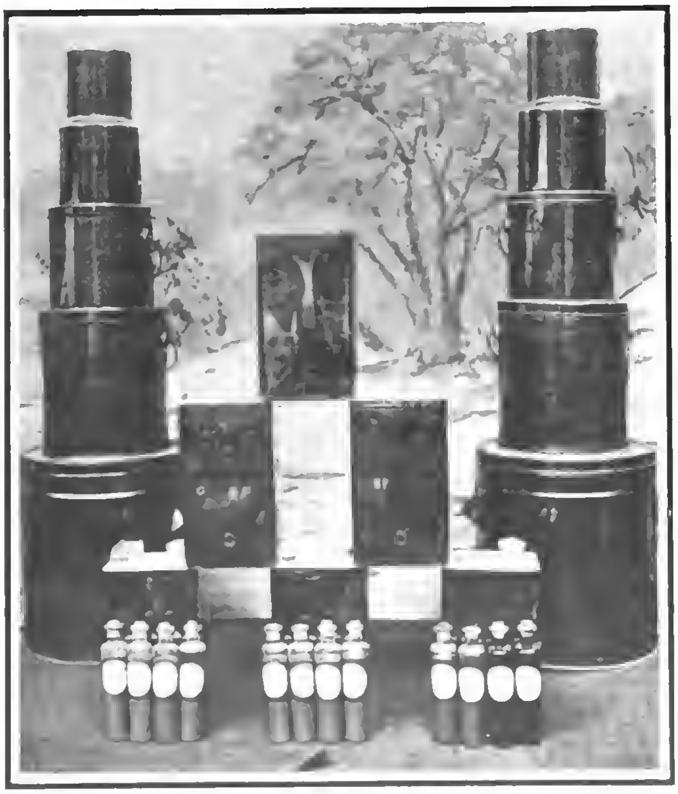
the tire cannot always be depended on for extreme accuracy. Patterns in most cases are based on the sizes of the standard rims, but many special cases are met with, especially since the vogue of the demountable rim. One of the latest products of the Hopewell factory is a cover to fit a Stepney spare rim and tire, with the clamping bolts all in place.

Business in Hopewell tire cases showed last year an increase of 250 per cent. over the year preceding, and the first two months of 1910 have yielded another 50 per cent. on the final figures for 1909. The capacity of the new factory, with its present equipment, is 50,000 cases a year, but arrangements have been made to triple this, increasing by degrees as necessary without disturbing the daily routine. For instance, the sewing machines are arranged in groups of five, mounted on a single table with an electric motor to drive them, and the groups can be moved around to suit the needs of the moment.

From tire cases it is a natural step to tires, and from the Hopewell factory in Newton it is but a short journey to the home of the Shawmut tire, in Watertown. The Shawmut Tire Company occupies a part of the enormous plant of the Hood Rubber Company, whose product is world-wide in its use. The advantages of the arrangement are obvious.

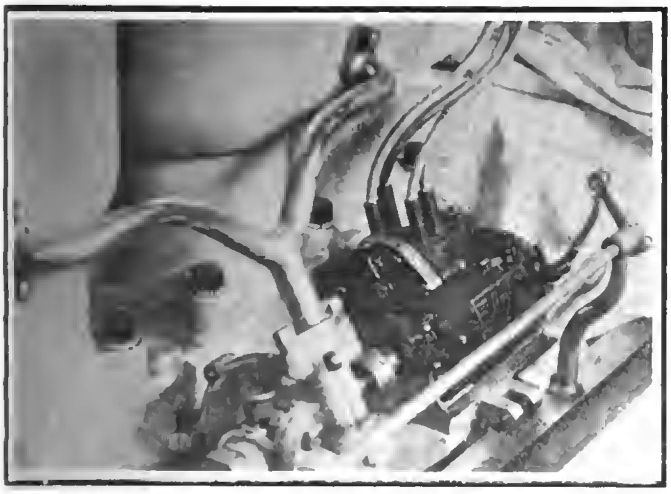
The manufacture of a tire is one of the most interesting processes in the automobile industry. The first wonder is that it is possible to make a slender bandage of a vegetable gum, inflated with air, which will support a two-ton mass of steel moving at velocities of a mile, or two miles, a minute. In the Shawmut factory each step of the process may be followed. The base on which the tire is molded is a heavy ring or core of cast iron, shaped to the proper size for the interior of the shoe. For the workman's convenience this is mounted on a hub with three adjustable spokes, which may be screwed out until they clamp it firmly. On this as a foundation the carcass is built up with successive layers of rubber and fabric, each rolled down until it becomes an integral part of those underneath.

The next step of the process is the vulcanizing. For this the carcass is put in a cast-iron mold, covering it completely, and with a number of other carcasses in similar condition is placed in an oven, carefully heated by steam to the desired temperature. This is the most lengthy process, as the heating lasts for six hours.

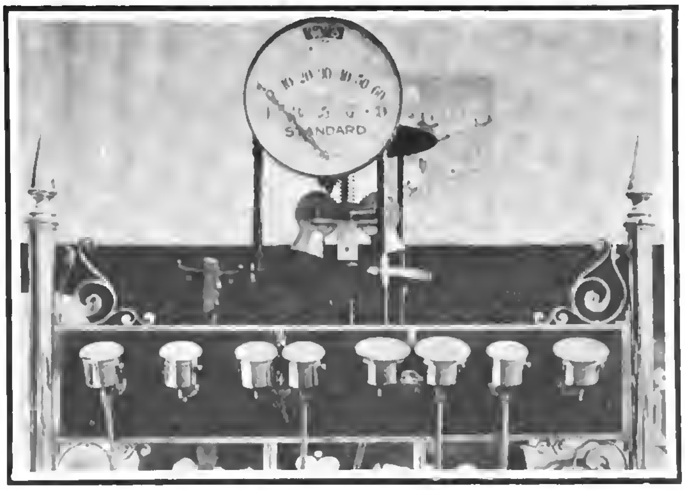


Motorol's Show Exhibit against an Artistic Background

Harris Oils Had a Comprehensive Exhibit at the Show



Mea Magneto, a New England Product, on a Parker Motor



Show Exhibit of Standard Speedometers Was Interesting

From the vulcanizing ovens the carcass is again taken to the workbench to have its tread wrapped on. This is of a grade of rubber differing greatly from that which forms the carcass; whereas the latter is compounded for resilience, the tread is compounded for toughness and wearing qualities. This tread layer applied, a second plunge into the oven gives the final cure. For this the tire, now complete, is wrapped in coarse sacking and exposed in live steam under the proper conditions of temperature and pressure. Metal molds, if used in this last operation, would be likely to burn the rubber; hence the exposure to the steam direct.

The equipment of the Shawmut plant comprises a number of ovens, of both the horizontal and the vertical types, and ranging in capacity from seven to twenty-five tires at one loading. Overhead trolleys are provided for handling, this being especially necessary for the first vulcanizing, in which the molds are used, as the weight of the molds ranges from 1,000 to 1,400 pounds.

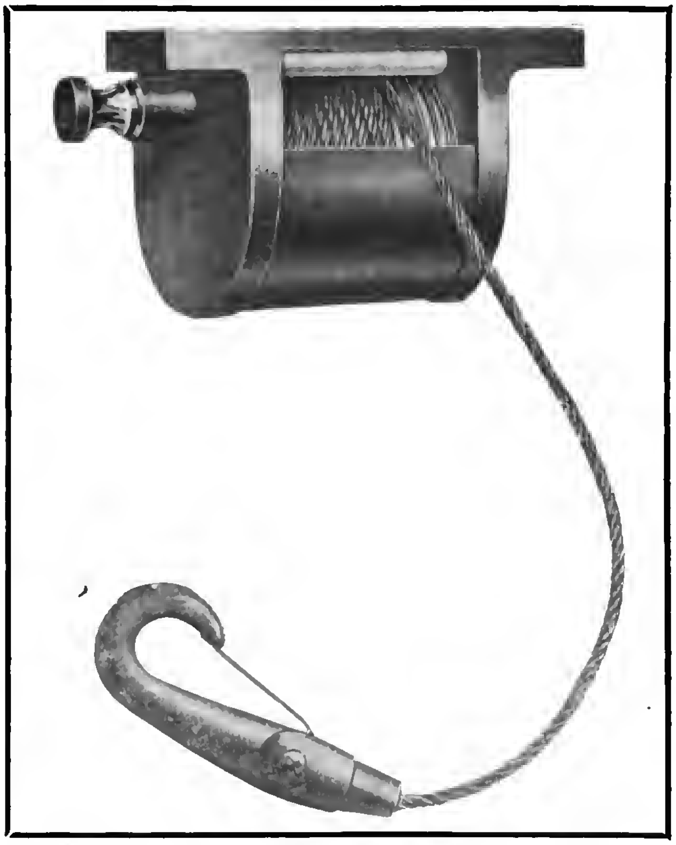
Shawmut tires are now entering upon their third season on the market. The growth of the company and the increase in the quantity of its product has been normal, though rapid. At present the capacity is 100 tires a day; although this does not entitle it to a rank among the giants of the industry, it is no small figure, as it means a total value of output of $1,000,000 a year. In addition to its separate equipment for such processes as concern tire making exclusively, the Shawmut company has all the facilities of the Hood Rubber Co. in the production of raw materials.

Within a few blocks of Harvard University, in Cambridge, Ernst Flentje has located the machine shop in which he makes the Flentje "shock preventer." His invention was the outgrowth of tests and experiments made with the idea of improving the riding qualities of his car, which he found very uncomfortable on rough roads. At the time he had no intention of putting the device on the market, but at the solicitation of friends who had ridden in his car he made and attached a number of sets. He finally undertook to manufacture them in quantities and offer them for sale, and patented the device in September, 1908.

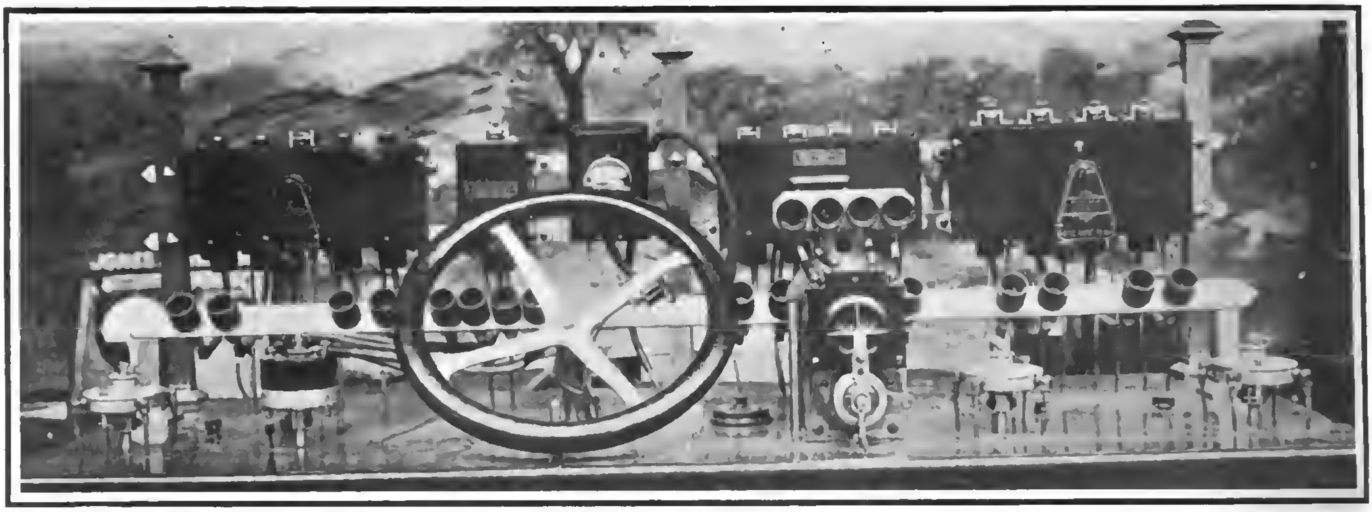
The principle on which the Flentje shock absorber works is familiar to all. It is, generally speaking, a hydraulic device; the liquid used is glycerine. A cylinder, filled with glycerine, is attached to the axle of the car, at each spring seat; in the cylinder works a piston, with suitable perforations for the passage of the glycerine from one side to the other. The piston rod is attached to the frame of the car. Both cylinder and piston rod are, of course, attached in such manner as to allow the sidewise movement due to the swaying of the car body.

Any vertical movement of the car body and frame relative to the axles must result in a movement of the piston within the cylinder, and the consequent passage of glycerine from one side

At the Show; the United Manufacturers' Varied Exhibit



Emil Grossman's Spring-Actuated Reel for Top Cables



Connecticut Electric Company, from Meriden, Conn., Had a Good Exhibit of its Ignition Appliances

of the piston to the other. As glycerine is practically non-compressible, the movement is limited by the rate of its passage through the perforations in the piston. The proper size of the perforations can be determined once for all for a given car.

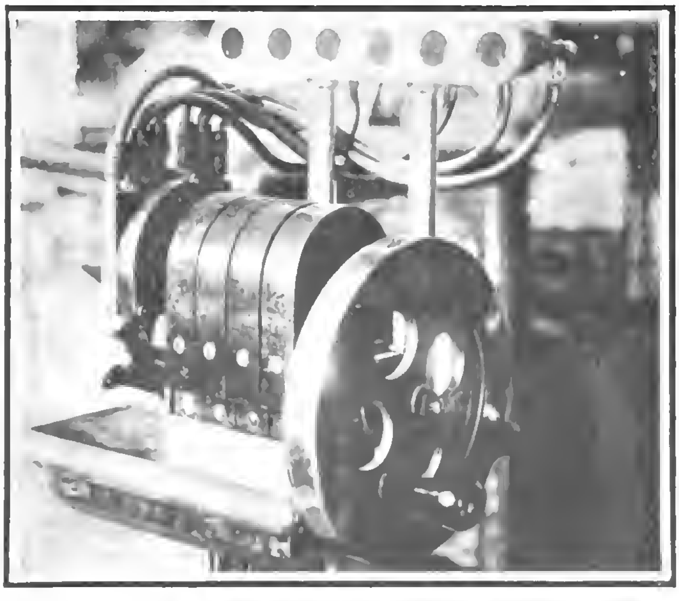
For the manufacture of these shock absorbers Mr. Flentje built a good-sized machine shop in the rear of his Cambridge residence, but the growth of the business has since forced him to have a large part of the machine work done in another Cambridge shop, where good facilities have been secured. The home shop does the lighter work, including the assembling, the insertion of the piston-pin packing, the finishing and final inspection. The construction is solid and substantial; the cylinder and end pieces are of bronze, and the piston and rods of steel.

Doctors are generally supposed not to like their own medicine; but the saying does not apply to this case. Mr. Flentje's own car, which has a record of 65,000 miles, witnesses the fact that this inventor uses his own invention and enjoys it.

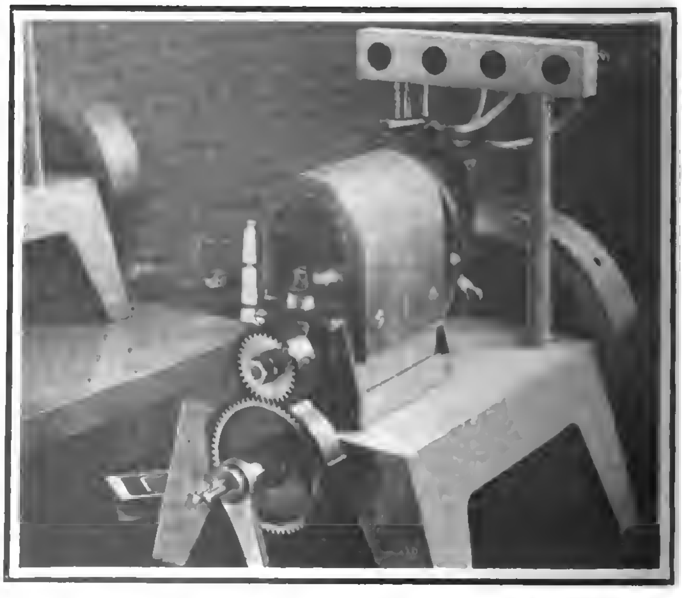
The Hoffecker Company, manufacturer of the speedometers with the "steady hand," has a commodious shop in the Motor Mart, a large building on Park square, Boston, exclusively devoted to the various industries connected with the automobile. The company has its offices and a large machine shop on the second floor, and an assembling and inspection room on the third floor. The machine shop is well equipped with the necessary drill presses and lathes; these are mostly light tools, as the work on the small speedometer parts resembles closely the operations of watch making. An exception, however, is a 6500-pound punch used for stamping out the top plates complete, with all perforations and bearing seats. This results in a great economy of labor and expense, as compared with hand work, and the finished product has the additional merit of being exactly to size and interchangeable.

The assembling department has a light and airy room, adapted to securing the best results in the way of careful and conscientious work. Micrometers are much in evidence here, showing the accuracy with which the parts are fitted. Highly skilled workmen are employed for this, and the analogy to clock-making is carried still further. When the instruments are assembled the dial is put on and calibrated by hand, each instrument separately, so that all are absolutely correct in their readings. After the case is put on and the final finishing done, another test is made before the instrument is allowed to pass to the sales department.

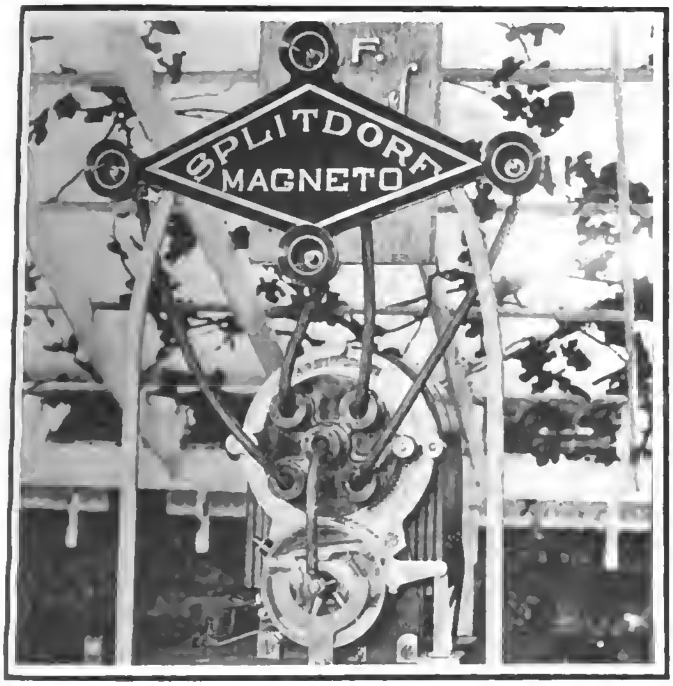
All Hoffecker speedometers operate according to the principle of centrifugal force, in the same way that the speed of a stationary steam engine is regulated. The front wheel of the car, through a flexible shaft, drives the "expander," a miniature ball-type governor. The indicating hand is absolutely controlled by this governor, which is built on correst principles, perfectly balanced and running on ball bearings. The special feature of the Hoffecker, however, which is covered by exclusive patents, is the lever connection between the governor and the indicating



Eisemann Magneto Exhibit for Hand-Power Demonstration



Bosch Exhibit Was Interesting to All Who Passed By



Ingenious Working Exhibit of the Splitdorf Magneto

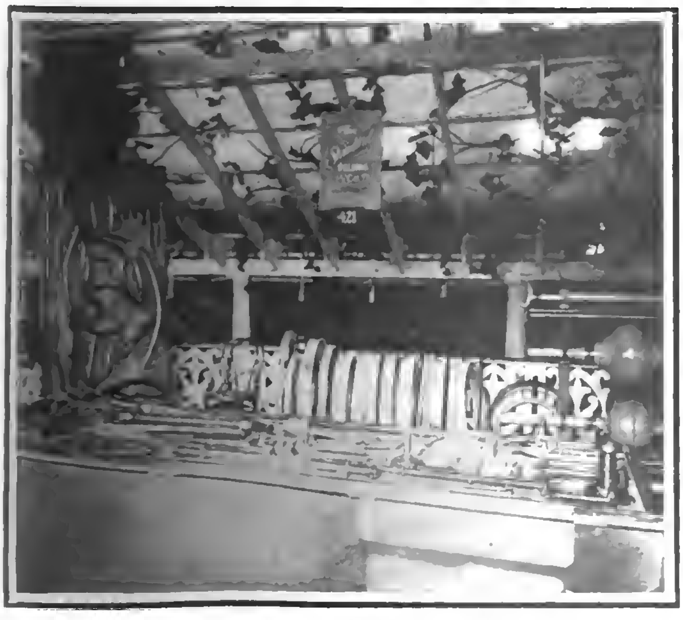
Pyramid of Hoffecker Speedometers of the "Steady Hand"

hand. The connection is controlled and interrupted by these levers in such a manner as to prevent the vacillation of the hand from any cause other than an actual change in the speed.

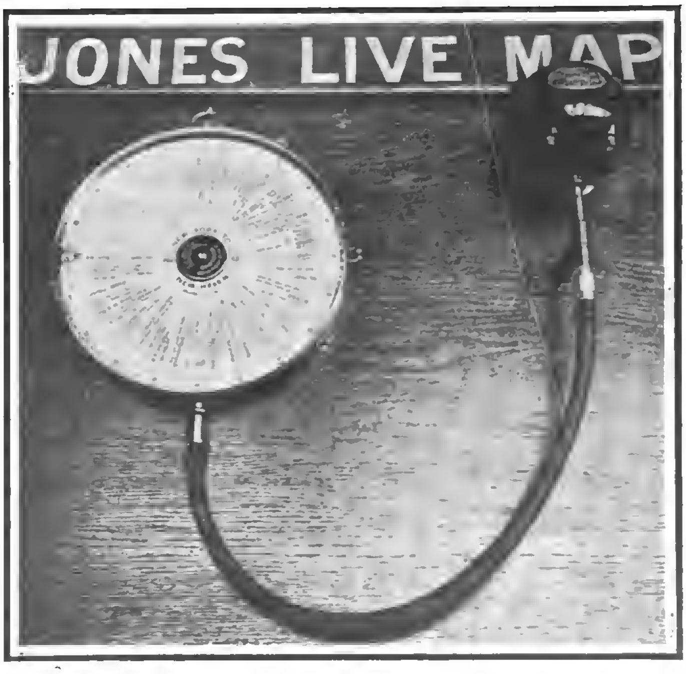
Hoffecker speedometers have a distinctive appearance, being cylindrical in shape and set with the dial end up, the fixture attaching them to the dashboard being arranged so as to give them an angle convenient for reading from the seat. The flexible shaft is connected through bevel gears at one side. The dial has another distinctive feature, in that the odometer trip mileage is indicated by a hand moving over a circular scale, concentric with the speedometer scale.

Another shop located in Boston proper, the product of which is familiar to most automobilists, is that of the Kilgore Mfg. Co., at 9 George street. Here the Kilgore pneumatic shock absorbers are made. A complete equipment of machine tools permits the manufacture of all the parts entering into this device. The materials used are Government specification bronze, for the cylinder and piston; cold-drawn seamless brass tubing, for the outer shell or mud shield, and tool steel castings for the brackets and clamps.

The operation of the Kilgore device depends on the elasticity of the air with which the cylinder is filled. The cylinder, to start with, is attached to the axle, and the piston to the frame of the car. The piston is solid, without holes opening from one side to the other. Were this all, a progressively increasing resistance would be secured to any movement of the spring in either direction. But such a resistance is not desired; what is really wanted is to leave the spring movement free for a considerable distance up and down, before the resistance is added. For this purpose a by-pass passage is provided in the cylinder wall which allows the air to move from one side to the other with considerable freedom when the piston is near the center of the cylinder; but a further movement of the piston covers up the opening, and the air thus entrapped between the piston and the upper or lower cylinder head, as the case may be, is compressed until the movement is checked. The by-pass is adjustable for area, and as it is quite small in proportion to the cylinder area, a considerable resistance is still interposed to any



Standard Welding Company Showed Axle Casings and Rims



Jones "Live-Map" Was a Drawing Card, As Often Before

Lancia Steering Wheel showing a rotary star shaped member concentric with one of the arms adjacent to the rim by means of which the mixture is adjusted to suit the requirements—ignition is fixed and requires no controlling lever

too rapid movement of the piston, even when near the center. A very good feature of the Kilgore is the double protection afforded against dust. The piston rod, besides being provided with the usual packing, is enclosed in a flexible leather boot, like that used on the drive shaft universal joints; and outside of this is a light brass shell which slides over the outside of the cylinder, and is provided with another packing ring.

Above the machine shop floor of the Kilgore factory are the assembling room and stock room. The shock absorbers are made in three sizes, the 2½-inch (cylinder diameter) for cars weighing not over 2,000 pounds; the 3-inch for cars weighing up to 3,000, and the 3½-inch, for very heavy cars. Thus a considerable number of parts must be kept in stock. The company had a very handsome exhibit at the Boston show, the feature of which was a stand hung with the different sizes of shock absorbers in polished brass, against a background of maroon.

For some unknown reason no dry-cell factory had been established in New England until the Universal Carbon Company brought out the "Diamo" brand, and built its factory at Ashland. This new plant has 120,000 square feet of floor space, and a modern equipment of machinery. Contrary to the usual practice, which calls for a large amount of hand work, the "Diamo" cells are made almost entirely by machinery, this being necessarily of several special designs. In this way uniformity and reliability are guaranteed.

Great care is taken to secure the best of material for the cells, and careful analysis is made of all, to secure them as nearly as practicable chemically pure. One test made quite recently by the Massachusetts Institute of Technology on the carbon used revealed that it was practically pure carbon; on ignition it left a residue of 0.10 per cent, consisting of silicia and traces of iron. In other words, the carbon was 99.9 per cent pure.

Casgrain speedometers, another distinctively New England product, have their inception in the factory of the Couch & Seeley Company, at 10 Thacher street, within a few blocks of the North Station in downtown Boston. Much stress is laid on the length of the scale of these speedometers, being no less than 28 inches, and on the fact that there is an individual number on the scale for each successive mile per hour, from 1 to 65. The instruments are calibrated and the numbers applied by hand, and the calibrating stand is a most interesting feature.

An electric motor drives through friction wheels a shaft which in turn drives six speedometers. The friction wheels are similar in arrangement to those used for changing the gear ratio on several well known makes of automobiles; one large face wheel is on the motor shaft, and a smaller wheel is mounted on the side shaft with its periphery against the face of the other, in such a manner that it may be slid back and forth to vary the speed of the side shaft. Of the six speedometers driven from the side shaft one is the master instrument, calibrated originally from a tachometer.

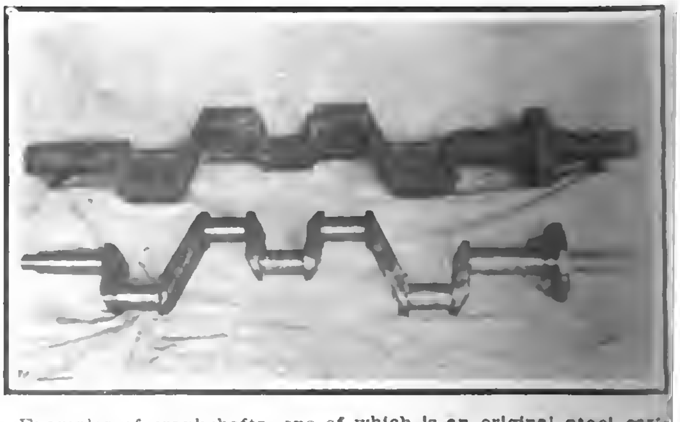
Given this equipment, the process of calibrating becomes very simple. The man in charge adjusts the driven friction wheel to a position quite near the center of the driver, to give a low rate of speed, until the master instrument reads one mile an hour. All the other speedometers are then turning at exactly the same speed, and the figure 1 is affixed to their scales at the spot indicated by the pointers of the instrument. Then the driven friction wheel is moved out a little further until the master speedometer reads two miles an hour, and the figure 2 is affixed to the scales of the other five. The process is continued for every figure up to 65, which is as high as the standard Casgrain reads. The figures are about ⅜-inch high.

Naturally it is a matter of interest how the makers of the Casgrain are able to obtain room for such a scale on an instrument of any reasonable dimensions. The answer is that the figures are placed spirally around a cylinder, which moves to correspond with the speed and brings the figures in succession before a window in the outer case of the instrument. The row of figures encircles the cylinder four times, and a brief calculation will show that the diameter of the cylinder itself, for a 28-inch scale, need be only a little over 2 inches.

The cylinder bearing the figures is rotated by liquid friction. Inside of it turns a shaft with paddle wheels, which carry along with them the liquid with which the case is filled. The cylinder has no direct mechanical connection with the shaft or paddles, but is turned by the friction of the liquid against its inner surface, against the tension of a spring. The force exerted by the friction is of course proportional to the speed of the inner shaft, which is driven by the usual connection with the front wheels. The design is such that there is not the slightest possibility of any of the liquid leaking out or evaporating.

Oil guns, grease guns and gasoline tank gauges, in addition to the "Jericho" horn, come from the Randall-Faichney Company's factory at 251 Causeway street. The latter differs from most exhaust horns in that it is always attached to the rear of the muffler, on the end of the exhaust outlet, and so its application does not require cutting the pipe. The horns simply clamps on, and ordinarily does not obstruct the free passage of the exhaust gases. When a hay wagon obstructs the road, however, the driver simply presses a pedal, which closes up the main outlet and diverts the gas through the horn, with effective results.

Another Randall-Faichney product is the "Webster" gauge, a float-operated device. The float is attached to a horizontal shaft, which turns the vertical indicating shaft by means of a



Examples of crankshafts, one of which is an original steel casting, the other being a finished crankshaft. This illustration is offered to indicate the advances which are being made in steel casting work, although there must be a speculative condition crown gear and pinion. The gauge is attached without soldering, and may be done without emptying the gasoline from the tank. The line of "B-rail" oil guns is too well known for comment.

The "Monarch" shock absorber depends for its absorbing and checking action on the pressure of a heavy coil spring against a cam which is rotated by any movement of the car frame relative to the axle. The cam is mounted on the frame, and is connected to the axle by a crank and connecting rod. A hardened steel plunger, backed by the coil spring, bears against the face of the cam. On that part of its face which the plunger bears against when the springs are in normal action, the cam is perfectly round, and so no resistance is offered to any movement of the springs a slight distance either side of center. A continued movement, however, brings the cam into action on the coil spring.

When the springs are in normal condition, the crank is horizontal, and so the axle has the greater leverage against the spring; but as the car moves up or down, its leverage decreases, until finally, in the case of a very violent shock, the crank is on dead center, and so brings the spring movement to an absolute stop. It is claimed to be impossible to break any spring fitted with this shock absorber. Charles M. Green, at 1036 Old South Building, Boston, acts as general distributor.

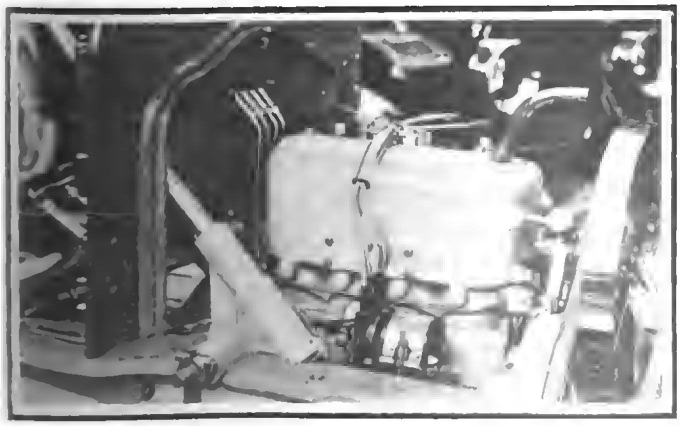
A gasoline tank gauge which works by magnetism is made by the Boston Auto Gage Company, at 8 Waltham street, under the trade name of the "Triumph." The noteworthy feature is the absence of any opening between the inside and outside part of the gauge. There is a vertical brass tube inside the tank, with a metal float inside which works in a spiral slot in such manner that it must revolve as it moves up and down with the varying level of the fuel. The indicating part of the gauge is entirely separate. Magnetism makes the connection between the two. If the glass over the indicating hand and scale should be broken, there still could be no escape of gasoline or air pressure.

White foot pedals showing the means of adjustment whereby the operator is enabled to lengthen the pedal stems to suit his own individual requirements; also the accelerator pedal and the connections of the Bosch dual ignition system

Some Features the Camera Caught at Boston

NOVELTIES at Boston were no fewer or less important than at the New York shows. New England is well recognized as the home of inventors, and new ideas keep cropping up there quite frequently. What was perhaps the most important new development was not a product of New, but of Old England.

After several years' absence from the American market, the Napiers made famous by S. F. Edge, the world's champion publicity man, bowed anew to the Boston enthusiasts. The famous English firm is now represented in Boston, for the United States, by British Napier Motors, Inc., at 47 Union avenue, Jamaica Plain. These cars were the first to adopt the six-cylinder motor, but after using this type exclusively for a time, found it necessary to bring out two- and four-cylinder models in order to cover the whole field. The Napier line now consists of a 10-horsepower, two-cylinder, a 15-horsepower, four-cylinder, and six-cylinder cars of 30, 45, 60, and 65 horsepower.



White Steamer showing the right side of the motor of the block type, nesting of the magneto, adjustable fan bearings, and the location of the steering gear housing with the arm passing above the chassis frame

The two- and four-cylinder cars are especially adapted for town work. They have the unit form of construction, the gear case surrounding the clutch and bolting to the rear end of the crankcase. The flywheel is placed in front. Cylinders are cast in pairs, with all valves on the left side. The distinctive Napier hood and radiator, the latter with its long tubular filling cap, are found on these small cars as well as on the sixes.

The 15-horsepower model finds extensive use in London as a taxicab, being found very satisfactory and economical in this service. This chassis, as well as the two-cylinder, also makes a good light delivery wagon.

A prominent feature, and one which quickly caught the eye of the visitor as he entered the show, was the new Herring-Burgess aeroplane hanging from the ceiling. This air-craft is the design of A. M. Herring, formerly the partner of Glenn Curtiss, and was built by W. Starling Burgess, the yacht-builder of Marblehead, Mass. In its detail it shows the effect of the mariner's training and instinct, being far superior to the majority of aeroplanes. This aeroplane also has the distinction of being the first to fly in New England.

This flight was made at Hamilton, February 28. It was regarded as of great importance because it constituted the first trial of Mr. Herring's device for insuring automatic stability. The start was not attempted until late in the afternoon, owing to the rain and wind. About 5 o'clock, after a short preliminary run of about 90 feet, equaling the world's record in this respect, the 'plane shot into the air. After rising to a height of 40 feet and turning through an arc of about 45 degrees, Mr. Herring, who was acting as aviator, shut off the power, and the machine glided gracefully to the ground, after covering a distance of about 120 yards.

Mr. Herring said that he was more than pleased with the result, not having intended to go so far on his first trip. When he once got into the air, however, he found it so easy that he kept on going up.

Stearns presenting details of the anchorage of the torsion tube to the cross member, presenting a large spherical bearing, universal action and the method of spanning the universal joint, which results in double bearings symmetrically disposed

The machine is a biplane, and is fitted with a Herring-Curtiss four-cylinder motor of 25 horsepower, with a four-bladed propeller on the rear end of the crankshaft. The automatic stability device consists of a number of small triangular surfaces like leg-o'-mutton sails, extending vertically from the upper plane. When the machine tips to either side these exert a righting effect. Each of them has a surface of about two square feet, and they are six in number, four being placed close together over the middle panel of the machine, and the other two about half way out to either end. The machine is mounted on three skids, one long one under the middle and two short spurs, one on each side.

Morse Car the Newcomer

The list of exhibitors promised two new cars, one of which was to be the Anderson, but through some inadvertence it failed to develop on time, and section No. 133 was pretty well filled up with Kline Kars instead. The Morse car, however, which is made by the Easton Machine Company, South Easton, Mass., was in place, and is attracting a wide amount of discriminating attention which cannot be explained away on the ground that the car is new. The photograph of this car, which will be found among the especially noted features of the show, presents a chassis in the foreground, which has all the earmarks of satisfying quality. A glance at the chassis will show an I-section front axle, which curves downwards sufficiently to afford clearance, but the shape is such that strains do not accumulate at points of divergence. The front of the radiator presents a graceful appearance, and cooling is due to the use of this radiator, which is the honeycomb type, and a centrifugal type of relatively great capacity, which is securely bolted into place, is driven by a safety dog, and has a packed gland. The motor is of the 4-cylinder, water-cooled type with valves in the head, individual cylinder castings, flanged and bolted to a crankcase, which is of cast aluminum with four integral arms, and the dust protecting flange system all arranged to support the motor between the side bars of the chassis frame. The oil sump in the bottom half of the crankcase is flanged thereto, and by unbolting this bottom half, it is possible to inspect and clean the oiling system, also to take up on bearings, and if the occasion requires, the pistons and connecting rods may be removed, repaired and replaced. The Stromberg carbureter is fastened to an intake manifold which is noted for its perfectly symmetrical T shape, and is so sized that popping in the carburetor and other troublesome performances are eliminated. Ignition involves the use of

The Morse exhibit presenting a chassis in the foreground, flanked by a "gunboat" type of body to the right, and a conventional form of touring car in the background. The stand was well arranged to set forth the merits of the car

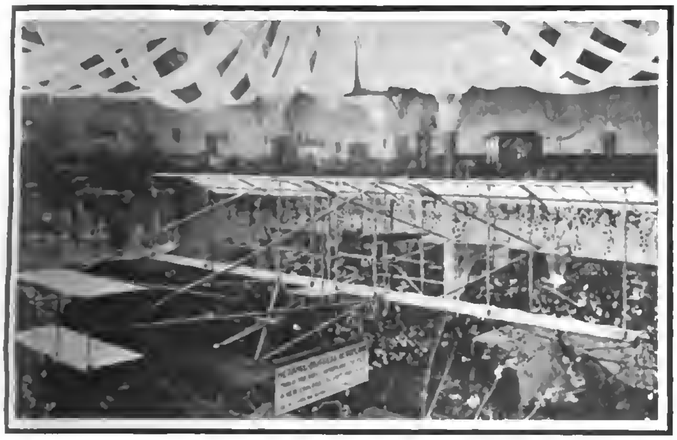
an Eisemann dual system, which, of course, includes a magneto and means whereby the ignition functions will be maintained even though the magneto may become deranged.

The crankshaft is of Krupp chrome nickel steel, forged under the hammer to give it its rough shape, and is then heat treated at the works of the Krupp Company at Essen, Germany, after which it is finished to exact size, which involves final grinding. The character of the material used in the crankshaft is reflected throughout the car. The clutch is of the multiple disc type, comprises 9 saw steel discs which are submerged in oil, and present 800 square inches of surface. A coil spring exerts the requisite pressure, and the foot pedal offers a lever advantage in the ratio of 6 to 1, so that disengagement is as easy as engagement is positive. A means for adjustment is provided, and a double universal joint counteracts torque inequalities, so that the clutch offers the advantage of utility and low maintenance.

The transmission is of the selective sliding gear type, with four speeds forward and one reverse. Three speeds ahead is on direct drive, through internal and external gear combinations, while the fourth speed is geared up so that on the fourth speed, the main shaft in transmission revolves faster than the crankshaft. Hess-Bright ball bearings are used throughout and all members including gears, pinions and shaft are made of heat-treated Krupp chrome nickel steel.

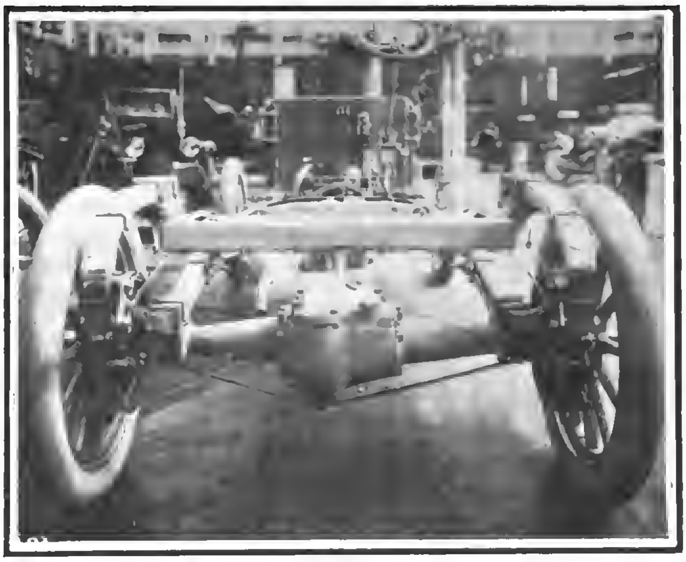
The steering gear is of the worm and sector type with a "Morse" cut. Every means is provided for adjustment, thrust ball bearings take the strains, and the housing is grease tight, with a means for feeding in grease as the occasion requires. The character of the workmanship throughout is consistent with the importance and nature of the service to be performed.

Rear view of the 15-30 Stearns, showing the kickup frame, substantial laterals at the rear, and a view of the live rear axle which permits the nesting of the differential gear, bevel drive, and transmission system within the branches of a special I-section axle



Herring-Burgess aeroplane, which was the first to fly in New England and is here presented as representing one of the fields of endeavor which was rendered possible by the perfection of the internal combustion type of motor for automobile work

The motor is rated at 24 horsepower, has a bore of 4 5/8 inches and a stroke of 5 inches. It is claimed that the power is actually realized at 800 revolutions per minute. The chassis frame is of the channel section, and in touring cars is 155 inches long. In the runabout type, however, it is reduced to 140 inches. The frame is so suspended with full elliptic rear springs, and half elliptic front springs, that it is 25 inches from the frame to the ground in front, and 27 1/2 inches between the same points at the rear. The wheels are 36 by 4 1/2 inches front and rear, with Goodrich tires on the touring car, and 36 by 4 inch all around, same make of tires, on the runabout. The live rear axle has a bevel reduction in the ratio of 14 to 47. The brakes are in 16 inch drums, with 2 1/4 inch shoe faces attached to the rear wheels, excepting the emergency brake which has an 11 inch drum located on the differential shaft. There are many other excellent features to be noted on this car, but they come as details, which are only to be expected, in view of the description already rendered, and will best find a place when the car is being written up.



White car showing the live rear axle with its bell shaped housing, smooth exterior, and method of bracing, also a spring perches double system of U bolts, three-quarter elliptic rear springs, and the method by which the springs are anchored to the chassis frame

The Morse line includes the standard type of touring car, and equipment, at $4,000, the runabout type at $3,900, and the chassis with a priming coat at $3,600, with options as to bodies.

RELATIONS OF PARTS MAKERS AND BUILDERS

By ALFRED REEVES, General Manager, Association of Licensed Automobile Manufacturers

THE already astonishing number of parts and accessory manufacturers who have been for some years co-operating in the production of motor cars is being added to at a remarkable rate. This is, of course, largely due to the reports that automobile builders cannot secure enough parts to make the output they have planned. Many old companies, notably those in the carriage trade, are making the change and becoming constitutent elements of the dominating motor industry. It is obvious that the closer these newcomers stick to their line of experience, the better co-ordinate units they will become in the industry.

I want to emphasize the point that the accessory and parts makers should put quality before everything else. There is nothing more important than quality, unless it be design. Poorly designed or made parts can have only the effect of discrediting their immediate producers, as well as the motor car makers who use them. The increasing importance of the interrelation between the parts makers and the car builders is a subject that can be profitably dwelt upon by anyone really interested in the industry. I have been gratified recently to note that parts makers are not only showing a tendency to stick to that line of manufacture in which they have had qualifying experience, but also instead of forcing production and taking orders beyond the point of possible delivery, disappointing everybody all along the line, are looking into credits and conditions carefully and acting conservatively generally; which action is viewed with marked approbation by automobile manufacturers. Nothing less than this is adequate in the proper and sound upbuilding of the industry, and, of course,, the conservation for all time begins with the steps taken in the upbuilding.

Alco, depicting the live rear axle, universal joint, pressed steel radius member, kickup chassis frame, half elliptic springs, and a commodious gasoline tank which is cut away to afford space for the enlargement of the axle to play in

Competition in the parts business must more or less soon become normal with profits reduced accordingly, success thereafter keeping step with inherent manufacturing and selling ability.

The modern automobile represents one of the highest achievements of mechanical engineering. No other industry probably has contributed so much to the development and refinement of machine tools, new, quick and accurate manufacturing methods, and of materials possessing enormous strength and properties undreamed of heretofore. Each and every part has been the constant subject of long and accurate tests and study, to bring about simplicity, strength and lightness, through proper distribution of material, according to mechanical laws.

This refinement is always going on, and no detail, however trifling, is overlooked in this steady march toward perfection. This is an index of the real task before the accesory and parts manufacturer, as well as the car builder; and indicates cl the field in which the manufacturers of merit will su

Exhibit of White Company

Broc Electric a newcomer

Elmore, Mitchell, Regal, Franklin-Overland occupied the center of Cleveland Show

CLEVELAND, Mar. 7—The Cleveland Automobile Club's show, the second for the city, opened Saturday night, and is generally conceded to have surpassed anything previously held here. Forty dealers are exhibiting cars, the total of makes represented being about seventy, and of complete cars there are over 160. So great was the demand for space that some of the exhibitors of automobiles were forced into the balcony, which has never been necessary before. The unfortunates number six. They console themselves, however, by the crowds which still penetrate to their stands.

A large crowd was waiting to enter the show when Mayor Baehr touched the button which turned on the illumination Saturday evening, and by 9 o'clock the big hall was filled to overflowing. The neatness and simplicity of the decorations excel anything yet seen in Cleveland. They are principally in white. The ceilings are concealed by five thousand yards of duck, and the walls and staircases are draped with bunting.

The balcony railing has been transformed into a solid bulwark of plaster of paris, ornamented at regular intervals with massive shields bearing each a lion's head and an automobile. The "automobile girl," the emblem of the show, stands in the very center of the hall on a high pedestal, resplendent with electric lights. From one end of the armory to the other strings of electric lights connect rows of Corinthian columns, all brilliantly illuminated. Suspended from the roof beams overhead are three clusters of lights, representing automobile wheels.

A prize of $100 has been offered for whoever recognizes the "Girl at the Wheel," after whom the central statue was modeled. The lady in question is said to be a prominent East End automobilist, and visits the show every evening, although not in the automobile costume in which she posed for the artist.

As in the earlier show, an extra aisle has been provided straight through the center of the hall. This arrangement has proved very useful in avoiding congestion, which otherwise

Sebring Another New One at Cleveland

Gunboat on Cadillac Chassis

Another View of Cleveland Shows Main Floor, Showing Beautiful Columns

would be extreme. Through this extra aisle the visitors were enabled to view the cars more quickly and so give the balconies a larger share of their attention.

Four companies which exhibited their cars in the earlier show also have spaces in the present one. They are the F. B. Stearns Company, the Studebaker Automobile Company, the White Company and Applebaum Brothers, who show the Detroit electric. The White Company did not decide to come in until the middle of the week and so had difficulty in securing place. When George Collister, the manager of the show, found that it was impossible to accommodate it otherwise, he asked some of the large exhibitors to spare a part of their allotments. This the C. B. Shanks Company did, and as a result the White Company has room to show two cars. The complete list of car exhibitors follows:

The Rambler Automobile Company, Rambler; the Babcock Electric Garage and Sales Company, Babcock electric; the Weddell House Garage, Inter-State and Holsman; the Studebaker Automobile Company, Studebaker; the Brandt Motor Car Company, Kissel-Kar; the Broc Carriage and Wagon Company, Broc electric; the Olds-Oakland Company, Oldsmobile and Oakland; the Maxwell-Briscoe Cleveland Company, Maxwell; the Charles B. Shanks Company, Chalmers and Hudson; the Cook Motor Sales Company, Premier and Reo; the Garford Motor Truck Company, Garford truck; the Sebring Motor Car Company, Sebring, O., Sebring; the Crest Motor Car Company, Paige-Detroit, Abbott-Detroit and Warren-Detroit; the Auto Shop Company, Thomas; the Western Reserve Motor Car Company, Pierce-Arrow, Apperson, Woods electric, Everitt and Hewitt truck; the Auto Sales Company, Velie and Hupmobile; the Euclid Auto Company, Firestone-Columbus, Columbus electric and Atlas; the Crawford Motor Company, Jackson, Fuller, Rider-Lewis and Stearns; the Buick Motor Company, Buick, Welch and Welch-Detroit; the Park Motor Car Company, Speedwell; H. S. White & Company, Pierce-Racine; the Overland Motor Car Company, Overland and Marion; the Regal Motor Sales Company, Regal; the Barger Automobile Company, Cadillac; Applebaum Brothers, Detroit electric; the White Company, White gasoline and steam; the H. H. Franklin Mfg. Company, Syracuse, N. Y., Franklin; the Mitchell Brothers Company, Ohio; the Elmore Motor Car Company, Elmore; J. H. Greenwald, Marmon and Moon; the Wentworth Motor Car Company, Mora; the V. R. Hall Auto Company, Cartercar and Plymouth truck; Lucas & Christenson, Mitchell; the Pullman Motor Car Company, Pullman; the Forest City Motor Car Company, Jewel; the Gabriel Carriage and Wagon Company, Gabriel, Krit and I. H. C.; Haynes Auto Agency, Haynes, and the Black Mfg. Company, Black-Crow.

The New York State Capital Made Its First Show as Impressive as Though It Were a Veteran at the Work

ALBANY, N. Y., Mar. 7—To make the first show ever held of such magnificence and attractiveness as to preemptorially challenge all others to the right of occupying first place in prominence is a big contract for any aggregation of men but such contract has been more than filled by the Albany dealers association in conjunction with the officers and men of the Tenth Regiment National Guard of New York located in Albany.

Buffalo, Rochester, Binghamton and New York City all had shows far in advance of all previous ones. They were all good and fine to look upon. But not one of them except Madison Square Garden presented anything like the spectacle that did this first Albany show. Of course both Buffalo and Rochester were bigger local shows but what Albany lacks in number of exhibitors she makes up in unobstructed floor space and harmonious decorative features.

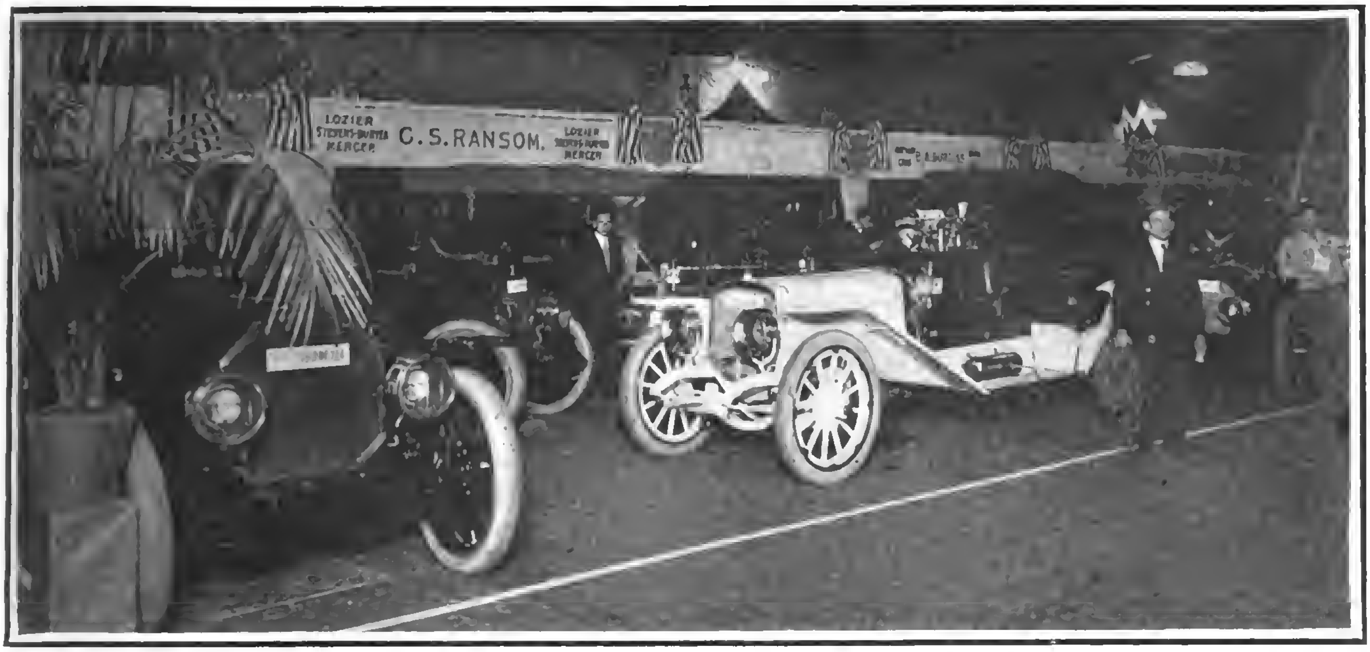
There are 35 exhibitors—all but six on the main floor. These 35 show 121 completed cars in addition to a long list of motors, chassis and accessories.

The armory in which the shows is being held, lacks but a few feet of being as large in floor area as is Madison Square Garden, that is, the main floor. This being true some idea may be gleaned of the splendid facilities for showing off all the cars. A vast crowd is almost lost among the exhibits.

The color scheme is as daring as it is beautiful. The dome and center ceiling is resplendent with national colors and flags. The side walls and balcony walls, to be found only at one end, are wrapped and artistically draped in a silken bunting of pale pink and white in wide strips. The idea of pink with the red of the national colors would seem to indicate a jarring effect but so skillfully has the work been done that this is far from true. Then, too, an abundance of stately palms and green ferns about the floors and suspended from the walls helps to harmonize the picture within itself. Suspended baskets of roses and other flowers illuminated by hidden electric lights added much to the general design. Down the center of the long drill hall is a partition or lattice work also wrapped and draped in white with big national shields separating the signs of the exhibitors. A profusion of palms and flowers furnishes the finishing touch.

The show is novel in several respects. The styles and designs of the cars are fine. They are more representative of the wide choice of the manufacturers than is usually to be found at a local show. Illustratively it should be noted that there are

Albany Tenth Regiment Armory Has Within a Few Feet of the Same Floor Area as Madison Square Garden



Comprehensive Exhibit of a Local Dealer, Including the Lozier, Stevens-Duryea and Mercer Cars

some seven or eight gunboat bodies, a lot of the ultra sporty runabouts, all in addition to a splendid showing of the standard designs. A glance at the list of exhibitors will also show that the very finest of American manufacture are to be seen here. Commercial wagons are also in evidence with five different makes shown on the floor.

Probably one of the most attractive exhibits is that of the Maxwell-Briscoe-Albany Company, showing seven Maxwells and two new Columbias. In addition to this line, which is the largest of any one make at the show, Manager Hadley has secured most of the Maxwell trophies and cups. These make a mighty showy case in the front of his space and are the center of considerable attraction.

Announcement was made at this booth that W. A. Hamilton, secretary-treasurer of the company, had recently been appointed manager of the Columbia department since it has been taken over by the United States Motor Company.

The Eureka Motor Car Company is newly organized by Charles A. Stiert and it is showing for the first time at any of the local shows in the State, the new Cutting car. It seems to have made a very favorable impression judging from reports.

The Buick exhibit which is also large in numbers is showing the Welch line, seldom seen at local shows.

A. J. Gervais, one of the late exhibitors, is showing "Brighten Up," a new non-acid, non-grease metal polish manufactured by S. C. Clapper & Co., at Nassau, New York.

The Walker non-skidding chain is also a newcomer in the field of accessories. The chain is said to prevent side skidding as well as slipping and spinning. The skid links are fastened at intervals in the center of the tire to a ring of the same metal as the chain and on the face look like really effective non-skids.

The management of this show is also varying from custom in that there will be no double admission society night. Upon Thursday night, however, a military night is planned, at which the brigadier-general and his staff will appear as a body.

It was expected that the governor might appear for the opening night but he did not and is looked for later in the week.

(Continued on page 527)

Another General View, Showing the Spacious Main Floor and the Galleries for the Accessories

Parisian Fashions for Fair Autoists

By Mrs. A. Sherman Hitchcock

"Charlotte Corday" Bonnet

Hood and Mackintosh

Hat and Loose Coat.

Mushroom Hat.

Turban of Feathers

AUTOMOBILE shows, which are held annually, arouse a wonderful amount of enthusiasm among the women motorists. They turn out in full force to view the new cars on exhibition, and their interest in motor matters is apparently as keen as that of their male escorts. In fact, the women who do not go to the show miss a good deal, and are counted out of the game by the women who do go. Many of the society leaders set the motor styles which the feminine portion of the world at large will follow, and many new motor fashions can be observed. Some of these motorists who have recently returned from abroad have brought back with them the very latest idea in motor garb from Paris, and their new coats, hats and veils bear the earmarks of the true Parisian.

Whenever two or three, or even more, of the fair sex are gathered together the motor car and the dress appropriate to the motor car are the chief topics of conversation. Motoring is now the leading sport for the up-to-date woman, and appropriate garb must be provided. There is now to be seen an enticing array of luxurious coats, coquettish hoods, becoming hats and attractive scarfs and veils which are built exclusively for motoring, and the woman who cannot make herself both comfortable and attractive in her motor togs has really to blame herself.

The fashionable motor coat is long and loose, and comes almost, if not entirely, to the hem of the gown. The heavy fur coats do duty when upon the road and are indispensable for the coldest weather. The leather coats are also garments of utility, but the cloth coats are most conspicuous for present wear, as well as the plaids and checks in the English blanket cloths and Scotch tweeds. The homespuns and meltons prevail with the best dressed women. The long, loosely fitting coats of breitschwanz are seen to a great extent, and will continue to be worn until really warm weather is at hand. The coat should have deep, roomy pockets and sleeves that come well down over the hand, and it should be cut in double-breasted fashion, with buttons all the way from the throat to the bottom of the skirt.

Fur-lined coats are usually made of broadcloth, melton or tweed, and have a big storm collar of a handsomer and more expensive pelt than is used for the lining. For driving or rainy days—and every true motor enthusiast defies the weather—there are long coats of gutta percha which have a high stand-up and turn-down collar and absolutely no opening. The coat stretches over the head and leaves one snug and dry, with absolute scorn for the falling rain. To accompany this coat is a very becoming little hood of waterproof silk, and with a rainproof chiffon veil the motor woman has no fear of the elements.

A very practical thing to be included in the motorist's wardrobe is the petticoat of thin kid. It is made of soft, pliable leather, and fits the figure closely. Capes of heavy Scotch goods are greatly in vogue. A popular conception is the long, circular cape, like the picturesque affairs worn by the Italian army officer, modified for feminine usage. Kid waistcoats are long, reaching as low as the knees; they are supplied with large collars and trimmed with buttons. Those of bright cherry red kid are very chic; others are dyed to match with the costume.

General View of Auto Show at Denver Auditorium.

William D. Nash,
President Denver Motor Club.

Exhibit of Louis I. Sanford, Agent for Croxton-Keeton Cars

Exhibit of Mathewson Auto Co. at Denver Auto Show.

C. P. Allen,
Treasurer of the Denver Motor Club.

Dr. J. Nicoll Vroom,
Vice-President of the Denver Motor Club.

E. C. Healy,
Secretary of the Denver Motor Club.

Exhibit of Johnson Motor Sales Co. Agents for Peerless, Premier, Fal Car, and Everett at the Show in the Denver Auditorium.

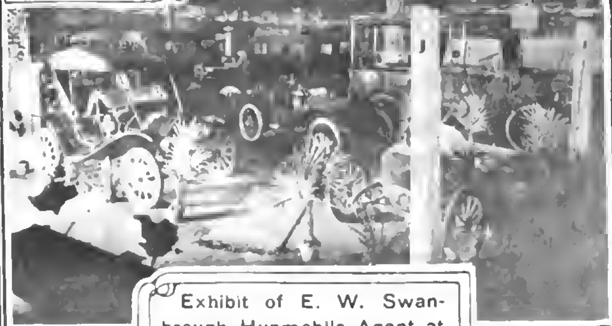


Exhibit of E. W. Swanbrough, Hupmobile Agent at Denver Show in Auditorium.

MOUNTAIN SHOW SUCCESSFUL

UNDER the auspices of the Denver Motor Club, the second annual automobile show, held in the Auditorium, has proved to be the most successful exhibition of the kind that has ever been held in Western territory, both from the dealers' point of view as well as an exhibition. The show covered a very large territory, many retail sales were made and proved of great value to the dealers inasmuch as many agencies were located, and the attendance was excellent. There was a total of 63 distinct exhibits, which were as follows:

E. R. Cumbex, Rambler and Mitchell; Overland Auto Company, Apperson, Overland, Baker Electrics, Marion "Flyer" and Winton; Krebbs Covington Auto Company, Haynes, Detroit Electrics, E-M-F and Flanders "20"; Johnston Motor Sales Co., Premier, Fal-Car, Peerless and Everitt; Studebaker Colorado Vehicle Company, Studebaker gasoline and electric and electric trucks; the Sanford Motor Car Company, Croxton-Keeton cars; Mathewson-Marr Aeroplane Company, Mathewson-Marr aeroplanes; Mathewson Auto Company, Thomas "Flyer," Oldsmobile, Reo, Oakland, Columbus and Ohio Electrics, Randolph and Reliance trucks; E. W. Swanbrough, Hupmobile; the Commercial Motor Car Company, Buffalo cars and trucks; Ford Motor Company, Ford cars; Fritchie Auto & Battery Company, Fritchie Electrics; Welch Motor Car Company, Welch cars; A. T. Wilson, KisselKar, Black-Crow and Empire; the Havens Motor Car Company, Frayer-Miller trucks and Dorris cars; Colburn Auto Company, Renault and Colburn cars; Michaels & Middlekauff, Parry cars; F. A. Trinkle, Brush runabouts; John Deere Plow Company, Velie cars; Arapahoe Motor Company, Elmore.

The territory covered by these exhibitors is Colorado, Wyoming, New Mexico, Arizona, Utah, Idaho and Nebraska. There was a total of 53 agencies placed by the exhibitors while the show was in progress. The exhibitors of automobiles secured good prospects for a total of 174 agents throughout the territory.

The Auditorium in which the show was held is the largest building in the West, but it was found necessary to place some of the smaller exhibits in the large corridors on account of lack of space on the main floor. The building was beautifully decorated, the general color scheme being worked out in white and green. While there were a great many cars in proportion to the amount of floor space available still the show did not present a crowded appearance; this was due to the care and judgment which the exhibitors exercised at the request of the club. The aeroplane exhibited by the Mathewson-Marr Aeroplane Company was quite a feature and attracted a large number of people.

NEWS FROM BEYOND THE ATLANTIC

French Show Still in the Air

Paris, Feb. 23—After the bulk of the automobile manufacturers of France have broken away from the Automobile Club of France and joined hands with the aero constructors for the holding of a joint aero and auto show, the national club has voted a resolution in favor of its own automobile show, to be held in the Grand Palais as usual. Thus, if this decision is persisted in, there will be two shows in Paris this year, compared with none in the year 1909. The club's excuse for holding a show after the manufacturers have broken away is that last year it passed a resolution that a show should be held in 1910, and cannot now depart from it.

Although the manufacturers, grouped in the Syndicate of Constructors, are resolved that the show shall be entirely in their own hands, they do not appear to be thoroughly satisfied with the step they have taken in signing an agreement for a joint show with the aero men. This will certainly be better than no show at all, but it is quite possible that the club may give up the idea of holding an exhibition at which exhibitors will be scarce, and that the few manufacturers who still stick to the club may desert that body. This would give the Syndicate of Constructors an opportunity to hold their show without opposition, with the Automobile Club of France as a figurehead, if it so desired, provided, of course, that the aero manufacturers would release them from their contract. But it is not certain that the aero manufacturers will be desirous of dissolving partnership, for, not yet being a very important body, they have everything to gain by combining with a powerful group of automobile manufacturers. The latter are only certain of winning if the club shows fight, in which case they will hold their joint show in the Grand Palais, while the club, having very few firms at the back of it, will either have to organize a tenth-rate exhibition or go out of business entirely.

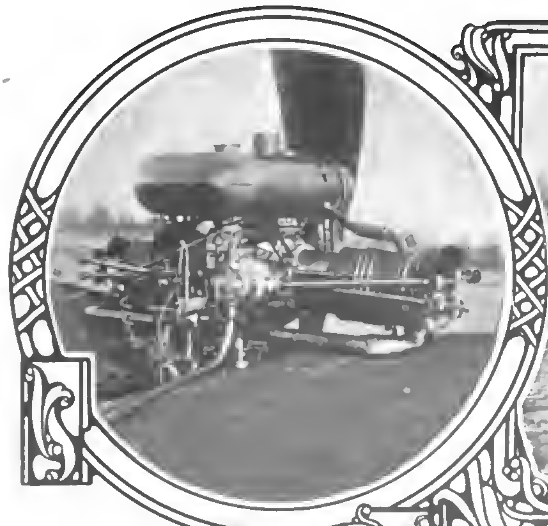
Through its manufacturers' section, the club has already put forth the conditions on which it will be willing to hold a show. Among the changes are uniform stands, with decorations, lighting and all fitting provided by the organizers; no reserved places for the oldest-established or most successful racing firms, and a sharing of the profits among the firms represented on the joint organizing committee. It is on these democratic lines that the manufacturers desire the show to be held, but when this programme was put forth by the manufacturers' section of the club, a contract had already been signed with the aero manufacturers. In addition, the manufacturers would like to see the club in a minority on the joint organizing committee, and the club still has the idea that it ought to occupy the premier position.

An endeavor is being made to arrive at a common understanding, but it is difficult to foresee the result, for, even if the club agrees to a new joint committee, on which the manufacturers will have a majority, it will be necessary to get the consent of the aeronautical manufacturers to a repeal of the present agreement for a combined show before a distinct automobile exhibition can be held. The Syndicate of Constructors, which signed the agreement with the Aero Association for a joint show, is composed of the following firms: Berliet, Léon Bollée, Bozier, Brasier, C. G. V., Chenard & Walcker, Clément-Bayard, Cohendet, Darracq, Delage, Delahaye, Delaunay-Belleville, Lorraine-Diétrich, Doriot-Flandrin-Parant, Grégoire, Harlé, Hotchkiss, Motobloc, Niclausse, Panhard-Levassor, les Fils de Peugeot Frères, Renault Frères, Rochet-Schneider, Rolland-Pilain, Sizaire & Naudin, Turcat-Méry, Vinot & Deguingand, Weyher & Richemond, and Zedel.

Clement Monoplanes Appear

Paris, Feb. 23—Aeroplanes built in series, listed on the catalog and sold complete ready for the air, are now an item of at least one French firm of automobile manufacturers. The Clément-Bayard Company has long been interested in aeronautics, and has contributed towards the experimental construction of airships and aeroplanes, but it was not until the Santos-Dumont type was perfected by the young Brazilian that it decided to catalog a flying machine.

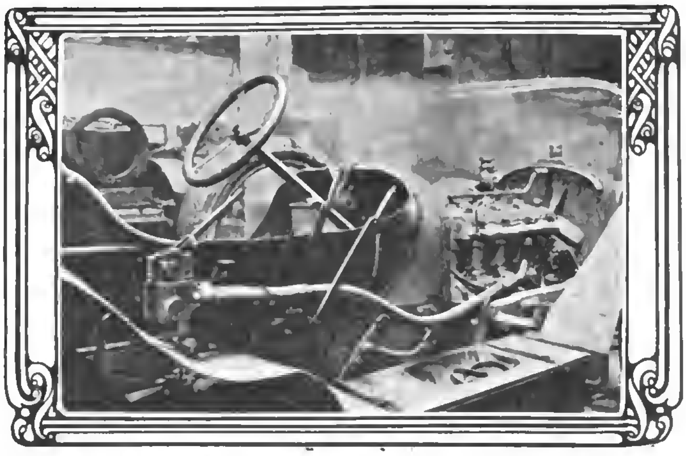
The first series left the works this week, having been constructed entirely in the automobile factory, with the exception of the wing frames. Nothing has been changed on the design, but there are considerable changes in the method of construction, the former bamboo frame having been abandoned in favor



Rear of New Clement-Bayard Motor

Jean Molsant, a Newcomer in Aviation, Uses a Gnome Motor on His Monoplane of a framework constructed entirely of light steel tubing. The only wood used in the aeroplane is found in the wings, which are made in three distinct sections, partly with a view to easy dismounting and storing, and also to allow replacements to be made at a decreased cost.

A special motor has been designed for this popular type of aeroplane. It is a two-cylinder double-opposed model, with steel cylinders of a bore of 5.1 inches, and a stroke of 4.7 inches. The water jacket is of copper, attached. The motor is mounted in the centre and at the forward edge of the wings, where it drives a two-bladed wooden propeller with a diameter of 78 inches. The only really distinguishing feature of the motor is the valve mechanism, inlet and exhaust being side by side in the head and worked off a single cam. Ignition is by high-tension magneto, with both water and oil circulation assured by pump. The radiator, consisting of a series of plain copper tubes, is mounted on the under surface of the wings.



The Jaugey Carbureter Is Placed Alongside the Driver

Gasoline Gauge for Customs

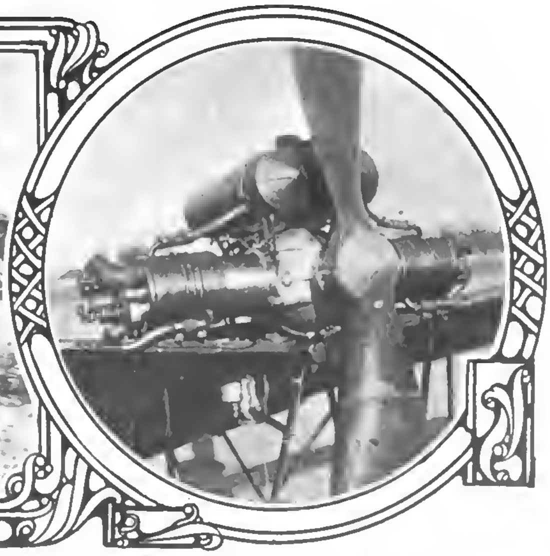
Paris, Feb. 23—A two-fold object has been attained in the new gasoline gauge produced by the French firm of Laforce: the instrument shows at all times the amount of fuel in the tank, and is also a register of every drop of gasoline passed through the filler. Its principle is simple, and it is none the less effective. In the centre of the tank is mounted a copper tube, with a diameter of about four inches and an internal spiral groove. A circular metal float is carried within the tube and is fitted with a couple of ears, so that both on rising and falling it must follow the spiral path of the groove. In addition, there are within the tube two metal rods passing through the float without being attached to it, united at their base by a transverse bar, and at the upper extremities by a circular plate. The float is free to slide up and down the two rods, but as it is secured within the spiral groove of the tube it must at the same time carry the two rods round with it in one direction for a rise and in the opposite direction for a fall of the fuel.

All that is necessary to transform this apparatus into an indicator is to affix a vertical stem on the centre of the upper plate and attach a needle to it, either directly or through gearing. With a gradual dial below, the amount of fuel will be accurately indicated. This is what has been done with the Laforce instrument, the needle being geared down, and the dial placed either horizontally, to lie on the top of the tank, or vertically by the use of bevel gearing. With a sufficient diameter of tube there is no danger of the float wedging in its groove, nor, with a proper construction, of friction between the float and the rods on which it ascends and descends. The fuel, being contained within a tube, is not given to rolling, thus allowing the indicator hands to be very steady. It responds immediately to a sudden change of level, as is shown by filling up the tank as rapidly as possible.

By a very simple arrangement of gearing, it is possible to fit up a totalizing needle, only recording on the rise of the float. Thus, all gasoline poured in it is registered, but on the fall of the float the needle remains stationary, only to operate again when the float rises. With this and a distance recorder, it possible to accurately gauge the mileage per gallon, as well as the total consumption for any given period.

The indicator has been designed to operate with equal accuracy for inclined or flat-bottomed tanks. For the former a false bottom is fitted, and the tube carried down to the lowest level of the tank, to which connection is made in a suitable manner. By this means the first pint of gasoline finds its way to the central tube, raises the float, and is indicated by the dial. Attention has been paid to this feature, with a view to having the instrument officially recognized by the Paris municipality. As all gasoline passing into the city of Paris must pay a duty of about two cents a pint, it is necessary that the amount on board the car should be accurately determined, and that, even when only a few pints are present in the bottom of a sloping tank, they should be registered. The indicator is now undergoing tests which, if satisfactory, will allow the instrumentt to be fitted to automobiles, sealed by the authorities, and its figures accepted by all the employees as the official amount of fuel in the tank. This will avoid the present inevitable disputes between drivers and officers, with the usual unsatisfactory indicators and the still more unsatisfactory measurements with a stick.

View from the Rear of Molsant Monoplane, Showing Rudder



Front View of Clement-Bayard Aviation Motor

EAST IS CLAMORING FOR THE GLIDDEN SUBSTITUTE

WITH the decision to plant the Glidden Tour in Southwestern soil, starting at Cincinnati and traversing a course through a half-dozen States, including Oklahoma, ending at Chicago, comes the conviction that the East will be bared of opportunity, and that the Glidden tryout will be a makers' institution, particularly the makers of relatively low-priced cars, most of whom have their plants in the West.

It has apparently been decided that the opening up of new territory will be for the good of the automobile, and that acquaintance with the roads as they are in the Southwest should be made. It is also likely that an effort such as this will, in some measure, tax the capabilities of the automobiles which will be entered. No matter what the advantages are, or who is so wise as to consider it desirable to abandon over 50 per cent. of the whole population of the United States, the fact remains that unless the wisdom thus displayed includes some sort of a run in that part of the United States which is inhabited before the end of the year the makers of the more pretentious types of automobiles will have no opportunity to display the qualities of their wares to their prospective customers, and will have to depend upon publicity reports as they will emanate from the "wisdom makers" who will accompany the Gliddenites on the Southwest venture.

The purchasing public is scarcely likely to be much interested in the character of newspaper reports which come under the conditions of a Glidden Tour in a remote section of the country, and it must be that the sole purpose of projecting a run of this character as to enable the makers of the cars which will be entered to obtain experience under conditions which will afford to them the advantage of comparison. Let it be taken for granted that the makers who will support the Glidden Tour this year will find it sufficiently edifying to satisfy their needs, but the fact remains that the East, or the centers of population in the Middle West, are left out in the cold, as the situation shows on the surface.

Last year the Munsey Run offered a slight opportunity to the Eastern patrons of the automobile industry, but it was not, according to some, an ambitious effort, and as for the remaining "pink tea" efforts, they do not count. The Munsey Run idea will scarcely suffice for the future, and the plant here is that there is apparently nothing scheduled for the coming season ,which is worthy of the high estate of the automobile, and the expectations of the Eastern makers and the citizens who support them.

If the wise ones have something up their "leg of mutton sleeves" which will satisfy the situation, the restiveness of the many who fail to fully appreciate the provision made for them will be subdued. It does not look, however, as if they are to be favored by the intelligence which would sound as music to their ears, and they are strong in the fear that there will be no endurance contest worthy of the name, which will permit an Eastern maker to participate in, unless he ships his automobile by rail a distance of a thousand miles, and enters it in a run over roads which are not yet made, with bats for spectators for the most part.

If a run were to be inaugurated it might have for its itinerary any one of a dozen routes which would sum up to the total required distance and prove to be sufficiently strenuous to tax the capabilities of automobiles, prove the harmonious relations which are supposed to reside in them or develop the weak points. As an illustration of a run of this character the following might be considered:

Starting from New York, through New Jersey, Pennsylvania, Ohio, Indiana, Michigan, perhaps across lower Canada, New York State (via Niagara Falls), Massachusetts, and ending at Boston. This is a mere suggestion of a run which would be interesting to the participants, tax the qualities of the cars, and permit the greatest possible number of citizens to note the results. Publicity would be of a more substantial character and it would be maximum in scope, because the tour would pass the door of more newspapers in a single day than the Glidden Tour will cast a shadow upon from the time it leaves Cincinnati until it angles into Chicago.

Heretofore, and especially last year, the rules which governed the Glidden Tour were far from satisfactory to many of the contestants, and discredit was cast upon the situation as a result. If the public is to be interested in contesting machines, there must be no question as to the fairness of the rules, or the manner in which they are observed. If interest could be aroused and agitation should result in some effort to bring about an endurance contest for the East, this question of the rules would become a serious matter and should receive concurrent discussion. Unless the run can be brought about, however, the question of fair and comprehensive rules to govern the same should scarcely have to be wrestled with. There is no time like the present for the discussion of this matter, and the aim here is to bring the glaring deficiency to public notice with the expectation, perhaps, that others will participate and that something may come of it.

(Signed) R. G. KELSEY.

RECEPTION AT THE WHITE FACTORY

CLEVELAND, Feb. 28—A novel event in the annals of motor car manufacturing was the reception held last Saturday at the White Company's factory, St. Clair avenue and Seventy-ninth street.

Although the greater part of the factory was completed and occupied three years ago, it was only last August that the new six-story administration building was completed and the wholesale offices moved from their former location in a downtown office building. Last Saturday's event, therefore, took on the aspect of a house-warming of the visitors to make a thorough inspection of the factory.

The arrangements made for the reception were not unlike those usually made for a reception in a great private house. A canopy was stretched from the driveway to the entrance of the factory and there was a retinue of door tenders, ladies' maids, etc., to look after the comfort of the visitors. The leading caterer of the city was on hand with a half hundred of his assistants and all the florists in town were called upon to furnish the decorations. The hours announced for the reception were from 1 to 5 o'clock, and during that period more than 1,500 of the socially elect of Cleveland attended.

The guests were received by the directors of the company and their wives, as follows: Mr. and Mrs. Thos. H. White, Mr. and Mrs. Windsor T. White, Mr. and Mrs. Rollin H. White, Walter C. White, Mr. and Mrs. Henry W. White, Mr. and Mrs. Ernest W. Hulet, Mr. and Mrs. M. B. Johnson, Mr. and Mrs. Frederic S. Porter and Mr. and Mrs. Albert R. Warner. Then the guests, in parties of a dozen or more, were conducted throughout the factory. After the guests had been conducted through the factory they were conducted to the "banquet hall," a large room which, in normal times, is used as a receiving room for raw material.

In connection with the reception, a little souvenir bulletin was distributed, giving some interesting statistics of the factory as follows: There are 1,500 employees and cars are now being built at the rate of 14 per day, or 84 per week. The weekly production is divided as follows: Forty steam cars, 40 gasoline cars and 4 trucks. Three months are required to build a White automobile.

MORE AND BETTER TRACK AND ROAD RACING RULES

RACING is apparently going to be more widely distributed and more generally interesting this year than ever, despite all predictions to the contrary. At least, that is what the committee in charge seems to think, and with that idea in view, the rules have been formulated so as to cover all possible cases. An additional list of rules is here presented, the first part having been given space in THE AUTOMOBILE for March 3.

Safeguarding Public and Contestants—A promoter must also furnish evidence satisfactory to the Contest Board that he has taken every possible precaution to safeguard the general public and the contestants, including the proper preparation of the roadway, and especially for the prevention of dust, the policing of the course, closing of highways and erecting fences where eeded, and shall file with the Contest Board the original or a certified copy of any and all contracts and agreements made or entered into by him for the accomplishment of such safeguards.

Repairs and Adjustments—All mechanical repairs and adjustments must be made exclusively by the crew of a car.

Repair Pits and Attendants—There shall be located at the start and finish line one repair pit for each car started, not less than 15 feet long and 8 feet wide. Each contestant shall be entitled to have three attendants, two of whom shall be permitted to make replacement of gasoline, oil and water and replacement or replenishment of tires, or crank the motor, when a contestant's car is at a standstill at its pit, but said attendants shall in no case make any mechanical repairs or adjustments to the car or assist in any manner in such repairs and adjustments.

Spare parts, tools, etc., may be laid on the shelf or ledge in front of the pit, and pit attendants, while in the pit, but not otherwise, may band same to the driver or mechanic.

A violation of this rule shall disqualify the car.

Fraud—Any attempt at fraud in the evasion of the definition of stock car and stock chassis and status of the car, on the part of an entrant, shall disqualify the car, the driver and the entrant.

In addition to the foregoing, there is provided a complete set of rules for the running of a road race, including weighing in and weighing out requirements; signal code for contestants; International road symbols for marking the course; road regulations; special duties of officials, etc.

SPECIAL RULES FOR TRACK RACES

Tracks are divided into three classes, viz.:

One-half mile, 1 mile, 2 miles or over, specially constructed speedways.

Tracks Must Be Licensed—Tracks will be inspected by a representative of the Contest Board and if arrangement of fences, buildings, ditches, provisions for laying the dust and other safeguards meet the requirements of the Contest Board, they will be licensed, such licenses expiring on December 31 of each year.

Licenses will not be issued to tracks which from the nature of their surfaces or turns, whether on account of dust, roughness, fencing or otherwise, may be considered dangerous.

Track Meeting Limited to Three Days—No sanction will be granted for a track contest of more than three days' duration.

One-Half Mile Track—No record will be allowed which is made on a track less than 1 mile in length.

Driving Reverse Way of Track—Any contestant who drives the reverse way of a track shall be immediately disqualified, suspended and reported to the Contest Board. The referee has no alternative in this regard.

LONG-DISTANCE RACE RULES

Change of Drivers—No driver shall be permitted to drive or have charge of a car for more than 3 consecutive hours. After the expiration of such 3-hour period he shall not be again permitted to drive until he has taken at least 1 hour's rest.

No 24-hour race shall be permitted on a ½-mile track.

Repairs and Replacements—Repairs and replacements are restricted to the part or parts actually damaged. No completely assembled unit, such as rear construction, transmission gear case, motor, clutch, etc., can be totally replaced unless damaged in all of its parts. When one or more parts of an assembled unit are damaged, such damaged parts only may be replaced.

Other rules added are:

Adequate code of signals to contestants.

Restriction of repairs and adjustments to a car on the track to those which can be made by the driver and mechanic and only such as will enable the car to run to the pit or paddock.

In case of total disability on the track, a car may be towed to the pit or paddock by a car approved by the referee.

Technical inspection during a race of any car which may be considered unsafe.

Stopping and restarting of race not to be announced in advance.

No work to be allowed on a car during any intermission.

SPECIAL RULES FOR HILL-CLIMBS

Provisions previously cited relative to permits to use the public roads and evidence of safeguarding public and contestants must be complied with before sanction will be issued.

Length and Grade—The promoter must file with the Contest Board 10 days before the running of any hill climbing contest a surveyor's certificate of the length of the hill to be climbed and a profile showing the greatest percentage of grade at any point and the average grade for the total distance. These figures must also be stated in the entry blank.

Except for the above, with a few minor amendments, the hill-climb rules for 1909 are unchanged.

RELIABILITY CONTESTS AND TOURS

A summary of these rules for 1910 will be issued shortly.

The complete contest rules for 1910 are now being printed and will be issued as soon as completed.

MILESTONES FOR THE AUTOMOBILIST

Mar. 5-12.........**Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park Square.**

Mar. 5-12.........Cleveland, Central Armory, Cleveland Automobile Club, Eighth Annual Show.

Mar. 5-12.........Des Moines, Ia., Coliseum, First Annual Automobile Show, Des Moines Automobile Dealers' Ass'n.

Mar. 7-12.........Albany, N. Y., Armory, Automobile Show.

Mar. 15-19.........Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

Mar. 15-19.........Bridgeport, Conn. Automobile and Aeronautic Show, Bridgeport Automobile Dealers' Assn.

Mar. 17-19.........Louisville, Ky., Automobile Show, Louisville Automobile Dealers' Association, in the Louisville Armory. Hubert Levy, Secretary.

Mar. 21-30.........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 21-28.........Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.

Mar. 26-Apr. 2...Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Mar. 26-Apr. 2...Montreal Automobile and Motor Boat Show, Official Motor and Sportsmen's Show Committee of the Automobile and Aero Club of Canada, in the Coliseum. E. M. Wilcox, Manager, 123 Bay St., Toronto.

Apr. 22-29.........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

Jan. 7-14, 1911...**New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.**

Jan. 17-24, 1911.New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

RACES, HILL-CLIMBS, ETC.

Mar. 19..........Altadena, Cal., Hill Climb, Licensed Motor Car Dealers' Association, Los Angeles, Cal.

Mar. 20..........Hill Climb, San Francisco Motor Club, San Francisco, Cal.

Mar. 28-29........Savannah, Ga., Endurance Run to Jacksonville, Fla., Savannah Automobile Club.

Apr. 8-10 & 13-17.Los Angeles, Cal., Inaugural Meet, Motordrome.

Apr. 30-May 2...Philadelphia, Roadability Run to Atlantic City, Quaker City Motor Club.

May 2............Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.

June 11..........Wilkesbarre, Pa., Annual Hill Climb Up Giants' Despair, Wilkesbarre Automobile Club.

FOREIGN SHOWS AND RACES

Mar. 19-Apr. 3...Berlin Automobile Show.

Mar. 22..........Elegance Competition at Monte Carlo.

Mar. 27-Apr. 4...Prague, Austria-Hungary, Automobile Show.

Mar. 28..........Brooklands, England, Easter Meeting.

Mar. 31-Apr. 8...French Spring Wheel Competition.

Apr. 2-24.........Turin, Italy, Automobile Show.

Apr. 27-28........Brooklands, England, Two-Day Meeting.

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.

May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.

June 2-8.........Prince Henry (German) Touring Competition.

THE AUTOMOBILE

Vol. XXII Thursday, March 10, 1910 No. 10

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Boston is taking advantage of the presence of the last big show of the year, and the attendance is of a character which seems to indicate that the autoing public will be sorry when it is over. Keen observers have failed to discover a wane of the interest, and it looks as if automobile shows, and the interest which is being taken in the cars themselves, will ultimately end in every man being his own mechanic. For a real study in contrast, there is nothing which will compare with the difference between the first audience which favored an automobile show by its presence, and the critical visitors who now linger over and admire the mechanical masterpieces which make up, for the most part, the automobiles of the year.

In the earlier shows, lack of knowledge of the mechanisms was not limited to the patrons who stood around and wondered why. Demonstrators frequently talked without really saying anything, and, fortunately for them, the audience was indifferent to the discrepancies. As it stands to-day, it would be a most unwise move, were an exhibitor to attempt to explain the reasons why, using an ignorant demonstrator as a mouthpiece. The autoing public is too thoroughly alive to the situation to permit anything of the sort.

In former years selling points were taken advantage of, and in more than one instance enlarged upon, but the mechanical education which is being acquired by autoists in general gives to them a wider view, and they are disinclined to regard a selling point, even though it may be a good one, as representing anything but one of many links in the chain. A real automobile has upwards of 900 different kinds of pieces in its makeup, and a selling point, if it is rested upon 900 different kinds of inharmonious relations, is scarcely to be looked upon as satisfactory.

In the long run selling points will disappear, because, when properly viewed, they represent conspicuous components in the makeup of the machines as a whole. In a sense, considering this fact, they portray a certain lack of harmony, and it is scarcely to be supposed that selling points will be readily picked out of a distinctly harmonious mechanical masterpiece. As an indication of the growing confidence of autoists in the products which are being exhibited, is the almost entire lack of demand for what has heretofore been termed "ideal" constructions. The average buyer, at the present time, is more inclined to look for clearance of the adjacent parts, absence of ill-shaped members of the mechanism, good oiling facilities, proper brakes, and the earmarks of the designer who indicates by his work that an automobile is a kinetic machine, rather than a contrivance to be drawn.

Night riding is scarcely to be enjoyed by prudent autoists unless they are assured that the steering gear is capable, the brakes effective, and the lighting is eminently satisfactory for the purpose. There are very few, if any, automobiles which are so poorly provided with mechanical contrivances as the steering gear and braking system, that it would be unsafe to go about at night, but the lighting question has always seemed to be in need of just a little more attention. Many autoists, especially those who own electric vehicles, have expressed the hope that electric lighting will ultimately become available for this use, and at the shows this year, the many evidences of refinement of this character of equipment would apparently indicate that the autoist who prefers electric lights has merely to engage them.

The improvements wrought have been all along the line. The batteries for this work are much more substantial. The lamps, they being of the tungsten type, are of an extremely high watt efficiency, hence the energy dissipation is reduced to a point so low that the battery lighting systems are quite satisfactory. For those who desire to tour, hence run the chances of frequently being far away from a charging source, the battery may be supported by a charging dynamo, and it is in this particular direction that the greatest amount of improvement is to be noted. The dynamos are now so installed that they will operate at a constant speed when driven by a variable speed engine with simple and strong mechanism.

Nitrogen, which is an inert gas, and almost devoid of refrigerating properties, is now being used instead of gasoline for fuel in automobile motors, to a limited extent, abroad. Energy is transplanted into the nitrogen after it is separated out, by the process of compression, it being the practice to hold the nitrogen in a tank under a pressure of 200 atmospheres (substantially 3,000 pounds per square inch). Improvements in the process of abstracting nitrogen are at the bottom of this new situation, and accounts have it that the performance of the nitrogen motor is extremely good. The gas works expansively, and a well designed steam engine is representative of the principles involved in the motor construction.

INDEPENDENTS ORGANIZING FOR MUTUAL PROTECTION

TAKE IMPORTANT ACTION AS PREVIOUSLY ANNOUNCED IN "THE AUTOMOBILE"--NEW IDEA TO BE SUBSTANTIAL SUCCESSOR TO AMERICAN MOTOR CAR MANUFACTURERS' ASSOCIATION, BUT MORE AGGRESSIVE IN CHARACTER

CHICAGO, Mar. 7—As pointed out in THE AUTOMOBILE in the issue of February 24, various of the independent makers were seriously considering forming a new association for the protection and good of the makers who are not members of the A. L. A. M. At that time the under current of events was very carefully concealed, and THE AUTOMOBILE was not in a position to release details. History is being manufactured at a high rate of speed these days, and the public, especially the portion which takes an interest in affairs automobile, lives in anticipation of a campaign which will counteract the aggressive publicity of the A. L. A. M.

Some of the details of the proposed new organization are now to be had, although speculation must still occupy a niche in the proceeding. There was a meeting of mysterious interests which was held in Chicago last Sunday night with the idea of promoting an association which will be "an organization for mutual protection against the Association of Licensed Automobile Manufacturers." This association may not be built exactly according to the old A. M. C. M. A. lines, however, but it is said that a serious attempt is being made by unlicensed interests to bring together those manufacturers outside of the Selden bulwarks, and whose most powerful weapon will be a patent which is said to have to do with bevel gear drive as utilized by most makers.

It was not until Saturday morning that the secret leaked out. Then it was whispered around that there was to be a meeting held that day at the La Salle hotel, but no one seemed to know who was to be present or who had called it. A quiet investigation, however, developed that the movement was by no means a new one, it being stated by several, who evidently were on the inside to a certain extent, that during the last Chicago show they had been approached by one E. R. Russell, who claimed to be an engineer and who said he was interested in a tire and axle concern located at Connersville, Ind., and also in an electrical construction company in Cleveland. This Mr. Russell told several of the unlicensed makers that he and his associates had secured control of a valuable patent and that he hoped to bring about an organization of unlicensed makers which could use the patent which he controls as a weapon against the A. L. A. M. He told the makers at the show that he intended holding a meeting later on, at which his association would be formed.

This meeting was held Saturday at the La Salle hotel but as to its results no one outside of those in Mr. Russell's confidence knows and Mr. Russell himself will not talk for publication, he having informed the newspaper men that it would be another week or ten days before he would be in a position to say anything. Despite Mr. Russell's secrecy, however, it has been learned that he has made some progress. All those whom he invited to attend Saturday did not go, although several representatives of unlicensed cars paid him a visit, more with the idea of learning of what he had to offer than to join, it is said.

One of those who paid a visit to Mr. Russell Saturday tells of star chamber proceedings. He found Mr. Russell and a Mr. Moore, a Chicago attorney, located in a suite of rooms on the eleventh floor of the La Salle hotel, and only one applicant was admitted at a time, coming in one door and exiting from another so that in this manner the proceedings were shrouded with great mystery. When the applicant reached Mr. Russell and his lawyer, he was told that the association already had been formed but that it was desirous to secure several more manufacturers before announcing the general plans of the association. Mr. Russell would not tell the applicants what concerns were affiliated with him nor would he go into details as to his patent holdings.

"You put in your application, pay us $1,000, and we will consider you as a candidate," he is said to have told one of the manufacturers' representative who called upon him; "When you are admitted you will be told everything."

"But who will pass upon our application?" asked this manufacturers' representative?

"We have a committee composed of one representative from seven manufacturing concerns which pass upon applications," Mr. Russell is said to have replied, but he would not divulge the names of any of them nor could the prospective member gain any further information unless he would put up the $1,000 asked.

From all it can be learned at the present time, the association is as yet in embryo. It is said that Indiana is the fountain-head of the affair and that several Hoosier manufacturers have been instrumental in starting Mr. Russell along these lines. As to the identity of the Indianian it is hard to conjecture, because most of the prominent Hoosier concerns already are members of the A. L. A. M. Also it is declared that neither Henry Ford nor Thomas B. Jeffrey are interested in the movement.

Following the meeting at the La Salle Saturday, Mr. Russell left Chicago yesterday morning, telling those interested, that he could be reached by mail at the Claypool hotel in Indianapolis.

LARGEST MERGERS MAY BE MERGED, IF THE STORY HOLDS

PERSISTENT rumors, supposedly having their origin in New York, have been floating about Detroit to the effect that an amalgamation is shortly to be effected between the General Motors Company and the recently organized United States Motor Company. It is an open secret that the advent of the United States Motor Company was not welcomed with any great outburst of joy by the combination in which W. C. Durant is the moving spirit. It is even recalled that in its earlier days General Motors made overtures looking toward taking over the Maxwell-Briscoe Company, strongest link in the new chain, although nothing came of the attempt. Since that time there have been various reports spread broadcast only to be denied in toto. The most recent gossip is to the effect that a giant merger is being discussed which would include a majority of the big factories throughout the country and make either one of the present corporations appear insignificant by comparison. Color was lent this rumor by the presence here for several days of Benjamin Briscoe, prominent figure in the United States Company. However, Mr. Briscoe denies that his visit possessed any special significance.

"There is nothing to the story of an amalgamation so far as we are concerned," said he. "No overtures have been made, no negotiations undertaken, in fact, nothing of that nature has been done. The United States Motor Company is thriving, and there may be further developments in that direction in the near future. But the rumored amalgamation is without foundation so far as I know."

Nevertheless, the story declines to down, and the presence in New York this week of several local manufacturers give added weight to the belief that something is about to happen.

HENRY FORD COMMENTS ON THE SELDEN SITUATION

I HAVE noticed in the press throughout the country that the A. L. A. M. are to wage war against what they see fit to designate as "unrecognized" automobiles to educate the public against buying them, and the stockholders of unlicensed companies against making them. At least this is what they would like the public to believe is their true motive, and it would be a most philanthropic undertaking, the like of which is rarely seen in commercal life. But they do the public a gross injustice to assume that it is so unintelligent as not to be able to see through the scheme. It should be, and no doubt is, so evident to the public that the real motive of this war of the A. L. A. M. against "unrecognized" automobiles is a selfish one, and is neither to protect innocent investors from putting their money into new enterprises nor to protect buyers from buying cars for which they will not be able to secure parts, but is for the purpose of maintaining their present extravagant prices.

Of course, I can appreciate why President Clifton and his associates want to maintain the present high prices of their cars. If they can continue to reap large profits on their product, they will do so even though it means stifling competition.

That is the easiest way to maintain profit—much easier in fact, than devising ways and means of reducing the costs.

I do not understand all the motives of this Licensed Association in its campaign of educating the public to the point where it will recognize the advantages alleged by the association to accrue from purchasing its product, but it occurs to me that a much shorter way would be to go to the courts and have the unlicensed manufacturers enjoined from producing cars. That would beat trying to educate the public to refrain from buying these tabooed cars.

Mr. Clifton is entirely correct in saying that many promoters are pointing to the profits made by a few of the old time manufacturers, thereby encouraging the formation of new companies and inducing innocent people to place their money in these said new companies on the alluring representation of profits made by the old companies. He is equally correct when he says there are a lot of these companies doomed to failure, but there are, too, a lot of the 72 varieties doomed to failure. In fact, in looking over the list of the 72 varieties, I think I can safely predict that there will be more failures among those makers during the next five years than there will be among the so-called unrecognized automobile manufacturers.

The Licensed Association does not grant to buyers of licensed cars any protection that is not granted to buyers of Ford cars. Time will prove whether or not the protection this association affords even nearly equals the protection a Ford buyer has. In spite of this intimidation campaign, no Ford buyer need fear an infringement suit. The Ford Motor Company will furnish a national surety bond indemnifying Ford buyers against suit. As the assets of the National Surety Company, of New York, combined with the assets of the Ford Motor Company, total approximately $12,000,000, it is evident that Ford buyers and present owners have every assurance of ample protection.

It should be evident to the members of the A. L. A. M. that the automobile industry must take its course with other industries, must allow the weeding out of the unfit, and must permit of the continuance of the industry by those who are left with the "Survival of the Fittest." This is exactly as in all other lines of trade. If the manufacturers of these 72 varieties were willing to work along those lines, they would be spending their money, time and effort in educating the public, and they would be devising ways and means to be among the surviving. Instead they are trying to build up a monopoly by means of this so-called Selden patent, a monopoly which will eliminate their having to compete for a position.

I am going to continue our fight along the same honest lines as always, and to trust to our courts, in which I have the greatest confidence, to see that justice is done. Between courts it is not unusual to have a difference of opinion. The expectation of such a difference is evident in Judge Hough's opinion. He predicts that the matter will be taken to the court of appeals, to which court we will surely take it, and here is something more to consider. We expect, later, to tell the public something else of interest.

(Signed) HENRY FORD.

GLIDDEN WILL START FROM INDIANAPOLIS

At a meeting of the administrative officials of the A. A. A., which is now going on at Boston, it is understood that the question of the starting of the Glidden Tour and the laying out of the tentative route will be disposed of in favor of Indianapolis as the starting point. After the original announcement of the proposed route, which was to start at Cincinnati, the Mitchell Ranger was started out and was given official recognition by the press generally, and Chairman Butler of the A. A. A. Contest Board announced in THE AUTOMOBILE that the official pathfinder had not been selected up to that time, and that the selection was finally made in favor of a Chalmers car. It transpired simultaneously, that makers of automobiles in and around Indianapolis, petitioned the A. A. A., and offered as an argument for the starting of the tour from Indianapolis instead of Cincinnati, the well known fact that Indianapolis is an automobile center of substantially the first magnitude.

Until the administrators of the A. A. A. reached a final conclusion at the meeting which is now being held at Boston, it will not be possible to procure a confirmation of the change as here referred to, but a canvass of the situation, in so far as it is possible under the circumstances, rather goes to show that Indianapolis is likely to be honored. The change will be made on the ground that there are many automobile makers centered around Indianapolis and their wishes carry weight, whereas Cincinnati ranks relatively low as a manufacturing city with automobile making as a factor.

UNITED STATES MOTOR CO. COMPLETE

That the United States Motor Company, the recently organized $16,000,000 corporation, which has so far absorbed the four plants of the Maxwell-Briscoe Motor Company, of Tarrytown, N. Y.; New Castle, Ind., and Auburn, R. I., and the mammoth plant of the Columbia Motor Car Company, of Hartford, Conn., is destined to stand in the front ranks of the industry is amply demonstrated by the personnel of officers elected recently at the first annual meeting of the corporation.

Mr. Briscoe, besides being at the helm of the Maxwell-Briscoe Motor Company, is interested in many concerns connected with the industry. Among the many positions which he holds is the presidency of the Manufacturers' Contest Association, having recently been elected for the second time, and is a director of the American Automobile Association, both positions being of a complimentary nature in honor of his high standing in the industry.

Associated with Mr. Briscoe in the new enterprise is J. D. Maxwell, first vice-president; H. W. Nuckels, vice-president; Carl Tucker, treasurer; J. W. Wellington, assistant treasurer; F. D. Dorman, secretary, and W. F. Crosby, assistant secretary.

Announcement was made last night at the Boston Show that Horace De Lisser, the well-known president and general manager of the Ajax-Grieb Rubber Company, has been elected to the vice-presidency with entire charge over the sales, of the new United States Motor Company, in which the Maxwell-Briscoe Motor Co. and the Columbia Motor Car Co. are already known as members.

LARGE CASH PRIZES AT LOS ANGELES MOTORDROME

At the inaugural seven-day meet of the new Los Angeles motordrome, April 8-10 and 13-17, 37 events will take place. Races of all sorts will give every form of car, either specially built or stock, an opportunity to do its best without having to face odds of being outclassed. In addition to this it is said that the management will hold a twenty-four-hour race and the American Automobile Association has been asked to set aside April 30 and May 1 for this contest.

For the inaugural meet large cash prizes are offered for professional events and handsome trophies for amateur races, and the fields in each class are expected to be larger than usual. The handicapping will be in charge of A. L. McMurtry. The complete program for the ten days' sport follows:

Event 1—One-mile time trials, free for all. First prize, cup; second prize, cup.

Event 2—Ten mile, stock chassis, 161 to 230 cubic inches. First prize, cup; second prize, cup.

Event 3—Ten miles, stock chassis, 451 to 600 cubic inches. First prize, cup; second prize, cup.

Event 4—Twenty miles, free-for-all handicap. First prize, $100; second prize, $50; third prize, $25.

Event 5—One hundred miles, stock chassis, 301 to 450 cubic inches. First prize, trophy and $300 in gold; second prize, $150 in gold; third prize, $100 in gold.

Event 6—Five miles, stock chassis, 231 to 300 cubic inches. First prize, $50; second prize, $25.

Event 7—Five miles, free-for-all. First prize, $100; second prize, $50.

Event 8—Twenty miles, stock chassis, free-for-all; open only to amateur drivers. First prize, trophy.

Event 9—Ten-mile chassis, 231 to 300 cubic inches. First prize, cup; second prize, cup.

Event 10—Fifteen-mile, free-for-all handicap. First prize, $150; second prize, $50.

Event 11—Ten-mile, stock chassis, 451 to 600 cubic inches. First prize, $75; second prize, $25.

Event 12—One hundred-mile, stock chassis, 161 to 230 inches. First prize, $250 in gold; second prize, $100 in gold; third prize, $50 in gold.

Event 13—Ten mile free for all. First prize, $100; second prize, $50.

Event 14—Twenty-five-mile, stock chassis, 301 to 450 cubic inches. First prize, $100; second prize, $50.

Event 15—Ten mile, free-for-all handicap. First prize, $100; second prize, $50.

Event 16—Ten-mile, stock chassis, 600 cubic inches or under. First prize, $100; second prize, $50.

Event 17—Ten-mile, free-for-all, open to amateur drivers only. First prize, cup; second prize, cup.

Event 18—Five miles, stock chassis, 161 to 230 cubic inches. First prize, cup; second prize, cup.

Event 19—One hundred miles, stock chassis, 231 to 300 cubic inches. First prize, $250 in gold; second prize, $100 in gold; third prize, $50 in gold.

Event 20—Ten miles, handicap, open only to amateur drivers. First prize, cup; second prize, cup.

Event 21—Twenty miles, stock chassis, 161 to 230 cubic inches. First prize, $100; second prize, $50.

Event 22—Ten miles, stock chassis, 451 to 600 cubic inches. First prize, cup; second prize, cup.

Event 23—Five miles, chassis, 231 to 300 cubic inches. First prize, $100; second prize, $50.

Event 24—Twenty-five miles, stock chassis, 301 to 450 cubic inches. First prize, cup; second prize, cup.

Event 25—Fifty miles, free-for-all. First prize, $250; second prize, $100; third prize, $50.

Event 26—Ten miles, stock chassis, 161 to 230 cubic inches. First prize, cup; second prize, cup.

Event 27—Ten miles, stock chassis, free-for-all, open to amateur drivers only, for California championship. First prize, cup; second prize, cup.

Event 28—Fifteen miles, stock chassis, 231 to 300 cubic inches. First prize, cup; second prize, cup.

Event 29—Ten miles, stock chassis, 301 to 450 cubic inches. First prize, $100; second prize, $50.

Event 30—Five miles, free-for-all handicap. First prize, $100; second prize, $50.

Event 31—One hundred miles, stock chassis, 451 to 600 cubic inches. First prize, trophy and $1,000 in gold; second prize, $500 in gold; third prize, $300 in gold; fourth prize, $200 in gold.

Event 32—Ten miles, free-for-all, best two out of three heats. First prize, $200; second prize, $100.

Event 33—Two-hour race for stock chassis over 600 cubic inches. First prize, $250; second prize, $100; third prize, $50; fourth prize, $25.

Event 34—Five miles, stock chassis, 301 to 450 cubic inches. First prize, $75; second prize, $25.

Event 35—Ten miles, free for all. First prize, $100; second prize, $50.

Event 36—Twenty-five miles, free-for-all, open only to amateur drivers. First prize, cup; second prize, cup.

Event 37—Ten-mile handicap for cars under 450 cubic inches. First prize, cup; second prize, cup.

TROPHY FOR FREE-FOR-ALL

The Speed Carnival of the Florida East Coast Automobile Association, which will be held March 22 to 25 on the famous Daytona Beach, will introduce the initial race for an entirely new prize, which is known as the W. B. Five Thousand Dollar Trophy, and which must be won twice in succession before becoming the property of the winner. This trophy is offered for the 300-mile free-for-all race, as this contest offers the widest field of entries and the most sportsmanlike competition. This splendid product of the jewelers' art is made of solid silver and stands nearly 5 feet in height and in form is a pure Greek urn surmounted by the figure of Victory holding a laurel wreath. The base is ornamented with winged wheels and bears in relief a racing car at full speed. This beautiful and valuable prize is presented by the W. B. Corset Company, of New York.

Trophy for Florida Spsed Carnival

ANOTHER TRACK IN SIGHT

Negotiations are being made by a company of New York capitalists for the purchase of the northern end of Monmouth Park, near Eatontown, known as the new part. This section contains 390 acres and has a splendid mile and three-quarter track. If the deal goes through many thousands of dollars will be spent by the capitalists to make this the finest automobile race track in the country.

FRISCO CLIMB SUCCESSFUL

San Francisco, Mar. 7—In the first hill climb of the season held here recently, by the Automobile Trades Association, of Alameda County, a wet track prevented fast time, but otherwise, the event was a great success. The contest was held on the Oakland avenue grade in Oakland, across the bay, the length of the grade being 6/10 of a mile. The greatest honors went to the Buick and Corbin cars. Frank Murray, driving a Buick, took three first places, and in the 40 roadster made the fastest time. The Corbin took its class event and in the free-for-all equaled the best time of the day as made by a Buick. The summaries:

Car	Driver	Time
RUNABOUTS, $1,000 AND UNDER		
Hudson	C. Allen	1:06
RUNABOUTS, $1,501-$2,000		
Buick 40	F. Murray	:52⅕
Auburn	F. Hurst	1:18⅘
RUNABOUTS, $2,001-$3,000		
Chalmers 40	J. Bemb	:58⅗
TOURING CARS, $1,500 AND UNDER.		
Buick 30	F. Murray	1:00
Paterson 30	L. L. Gummow	1:15
TOURING CARS, $1,501-$2,000.		
Buick 40	F. Murray	1:04
Elmore	P. F. Gillette	1:37
TOURING CARS, $2,001-$3,000		
Corbin	A. Loughead	1:06⅕
FREE-FOR-ALL		
Corbin	A. Loughead	:52⅕
Buick 40	F. Murray	:56
Maxwell	C. King	:57⅗
Chalmers 40	J. Bemb	1:03
Gillette Pup	P. F. Gillette	1:06

AMONG THE GARAGES

One of the new Parry cars, standing in front of the immense factory at Indianapolis, Ind. This is the car which exemplifies the "Parry Idea"

Wilkesbarre, Pa., automobilists have received the announcement of the opening of Lee's garage, at 182 North Pennsylvania avenue. The garage covers four city lots, with a depth of 112 feet. It sets back 40 feet from the sidewalk, leaving a large yard paved with cement. The building has at present a storage capacity of 35 cars, and is so planned that the second story, when added, will accommodate 90. Arrangements have been made so that this enlargement can be made during the present season without vacating the building.

Commodore C. Stanley Grove has purchased the States garage, Atlantic City, N. J., on Atlantic avenue between States and Delaware avenues. This is the newest and handsomest in the city, having been opened only last July. During that time its builder, G. T. Lippincott, made it also one of the most popular. It is a two-story fire-proof building on the Roebling system, 72 feet front and 100 feet deep. The new owner will continue the same liberal policy.

The new plant of the Regal Motor Company, near Walkerville, Mich., is rapidly nearing completion, and will be finished within two weeks. An order for mechanical equipment has already been placed.

The new plant of the Fiat Automobile Company in Poughkeepsie, N. Y., is practically completed, and the machinery is now being installed.

Brief Personal Mention

C. J. Holdrege, formerly sales manager of the Stromberg Motor Devices Company, of Chicago, has transferred his flag to the Ideal Electric Company, of Chicago, with which concern he will occupy the same position. The Ideal Electric Company is making rapid advances in the electric vehicle field, and the new sales manager is busy making suitable arrangements to dispose of a large and important product.

J. B. Sperry, until recently connected with the Motor Car Company of Washington, D. C., has joined the selling force of the E. R. Thomas Motor Branch Company in Boston. Mr. Sperry has had several years' experience in the automobile business, the greater part of which was handling Thomas cars in western territory.

C. S. Henshaw, manager of the E. R. Thomas Motor Branch Company, of Boston, Mass., has secured the services of A. D. Frost as assistant manager. Mr. Frost was formerly connected with the Thomas Flyer agency in New York, and later was sales manager for the Herreshoff Motor Company, of Detroit.

R. T. Mitchell, well known to the Cleveland automobile trade, has joined the sales force of the Babcock Electric Garage & Sales Company, of Cleveland, and in the future will have charge of the sales of the Babcock for the State of Ohio.

C. R. Mertens, who severed his connection with the Columbia Motor Car Company some time ago to enter the service of the Whitlock Coil Pipe Company, has again returned to the Columbia factory in the capacity of assistant superintendent. He will have charge of the test department and also several others.

M. F. Todd, formerly connected with the sales department of the Regal Motor Sales Company, Detroit, has been transferred to the Cleveland branch and will have charge of the sales of the Regal car in the State of Ohio.

C. M. Halstead, formerly connected with a wire concern at Beaver Falls, Pa., has taken the management of the Auto Company garage at Akron, succeeding Andy Auble and Fred Woods, who acquired a garage in Cleveland.

Starr Burdick, for several years factory and sales manager of the Spicer Manufacturing Company, of Plainfield, N. J., has resigned his position and is about to embark in a new enterprise.

Lee E. Horton, formerly Cleveland Morgan & Wright manager, has accepted a position with the Fisk Rubber Company, and will have charge of the Cleveland sales for that company.

Charles L. F. Wieber, who two years ago became a member of the Rauch & Lang Company, of Cleveland, has been chosen manager of the factory and financial head of the company.

R. E. Olds, president of the Reo Motor Car Company, Lansing, Mich.

WITH THE AGENCIES

Even actors and actresses are getting the motoring fever. The picture shows Harry Lauder, the famous Scotch comedian, with his wife in their Hudson

Under the name of the United Auto Supply Stores Company, a new automobile supply house has been opened at 1693 Broadway. This branch is in charge of John Wooster, who bears the title of New York manager. From Mr. Wooster it was learned that this company has been recently incorporated to open up general supply and tire stores in the leading cities throughout the country.

The Firestone Tire & Rubber Company announces the establishment of the following new distributing agencies for Firestone tires and demountable rims: Central City Rubber Company, 129 E. Water St., Syracuse, N. Y.; Shuler Rubber & Supply Company, 345 Baronne St., New Orleans, La.; Chesapeake Tire & Rubber Company, 202 St. Paul St., Baltimore.

A movement is on foot by local interests to bring to Hartford, Conn., a British concern engaged in the manufacture of automobile parts. There are many available sites, and it is hoped that the prospective producers will locate here. The local board of trade offers every encouragement to automobile industries.

The Regal has been placed for Wisconsin with the Franklin Automobile & Supply Company, of Milwaukee. It was formerly distributed by the Grove Automobile Company, agents for the Jackson and Fuller.

Frank Briscoe, president of Briscoe Mfg. Company, and Brush Runabout Company

It is said that at the conference of the distributing agents of the De Tamble line held in Chicago on February 11, through concessions made by the agents and the factory, it would be possible to reduce the price of the De Tamble 34-horsepower car from $1400 to $1250.

The Great Western Automobile Company has closed contracts for the sale of Great Western "30" cars with the E. W. Clark Motor Company, Fond du Lac, Wisconsin; W. F. Huebner, Arrowsmith, Ill., and the Glide Automobile Company of Indianapolis, Ind.

The Columbus Buggy Company, of Columbus, Ohio, recently shipped its first carload of 1910 gasoline cars to the California Auto Company, of Los Angeles, the distributing agency for Southern California.

C. M. Logan, formerly with the Cleveland branch of the Olds Motor Works, has secured the agency for Pope-Hartford cars. Mr. Logan's territory includes all of Ohio except Cincinnati.

It is said that the British firm of Napier Motors will establish United States agencies with those who can add the British-built six-cylinder Napier to their present business.

The Eclipse Motor Car Company, of Columbus, O., has taken the Central Ohio agency for the Krit, manufactured in Detroit. The demonstrator is expected soon.

The Ohio Automobile Company, Dayton, O., has been appointed State distributor for the Springfield Car, made by the Springfield Motor Car Company, Springfield, Ill.

At Youngstown, O., Smith, Morgan & Company have taken possession of their new salesroom on East Boardman street. The Buick line will be handled.

The Ross Motor Company, of Superior, Wis., has secured the local agency for Overland automobiles, in addition to a number of other lines already handled.

The Krouse Motor Car Company, 317-321 North Broad street, has acquired the Philadelphia sales rights for the Halladay car.

W. W. Lester has taken the Hartford agency for the Brush runabout. This is the first appearance of that car in this city.

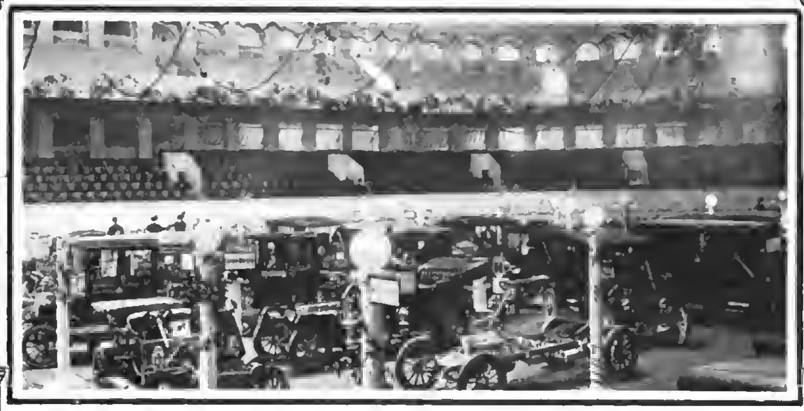
The Grout Automobile Company, of Orange, Mass., has opened a Boston branch in the Motor Mart. E. P. Forbes is in charge.

Harry S. Moore, Cleveland agent for the Stoddard-Dayton and National, has taken the agency for the Courier.

The R. A. C. is an addition to the line carried by the Hickman-Lauson Diener Company, of Milwaukee, Wis.

The Overland district agency for Rice Lake, Wis., has been placed with T. H. Field, of that city.

E. H. Peshak, of Beaver Dam, Wis., has obtained the district agency for the Oakland.



REALM OF THE MAKERS

View of one corner of the Milwaukee Show, showing the decorations, seats in the gallery, and in the foreground the Locomobile and Haynes exhibits

The Central City Rubber Company, 131 East Water street, Hanover Square, Syracuse, N. Y., is having extensive improvements made to its store, which when completed will give the firm one of the finest retail salesrooms for the handling of everything for the autoist but the automobile that there is in all central New York. These improvements include a new all-glass store front, modernized salesrooms on the main floor and in the basement, besides new concrete sidewalks of modern construction with sidewalk elevator.

Although it is about six weeks since one of the large factory buildings of the Racine Manufacturing Co. was destroyed by fire, it remains that they have resumed operations in practically the same proportions as before, delivering finished products to their patrons as usual. This concern has equipped a new factory building which was completed just prior to the fire.

At the recent automobile show in Portland, Ore., a Franklin, the only air-cooled automobile exhibited, was given an extreme test in a 72-hour non-stop run. This ended without a sign of overheating, nor was any replacement of parts necessary during the three days of continuous work.

The Winton Motor Carriage Company has purchased 89 feet on the east side of Woodward avenue, near Warren, in Detroit, and is planning to erect a modern showroom on the site.

J. G. Perin, chief engineer, the Lozier Motor Company, Plattsburg, N. Y., and Detroit, Mich.

The Mitchell-Lewis Motor Company, of Racine, Wis., is making every provision for the comfort and convenience of its thousands of employees. The latest innovation is a hospital corps. A Mitchell is stationed at the plant at all times day and night ready to transport an injured man to a physician's office or hospital, as occasion requires.

The Goshen Buggy Top Company, of South Bend, Ind., has decided to equip its factory for the manufacture of automobile tops. The necessary machinery has been ordered, and when installed an additional force of men will be put to work.

The Sebring Motor Car Company, of Sebring, O., has completed its first car and will exhibit it at the annual show to be held in Cleveland, February 19-26. The Sebring is of the six-cylinder type and has a horsepower rating of forty.

The first regular allotment of Model S Mitchells to be sent to dealers, left the plant of the Mitchell-Lewis Motor Co., at Racine, Wis., last week. The Model S is the new six-cylinder listed at $2,000.

The Gardner Wheel Company, Indianapolis, has put in complete equipment for the manufacture of automobile wheels. Indiana hickory, which has long been the standard wood for this purpose, will be used.

The Star Rubber Company, of Akron, Ohio, has announced its intention of manufacturing automobile tires on a large scale. A large addition to its present plant will be erected within a short time.

The E-M-F people say that they set a record of 20 cars a day sold at the recent Philadelphia Show. This company exhibited a full line in their spacious showrooms on Chestnut street, that city.

The McCord Machine Company, Philadelphia, Pa., formerly located at 1621-4 Brandywine street, has removed to 2231 Brandywine street, where it has a first-class establishment.

The B. C. K. Motor Car Company, of Philadelphia, has just completed new buildings at its Bath, N. Y., plant, and machinery, approximately $32,000 worth, has been installed.

W. L. Eslein, traveling representative of the Wisconsin Motor Car Company, of Janesville, Wis., making the "Wisco," is now working in northern Wisconsin placing agencies.

The Pope Manufacturing Company, of Hartford, Conn., has delivered to the Denver fire department a combination chemical and hose wagon of the usual type.

The Compressed Gas Tank Company has succeeded the Puritan Gas Tank Company, and will continue to build these latter tanks at Canton, Mass.

Beginning February 1, the price of the Hupmobile was raised $50, and in the future this little car will sell for $800.

NEWS IN GENERAL

Scene in Philadelphia during the big strike, showing the White steamer used by the police to charge through the crowds and thus disperse them

Boston now has over eighty purely automobile houses, representing over one hundred different makes of cars. There are about a dozen makes of commercial motor vehicles represented, and the rest are pleasure vehicles. This is a marked increase over last year, both in the number of establishments and in cars represented. The cars include practically every well-known make of American machine, and within the past few months not a few of the newer cars have obtained agencies here. There are a half-dozen agencies or branches for the sale of foreign cars. Of the total number of establishments, seventeen are branch houses and the remainder agencies. Only one or two new branches have been opened the past year, the tendency being apparently more strongly in the direction of agencies than toward branches. The local trade is in excellent condition, and long before the deliveries of 1910 models ceases a new record for sales will have been established, all previous marks at show time already having been surpassed.

Paul Hardin, of Chester, S. C., is out with a challenge that has set the auto gossips busy in at least four of his neighboring counties. A few days ago W. C. Thomson agreed to buy a two-cylinder 1910 Reo on condition that it would be run under its own power from Chester to Bullock's Creek, S. C., by Hardin. Thomson lives twenty miles from the nearest county seat, where the roads are of a heavy red clay, which at this time of the year are impassable for a wagon in many places. The long trip was successfully made by Hardin, though the road was lost twice. Thomson is now the proud owner of the car and Hardin offers to bet any local dealer of a car that cost twice the price of the 1910 two-cylinder Reo, one car against the other, that he cannot follow the Reo in a cross-country run to Bullock's Creek, or over any other similar roads within fifty miles of Chester. The challenge has as yet not been accepted.

With the advent of open weather will come the installation of the first suburban auto bus service ever operated in Philadelphia County, Pennsylvania. Citizens living along Bustleton Pike, between Frankford and Somerton, have requested the rapid transit company in Philadelphia to establish a line along the Pike. Failing in this, a number of citizens decided to form a company, with a capital of $15,000, to be used for the installation of an auto bus line. Three cars, with a capacity of fourteen passengers each, have been bought.

The Aero Club of America has secured one of the finest suites of offices in the Engineering Societies Building, 29 West Thirty-ninth Street, practically the last now available in that national headquarters of professional men devoted to engineering and mechanical pursuits. It is the home of twenty-five engineering bodies with some 30,000 members, every one of whom, by nature of his training and occupation, is interested in this latest development of mechanical arts.

A Cadillac roadster has been purchased by the Water Department of Wilmington, Del., at a cost of $1,700, for the use of the directors and officers of the department. This is the second branch of the city government to be so equipped, the street and sewer department having had a machine in use for some time. with great success.

A Webb automobile fire engine has been purchased by the Reliance Fire Company, of Wilmington, Del., at a cost of $8,500. The builders are to give it a thirty-day test before it is accepted by the purchaser. Several other companies are awaiting the result of this test before placing orders for machines.

Sheriff H. E. Frank, of Milwaukee, believes that it takes an automobile to catch an automobile, and has a 1910 Franklin touring car, with which he plans to capture speed law violators during the summer. The Sheriff will cover the Whitefish Bay road, one of Milwaukee's best automobile highways.

Carl G. Fisher, of Indianapolis, has divulged plans for an automobile row in that city, which will represent an aggregate expenditure of about $1,000,000. It is said that the ground has been purchased and plans drawn for the building.

The Pittsburgh Taximeter Company has been organized by Grant McCargo, Charles A. Blanchard and John W. Weibly to manufacture taximeters.

H. O. Smith, president of the Premier Motor M pany, Indianapolis

Independent Boston Show in the Former Art Museum, Where Parry, Lexington, Hupmobile, Mack, and Whiting Appeared

INDEPENDENTS SHOW AT ART MUSEUM

The old Art Museum in Copley Square, Boston, was turned over to the independents who failed to get space at the big show in Mechanics' Building, and the effort, while it is less pretentious than that of the trade association, attracted its measure of the patrons in Boston and vicinity. The location of the Art Museum is so thoroughly advantageous that every autoist in going to and from the railway trains at Back Bay had attention drawn to the independents' show by large and well-placed signs which are clearly depicted in the illustration here offered. The attendance is reported as encouraging in the extreme, and the independents who have the courage of their convictions feel justified in thus making what must be termed an ambitious effort.

Exhibitors at the independents' show were: Hupmobile, Lynn Automobile Company, Boston; Rainer, Rainier Company, Boston; Lexington, Nock Auto Company, Providence; Mack, the Manhattan Motor Truck Company, Boston; Parry, the Parry Company, Boston; Whiting, Flint Wagon Works, Flint, Mich.

AEROPLANE AND BIG CROWD AT PORTLAND

Portland, Me., Mar. 5—Portland's automobile show closed Saturday evening, and there had been a record-breaking attendance during the whole of the week. Not only were there large crowds during the afternoons and evenings, but the morning attendance was the largest ever known in the history of the five shows given in Portland. Before the end of the week, as some of the cars were late in arriving, it was estimated that fully $300,000 worth of automobiles had been placed on exhibition.

On Friday, the day before the show closed, an aeroplane of the Curtiss type arrived, and was exhibited in the basement of the Auditorium. It proved the center of attraction for the whole show, as hundreds of people went to the exposition just to see this. The flyer shown was the property of F. J. Tyler, of the Maxwell-Briscoe Company, and was especially loaned to the Portland show by the owner, who had purchased it at the Boston aero show.

MILWAUKEE SHOW FINANCIAL SUCCESS

Milwaukee, Wis., Mar. 7—It is conservatively estimated that nearly 100 cars were sold during motor show week in Milwaukee, to the aggregate value of $215,000. This includes sales made at the Milwaukee Automobile Club's second annual exposition in the Auditorium and by the fourteen independent dealers who held private shows in their garages. The Auditorium show's total attendance was 33,500. Of the profit, the exhibitors will receive 35 per cent., or 10 per cent. more than in 1909.

Twenty-six pleasure vehicles were shown for the first time at the Milwaukee show, the newcomers comprising more than 50 per cent. of the entire pleasure vehicle display. In the commercial section twelve makes were presented and Milwaukee's standing as a commercial vehicle manufacturing center was strikingly shown in this instance. In the motorcycle division six standard makes were represented, three being home products, while the accessory concerns represented numbered twenty-four.

The officers and board of directors of the Milwaukee Automobile Club who were largely responsible for the pronounced success of the exhibition, even in spite of many obstacles placed in their way by the so-called insurgent dealers, are as follows: President, Clarke S. Drake; vice-president, Geo. A. West; secretary, Arthur C. Brenckle; treasurer, Lee A. Dearholt; M. C. Moore, C. Schlotka, O. F. Fischedick, Dr. Louis Fuldner, Wm. H. Pipkorn, J. E. Farber, Faustin Prinz, J. F. Schreiber.

FOUR MORE SELDEN PATENT LICENSEES

Seventy-six makes of American and foreign cars now appear on the official list of Selden Patent licensees.

Those appearing on the list for the first time are: Flandrau Motor Car Co., of New York City, licensed to import and sell in this country the Brasier car; W. H. McIntyre Co., of Auburn, Ind., making the McIntyre car, and Simplex Motor Car Co., of Mishawaka, Ind., making the Amplex car, formerly known as the American Simplex, and Great Western Automobile Company, Peru, Ind., making the Great Western car.

CHICAGO SHOW FOR 1911 WILL RUN THIRTEEN DAYS

THE Chicago Show of 1911 will extend over a period of thirteen days, exclusive of Sundays, instead of seven days. This was decided upon at a meeting of the executive committee of the National Association of Automobile Manufacturers, Inc., held on Wednesday afternoon, having been recommended by the show committee and the general manager.

The amount of space at the command of the Chicago show management is greater than at any other show held in the United States, but this year, despite this fact, the application of over 40 makers of automobiles and 200 makers of accessories were refused on account of lack of space, while the makers of commercial vehicles were not even considered.

It has not yet been decided how the exhibits will be divided. It may be, and it is indeed probable, that the space allotted to automobile exhibits during the first week will be given exclusively to members of the National Association of Automobile Manufacturers, as founders, but whether pleasure cars and commercial vehicles will be mixed during the second week is a matter for future consideration, and is, perhaps, dependent to some considerable extent on the amount of interest taken in the exhibition by commercial vehicle makers.

Another branch requiring careful consideration is the motorcycle department, confined heretofore to about 25 spaces, but demanding, through the Motor Cycle Manufacturers' Association, at least four times as much space as it has been possible heretofore for the management to furnish.

The show will open on Saturday, January 28, and the first section will continue until and including Saturday, February 4. The floor will be entirely cleared of cars that night, and the buildings will reopen on Monday afternoon, February 6, for the second section of the show, continuing until and including Saturday, February 11.

Present at the meeting on Wednesday afternoon were: L. H. Kittredge, W. T. White, Thomas Henderson, W. E. Metzger, S. T. Davis, Jr., S. D. Waldon, C. C. Hildebrand, H. O. Smith, A. L. Pope, Benjamin Briscoe, R. D. Chapin, C. G. Stoddard and S. A. Miles, general manager.

The report of the late Chicago show showed that there had been 1,548 dealers in attendance, and that the total attendance, including the public, dealers, exhibitors and their attendants, exceeded 200,000 people, and probably reached nearer 220,000.

The committee further adopted the following resolution: "Resolved that, in the opinion of this executive committee, the interests of automobile manufacturers are well and sufficiently served by the national shows held annually at New York and Chicago, and that experience has indicated that an addition to the number of shows would be undesirable.

"Resolved further, that the National Association of Automobile Manufacturers, Inc., will sanction, during the twelve months following the date of this resolution, no shows other than the annual national shows at New York and Chicago."

The president nominated and the committee approved the appointment of the following standing committees for 1910: Membership—S. T. Davis, Jr., J. W. Gilson, C. C. Hildebrand. Legislative—W. R. Innis, Benjamin Briscoe, C. G. Stoddard. Good Roads—R. D. Chapin, S. D. Waldon, L. H. Kittredge. Show—W. E. Metzger, A. L. Pope, Thomas Henderson. Contest—H. O. Smith, W. T. White, W. E. Metzger. Auditing—Benjamin Briscoe, S. T. Davis, Jr., Charles Clifton. Traffic—A. L. Pope, W. R. Innis, C. C. Hildebrand.

ALBANY SHOW WINS AGAINST WEATHER

(*Continued from page 511.*)

Notwithstanding a bad snowstorm which started early in the evening—in fact before dark there was a mighty good attendance—all of which was paid as the management, original again, did not put out any paper to swell the first night's attendance.

The usual large number of manufacturers and accessory representatives are on every hand giving the show the appearance of first importance such as it warrants by its extreme excellence in every detail.

The list of exhibitors comprise:

Albany Garage Company, Peerless, Simplex, Studebaker, Palmer-Singer, Apperson, E-M-F and Flanders; Albany Hardware & Iron Company, auto supplies, sporting goods, launches and canoes; Albany Motor Car Company, Cadillac and Thomas; Albany Rubber Tire Company, Selden; Buick Motor Company, Buick, Welch-Pontiac, Welch-Detroit; B. A. Burtiss, American, Hurtis auto wind shield; Central Automobile Company, Knox, Hupmobile; Cox Brass Manufacturing Company, windshields and accessories; Thomas L. Davis & Company, Jenkins; William Daye, Matheson; Eureka Motor Car Company, Cutting; G. Feltman, Reading Standard and Emblem motorcycles; Franklin Auto Company, Franklin; James Goold Company, Marmon; J. A. P. Ketcham, Packard; John Kingsbury, special bodies, tops, etc.; Lansing & Morrison, Gramm-Logan trucks; Maxwell-Briscoe Albany Company, Maxwell, Columbia; Peter Murray, Inter-State; Mohawk Valley Auto Company, Oakland, Oldsmobile; Park Garage, Mitchell, Speedwell, Chadwick, Frayer-Miller; Patten & Almy, Cameron; C. Sutherland Ransom, Lozier, Stevens-Duryea, Mercer; Roy M. Robinson, Reo, Rainier; Rose & Kiernan, auto insurance; Wm. L. Schupp & Sons, Marion, Overland, Rapid trucks; Snyder Auto Bazaar, Velie, Stearns; Steefel Brothers, auto apparel; Troy and Albany Auto Exchange, Pierce-Arrow, Chalmers, Hudson; Troy Auto Improvement Co., Hupmobile, Koehler; Taylor Automobile Company, Locomobile; George W. Wait, Elmore; Walter Chain Mat Company, No-skid chains; C. F. Weeber Manufacturing Works, Ford, Haynes; J. B. Wilbur, Regal, Croxton-Keeton; Wright-Rye Motor Company, White, Jackson, Rambler, Atlas; Vrooman Brothers, Hupmobile, Regal, Elmore.

The committee in charge consists of Major Charles B. Staats, Captain William J. McKown, Captain Allan L. Reagan, Wm. J. Grounsell, Chauncey Hakes, C. Sutherland Ransom, W. K. Foskett, J. A. P. Ketcham, Dr. Edward G. Cox and James C. Fitzgerald.

OMAHA DEALERS HOLD A GOOD SHOW

OMAHA, NEB., Mar. 3—One of the most successful shows ever held in the West came to a close Saturday night. Omaha dealers are proud of the showing they were able to make, especially in the number of different cars; the Omaha exposition had but five less factories represented than that at Chicago. This exhibition, in the minds of the local dealers, has clearly demonstrated that Omaha is the real center of the automobile trade west of the Mississippi.

The show just closed is the fifth to be held by the Omaha dealers. When the first show was held there were but five dealers in the city, and they had to scour the country to secure cars enough to make a respectable showing in the big building. Considerable urging was necessary to persuade some of them to take the chance on renting the building. Now it is not a question of how to get cars to fill the building, but rather how to get in all those that want to exhibit.

The management of the Sioux City show was so impressed by the decorations at Omaha that it bought all the fixtures outright at half price, thus making a saving to themselves as well as to the Omaha management.

RUMOR INVOLVES MORGAN AND E-M-F

DETROIT, Mar. 9—Just as THE AUTOMOBILE is going to press a special wire from Detroit reaches the Editorial Office in which it is said "Morgan gets E-M-F for five million dollars." All efforts to verify this story proved futile, nor was it possible to obtain information bearing upon this subject from anyone who could be reached in the office of J. P. Morgan & Company. Walter E. Flanders, president and general manager of the E-M-F Company, left the Hotel Martinique, New York, yesterday morning ostensibly to visit the Boston Show. THE AUTOMOBILE was unable to reach him within the limited time available.

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VOL. XXII NEW YORK—THURSDAY, MARCH 17, 1910—CHICAGO No. 11

THE AUTOMOBILE

FIRE EQUIPMENT is valuable in proportion to its ability to spill water on a conflagration, but it is of the greatest possible advantage to start the spilling process at the earliest moment after the fire has been started. There are a hundred reasons why prompt action is more efficacious than would follow the use of a mass of equipment on a procrastinating basis. There is no possible way of determining the relations which must exist between the effort required to quench a fire after it is well under way, as compared with the lesser effort, when the work is promptly begun. It might even be looked upon as a wasted effort to discuss this phase of the problem, but if it is well understood, it is amazing that fire departments persist in adopting animal-drawn equipment, when the automobile situation is sufficiently well in hand to serve every need, besides offering the advantage of greater promptness in putting streams on fires.

It is not the purpose here to delve into the theory of fire fighting, unless superficially, and to the extent which will be necessary in order to emphasize the importance to be attached to promptness. It is conceded that a fire equipment should possess a certain vigorousness, but it is only a matter of a few days ago when the writer witnessed the burning to destruction of a building with the fire engines stuck in the mud within a block of the scene of action. The engines were big enough; they were designed to throw a sufficient stream of water to accomplish the purpose, but they were handicapped by their weight, the condition of the pavement, and the inability of the horses to make headway.

This extreme case will serve as the preliminary in a further illustration of the differences which are not always taken into account. Admitting that the equipment should have a certain ability, it must also be conceded that it must be mobile. It is just as necessary to be able to move with speed and a certain exactness in going to a fire as it is to be able to apply vigorous streams of water, and remembering that a fire may be most readily quenched if the streams are directed thereon at the propitious moment, it may be that speed of the apparatus en route has a greater measure of virtue than will be found in a large capacity pumping engine.

These very ideas lead up to a detail which is pretty generally overlooked by the City Fathers in their widsom; if it is a distinct advantage to move to a fire with speed and certainty, it will be almost equally advantageous to speed back again in order to be ready for any possible contingency which may arise. If the fire equipment is sufficiently mobile, and has the property which will make it efficacious, it will not only do its work quickly, due to a prompt start, but it will be back again at its station awaiting an alarm.

Without attempting to be exact, it might be within the bounds of reason to proclaim that a company, if it arrives on the scene of a fire within half the time as ordinarily taken will be able to do its work at one quarter of the loss which would result under the first conditions named, but if it does its work in half the time, it will be available to do other work the other half of the time, and conclusions may be drawn as follows:

(A) One half as much fire equipment will accomplish the given work.
(B) The fire loss will be reduced to one-quarter.

Municipalities are never justified in counting the cost of a fire department in dollars expended. It is necessary to consider the saving of life and property which is realized by utilizing an organization of this character. It makes no difference then, as to whether or not the automobile type of fire fighting equipment will cost more or less than the conventional (animal drawn) equipment, since at any price likely to be charged, the equipment will cost but a small percentage of the saving it will effect to the community.

It is not conceded that automobile fire-fighting equipment will be more expensive than the animal-drawn apparatus, for the reason that the very promptness with which streams may be applied to fires reflects the small time which would be taken in putting them out, and if the equipment will do the work in less time, less of it will have to be used in a given zone for fire protection. Entirely aside from the conditions as above enumerated, there is still another angle from the cost point of view, which amounts to a paramount issue.

It is the uniformed force which bears most heavily, financially, upon the community, and if it is true that automobile fire equipment would reduce this force numerically, if it might not be cut in half, the cost of maintenance will then be nearly halved, and the difference in money value will be sufficient to pay interest upon a vast amount of equipment, but the conditions are such that the increase in equipment would not have to be made.

Fig. 1—Horse and carriage formerly used by Chief Lally in the Borough of Brooklyn, New York City, with 141 square miles of territory to cover

ENLIGHTENED METHODS ARE MAKING SUBSTANTIAL HEADWAY

Despite the uproar which is frequently made by reluctant taxpayers, the automobile is making inroads in fire-fighting work, and it is only necessary to discuss the situation using some one illustration to bring out the point which it is desired to make. Take for illustration the Boroughs of Brooklyn and Queens in the City of New York. Deputy Chief Thomas Lally in charge, who answers to every second alarm, must cover over 141 square miles of territory. In the old days the work was done by the horse and carriage, as shown in Fig. 1; but it was obviously impossible for a general officer to be first at a fire in a territory so large if the fire happened to be in a remote district. As for covering two fires within a short time of each other, to do so with the horse and carriage was utterly impossible.

The first change from the old idea came with the purchasing of a 16-horsepower Locomobile, as shown in Fig. 2, and while the little car was a revelation to the department, and gave the utmost satisfaction, the fact remains that it was the smallest size of regular touring car as then made by the company, and it indicated quite comprehensively the attitude of the City Fathers who seem to count the cost of the individual automobile in dollars rather than the value of the service.

After two years of the most strenuous type of service it was decided that the 16-horsepower Locomobile should be put in good working order and held in reserve. Up to this time the horse and carriage were held in reserve, but the extraordinary value of the service rendered by the Locomobile made it impossible to consider the advisability of using a horse and carriage, even in a supernumerary capacity. The next move was in the nature of a distinct advance, resulting in the purchase of a 50-horsepower Berliet (Alco), as shown in Fig. 4. This car offers the extra advantage of increased weight, larger diameters of tires, more power, storage capacity for clothing and appurtenances, and the speed over cobblestone pavement, of which Brooklyn has some hundreds of miles, is considerably higher than that which was formerly realized.

The conditons in Brooklyn are such that the Deputy Chief in charge turns out for first alarms in the high-pressure zone, on the park slope and along the water front, and, as before stated,

Fig. 2—Sixteen-horsepower Locomobile which was purchased by the department to replace the horse and carriage shown in Fig. 1. and is still in use as a supernumerary

Fig. 3—Oldsmobile police patrol as used by the department at Lansing, Mich., with excellent results, illustrating the added advantage of automobiles in police departments

for every second alarm. A canvass of the situation indicates with reasonable accuracy that Chief Lally goes to at least one fire per day for every day in the year, and not counting departmental inspections, travels at least a distance of 10 miles per run. It will readily be observed that there is no possible animal-drawn vehicle which would be capable of making these long runs on any basis whatever.

In the old days, then, considering the exigencies of service, the general officer in command of the department rarely ever gave the fire fighters the benefit of his skill and experience, and it was even a question if district deputies went to all the fires within the confines of their own territory. It is probably true that battalion chiefs went to every fire, but it cannot be said of them that they arrived in time to be of maximum service.

It is of incalculable advantage if field officers are on the ground ahead of the engine companies, for then they will be in a position to determine as to the extent of the conflagration, locations of hydrants, characteristics of the structures, and will be enabled to determine as to the best plan of action, so that when the companies come up they may be instructed in accordance with a definite plan of action.

On divers occasions it was found that additional alarms should be sent in, and the general officer upon arriving, even ahead of the companies which respond to the first alarm, promptly sent in the additional alarms, which, according to judgment, would call out the requisite number of companies, and by so doing save much valuable time. In the old way, the second, third and fourth alarms were turned in successively upon the arrival of the respective commands, and frequently the Chief of the Department found the distance too great to permit of responding to anything but a third or fourth alarm.

Experience with the automobiles as used by general officers has been favorable, and in so many ways that fire equipment of the automobile type is expanding at a rapid rate, so that to-day it is possible to procure from reliable makers divers types of equipment. Fig. 5 represents a Knox type of a hose wagon, as used in the New York Fire Department. This wagon, in addition to affording a sufficiently large platform on which to lay down the hose, offers the special advantage of a high-pressure nozzle, mounted on a stand, and mechanically designed to swivel into any desired position. The wagon is of stout design, with a tool box located under the body at the rear, and facilities for the orderly placing of firemen's appurtenances, and such other contrivances as are used in this service.

A platform for the hose is much more efficacious than any form of reel thus far tried out, not only as respects the length of hose which can be carried, but from a point of view of speed when running a line at a fire. The reel idea has its awkward situations. The hose is likely to be tangled up on occasions, and the total length of hose which can be reeled on is variable, depending upon the care with which the work is done; but it must be appreciated that care suggests time, which must be taken. The bottom illustration, Fig. 11, shows a Knox type of hose wagon, which is devoted to the high-pressure service in the New York Fire Department, and it illustrates how the hose is carried on the platform. There have been many attempts to improve upon this plan, but nothing thus far seems to possess the inherent merit of this simple process. The center illustration of

Fig. 4—Berliet (Alco) fifty-horsepower touring car now used in the Borough of Brooklyn by Deputy Chief Lally to cover one hundred and forty-one square miles of territory

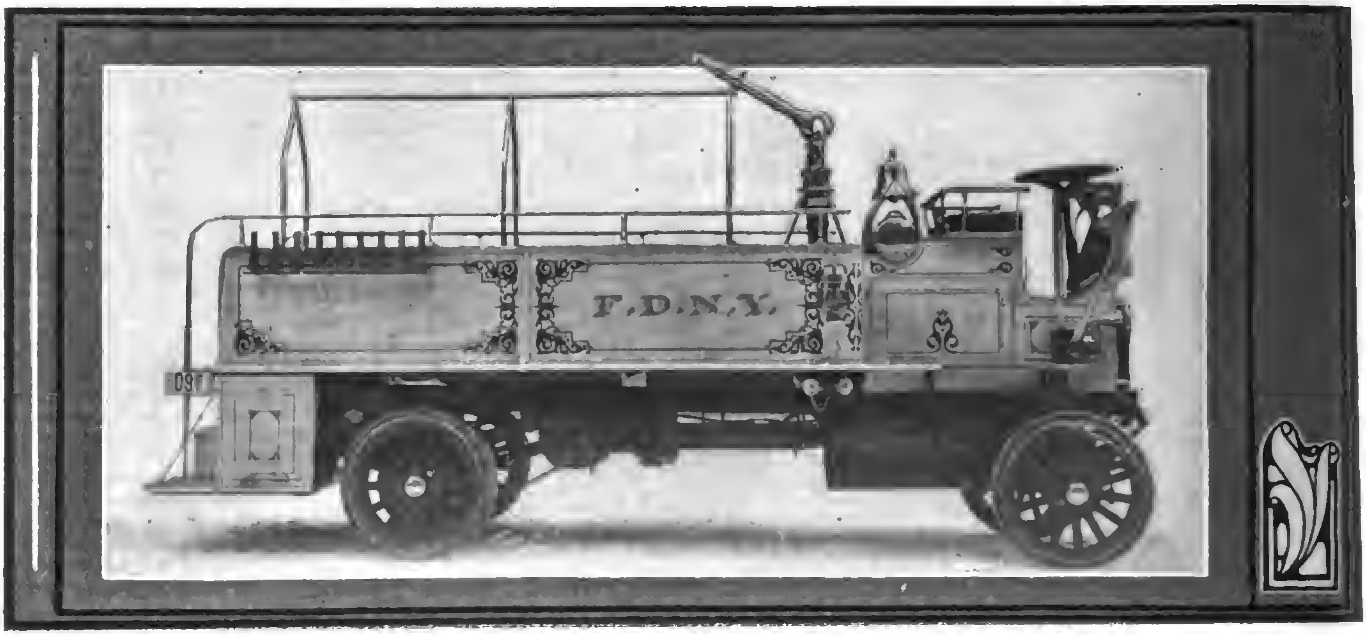


Fig. 5—Knox hose wagon, with swivel nozzle mounted in front, as used in the New York Fire Department

Fig. 11 shows a type of wagon as manufactured by Thomas B. Jeffery & Co., which serves for the first alarm work, having all the advantages of a chemical engine with a sufficient length of hose on a reel, and an ample supply of tools, as pikes, axes, etc., with seating capacity for the full company, and all the advantages of speed and endurance that are possible to obtain in connection with an automobile. The top illustration of the same figure presents a Pope-Hartford chemical equipment, which is used by the Bristol Fire Department, in connection with which provision is made, not only for the chemical apparatus and hose, but ladders as well.

Fig. 8 shows still another type of chemical as made by the Everitt-Flanders Company, the particular example heing in use at Taunton, Mass. In this case the Chief, with a limited crew, is enahled to go to a fire at top speed, and arriving on the scene in time frequently permits him to put out the fire hefore it assumes more than still alarm proportions. This car and the manner of its use offers a clinching argument in favor of prompt action.

Figs. 6, 7, 9 and 10 were taken by R. D. Lillie, especially for THE AUTOMOBLIE, at Lansing, Mich., and they represent the advanced methods which obtain in this progressive city. Fig. 6 shows the engine ready to go into action with hose, ladders, lamps, tools and a chemical auxiliary availahle for instant use. Fig. 9 is another view of the engine, which was taken in front of the fire house at Lansing, just as the same would appear ready

Fig. 6—Webb engine mounted on an Oldsmobile chassis as used at Lansing, Mich., showing the same going into action

to respond to an alarm. The Lansing chemical is shown in Fig. 10, and it has heen found to serve the purpose with high efficiency. The Chief's wagon is presented in Fig. 7. It is a runabout type of automobile, seating four, and is equipped with a chemical auxiliary, lanterns, tools and such other fire-fighting facilities as will he found of great advantage during the early stages of a fire.

The illustrations here offered cover the field in a general way, and to view them properly is to reach one conclusion of perhaps the greatest importance, from the point of view of fire-

Fig. 7—Chief Hugo R. Delfs, of the Lansing Fire Department, starting for a fire in the Oldsmobile

fighting. Promptness, which is said to be a virtue, is best exemplified in this class of work, and each one of the efforts made had this promptness as the underlying feature.

HIGH-PRESSURE SYSTEMS INCOMPLETE WITHOUT AUTOS

In the big cities, especially New York, modern "skyscrapers" so called, although they are said to be ahsolutely fireproof, must be protected from fires in adjacent huildings, and to whatever extent furnishings augment the fire risk, these buildings, some of them 30 stories high, can only be protected when a high-pressure system is employed, and even then promptness in applying streams has even greater virtue than would be true under ordinary conditions, due to the relative inaccessibility of the fires when started, and to the greater risk.

Fig. 8—E-M-F car used at Taunton, Mass., showing a chemical equipment on the running board; also the chief and company.

If a high-pressure system is available, which is true in New York City, all that is required is the requisite number of hose wagons, as illustrated in Fig. 5, and perhaps towers, although every building of importance within the metropolitan areas is provided with a system of standpipes. It was shown that the utilization of automobiles for field officers made it possible for them to go to every second alarm fire, even when the district covers more than 140 square miles, and to respond to first alarm fires within the solidly built-up districts. If it is advantageous to have the general officers so equipped that they will be enabled

Fig. 9—Webb engine in Oldsmobile at Lansing, Mich., standing in front of the fire house ready for instant use

to reach the scene of a fire first, this is equal to saying that the company should arrive soon enough to accept directions. It must be quite plain to any one that in the absence of fire equipment with which to proceed with the work, a general officer arriving on the scene can do but very little. It is the effort which counts above everything else, if the apparatus is not far behind, and if the streams can be applied forthwith.

In addition to the fire equipment proper, there are other situations to be taken into account, as, for illustration, the tenders. Then, there are the police patrol wagons, and hospital ambulances. It is of equal importance that these auxiliaries to a fire department, which is what they become under severe conditions, should be equipped to proceed with the utmost speed and certainty promptly upon call.

GASOLINE PUMPING ENGINES NOT SUFFICIENTLY DEVELOPED

One reason why automobile fire fighting equipment has not been adopted more readily, may be assigned to the absence of suitable headway in the design and production of pumping engines of the class which utilize gasoline motors as the source of power. This phase of the situation has been retarded for two reasons, one of which lies in the lack of enterprise of the makers of automobiles. They have confined their efforts to the class of cars which were most readily sold (pleasure automobiles), but they are beginning to realize that there is such a thing as overproduction, and they probably do appreciate the necessity of having a second line of defense. Commercial automobiles are rapidly supplanting horse-drawn vehicles in ordinary commercial pursuits, and as they develop along substantial lines, they will serve as the basis for special efforts, and with slight modification become available as the basis of design of fire-fighting equipment.

It is possible that public opinion will have to be aroused, to some extent, in the process of completing the evolution in favor of automobile equipment for fire departments, and unfortunately, the public is now divisible into two camps, the one of which realizes the stability of automobile equipment and the increased value which comes from its use; the other is bound down by inertia, which comes from lack of knowledge, hence absence of appreciation, and decries efforts at advancement.

Fig. 10—Chemical used at Lansing, Mich., showing an Oldsmobile chassis and every facility for quick work

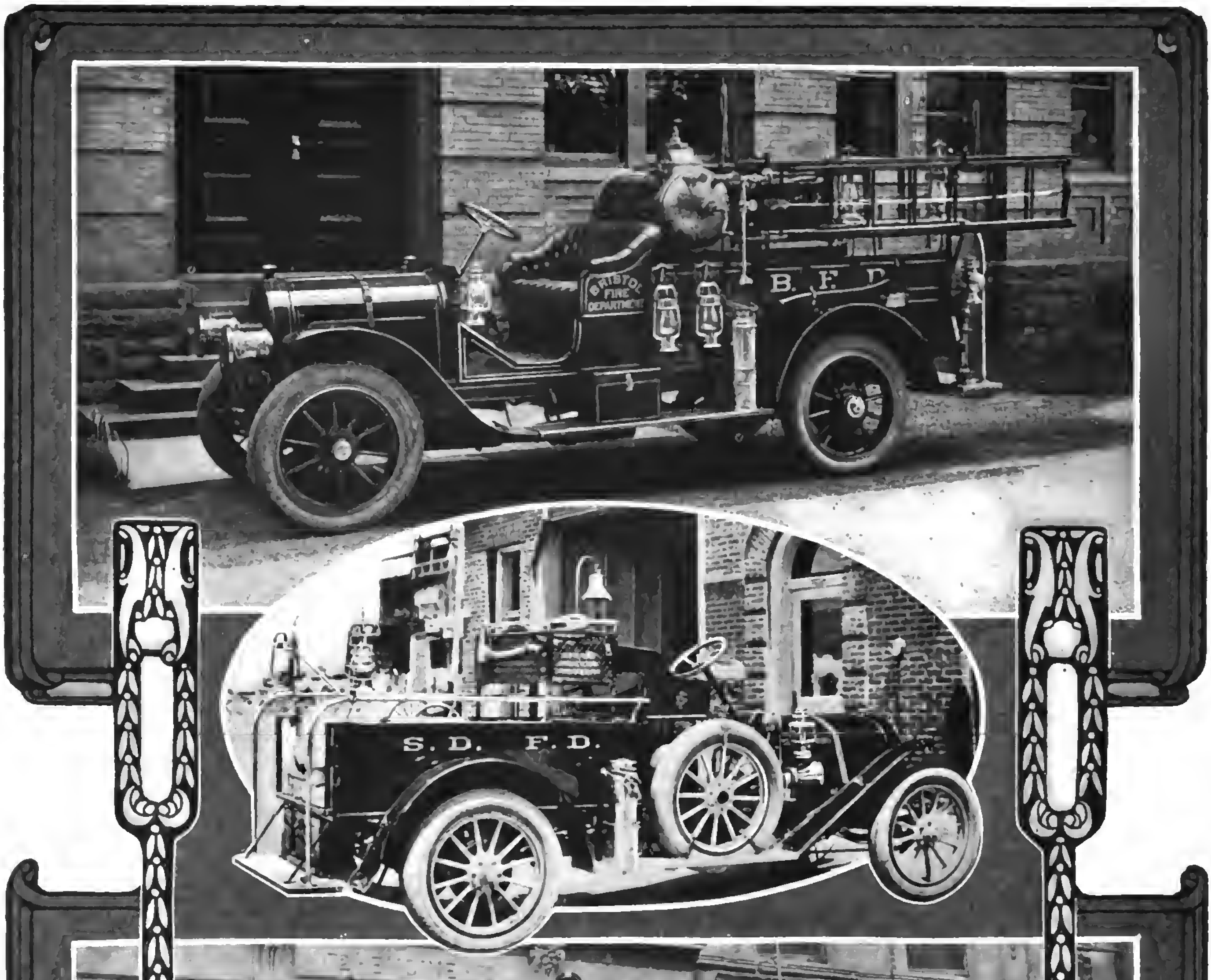


Fig. 11—Top—Pope-Hartford chemical equipment as used by the Bristol Fire Department. Middle—Example of Rambler fire-fighting automobile. Bottom—Knox hose wagon used by New York Fire Department

FINIS

Graphical Determination of Transmission Loads

By L. C. FREEMAN

THE question of the selection of the proper sizes of ball-bearings for any given set of conditions is one that should receive the consideration of those most expert in their design and application. However, in change speed gear design, where the ratio between the diameters of the bearings and the diameters of the gears is small, the sizes of the bearings have so great an influence on the center distance of the shafts and the shape and outline of the casing that a change in the bearings from those originally laid out frequently necessitates the redesigning of the whole job. This, viewed from an economy standpoint, is a sheer waste of money that can be avoided and easily too. With an idea of aiding in this the following article was written.

This analysis is presented with the idea in view of determining the most important factor to be considered in the selection of the bearings, viz., the maximum loads imposed on them by the action of the gears. This will be found, and has been found in actual practice, to call for bearings of such size that a consideration of the other factors will not change them to an extent sufficient to cause a rearrangement of the entire mechanism. The other principal factors to be considered are the effects of unbalanced rotating parts, of brakes and sprags, of universal joints, of variations in the loads and the period of these variations. The latter will usually be found to permit a certain per cent. overload on reverse, sometimes 75 per cent. or over, due to its infrequent use.

The assumption then on which this analysis is based is that there are no forces acting on the bearings except those due to the gear pitch line loads.

The data required is the maximum turning moment, the diameter of the driving wheels, the load on the rear axle and the maximum coefficient of friction between the tires and the ground.

The method can best be illustrated by assuming the data and working out an actual example.

The motor develops 40 horsepower at 1,000 revolutions per minute. Spur gears, 6-8 pitch, having a pressure angle of 20 degrees. Bevel gears, 5 pitch, with 14 1-2 degrees pressure angle. The pressure on the bevels is assumed to act on the largest pitch diameter.

The arrangement of gears and numbers of teeth is shown in Fig. 1. Center distance of shafts, 4 1-2 in.

Gear	1—20 teeth,	6-8 pitch	3.333	pitch diameter
"	2—34 "	6-8 "	5.666	" "
Gear	3—28 teeth,	6-8 pitch	4.666	pitch diameter
"	4—26 "	6-8 "	4.333	" "
"	5—36 "	6-8 "	6.000	" "
"	6—18 "	6-8 "	3.000	" "
"	7—15 "	6-8 "	2.500	" "
"	8—18 "	6-8 "	3.000	" "
"	9—20 "	5 "	4.000	" "
"	10—60 "	5 "	12.000	" "

Note.—Paper read at semi-annual meeting of the Society of Automobile Engineers, Jan. 13, New York City.

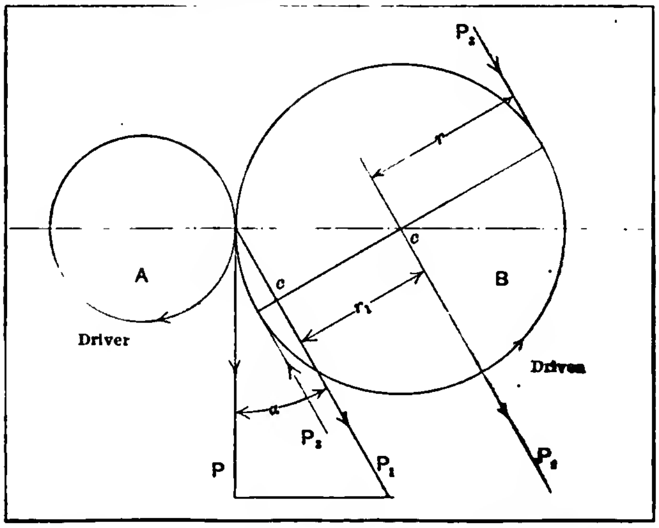


Fig. 2—Diagram of tangential pressure on gear teeth

Thirty-four-inch driving wheels with 2,500 pounds on the rear axle.

Sixty per cent. maximum coefficient of friction between the tires and the ground.

$$\text{Maximum turning moment is } \frac{\text{Horsepower} \times 33{,}000 \times 12}{N \times 2\pi} = pr.$$

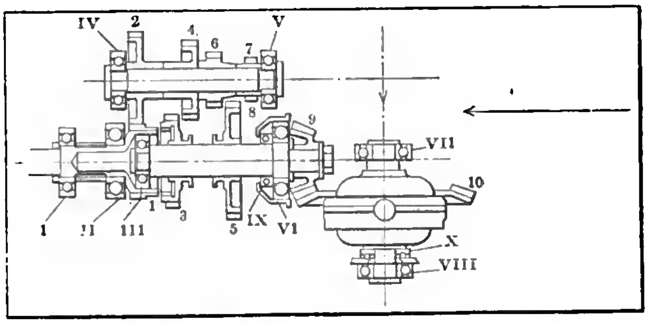
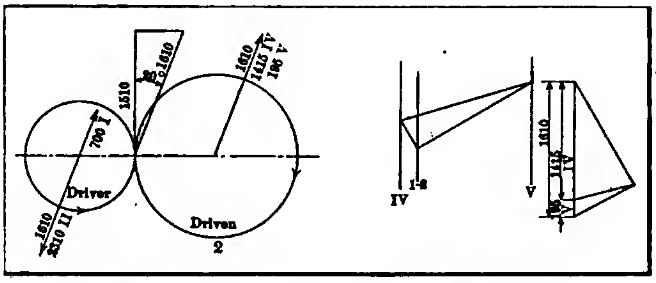


Fig. 1—Arrangement of gears in an actual example of a transmission



Figs. 4 and 5—End view of pitch circles showing notation

Where N = revolutions per minute;
r = radius of gear in inches;
p = tangential pressure on pitch line.

$$\frac{40 \times 33{,}000 \times 12}{1{,}000 \times 2\pi} = 2{,}520 \text{ inch-pounds.}$$

Pressure at largest pitch diameter of bevels necessary to slip

$$\text{wheels} = \frac{2{,}500 \times .60 \times 17}{6} = 4{,}250 \text{ pounds} = \text{maximum pitch line}$$

load on bevels. This is equivalent to a turning moment on the pinion shaft of 4,250 × 2 = 8,500 inch-pounds.

Turning Moment on Pinion Shaft

Pitch line load on constant mesh gears is

$$\frac{2{,}520}{1.666} = 1{,}510 \text{ pounds (gears 1 and 2) } 2{,}520 \text{ inch-pounds.}$$

Pitch line load on second speed gears is

$$\frac{1{,}510 \times 34}{26} = 1{,}970 \text{ pounds (gears 3 and 4) } 4{,}600 \text{ inch-pounds.}$$

Pitch line load on first speed gears is

$$\frac{1{,}510 \times 34}{18} = 2{,}850 \text{ pounds (gears 5 and 6) } 8{,}550 \text{ inch-pounds.}$$

Pitch line load on reverse gears is

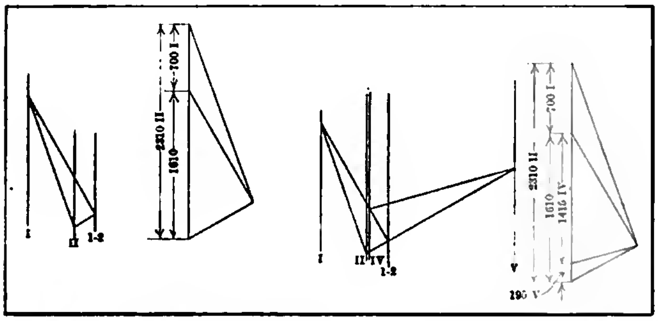
$$\frac{1{,}510 \times 34}{15} = 3{,}420 \text{ pounds (gears 5, 7 and 8) } 10{,}250 \text{ inch-pounds.}$$

But 8,500 inch-pounds is the maximum turning moment that can be applied to the pinion shaft without slipping the wheels.

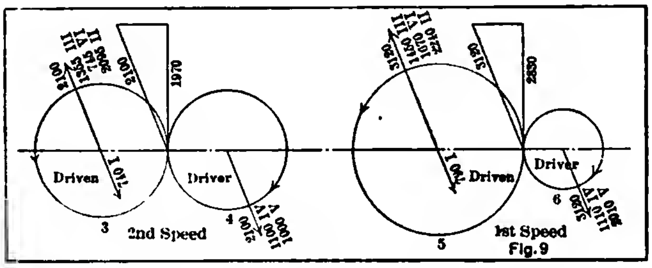
It will be seen that this is slightly less than that due to the first speed gear, and that the full power of the motor cannot be transmitted on reverse.

The pressure on the bearings of a pair of gears is equal to the pitch line tangential pressure multiplied by the secant of the pressure angle of the tooth, and the sum of the loads on the bearings of one gear is equal to the sum of the loads on the bearings of the other. That this is true may be seen by reference to Fig. 2.

A is the driver, B the driven gear, P the force acting tangent to the pitch circle, P_1 the pressure along the line of action, α the



Figs. 6 and 7—Graphical method of finding component forces acting



Figs. 8 and 9—Stress diagrams for gear pairs 3 and 4, 5 and 6

pressure angle, P_2 the pressure on the bearings parallel to P_1, and the forces P_2 form the resisting couple.

The moment of P about O equals the moment of P_1 about O.

$$P_1 = P \sec \alpha \qquad \frac{r}{r_1} = \frac{P_1}{P} \qquad Pr = P_1 r_1$$

$$r = r_1 \sec \alpha$$

The turning moment must be equal to the resisting moment, or $Pr = P_1 r_1 = 2 P_2 r$. (1). Taking moments about c,

$$\frac{P_2 (r + r_1) + P_2 (r - r_1)}{r_1} = P_2$$

$$\frac{2 P_2 r}{r_1} = P_2 \text{ from (1) } \frac{2 P_2 r}{r_1} = P_1 \therefore P_1 = P_2$$

Similarly for gear A

Fig. 3 is a skeleton diagram of Fig. 1, giving the distances between the centers of the gear pairs and bearings. All end views are taken in the direction of the arrows.

Lay off end views of the pitch circles of the gear pairs showing direction of rotation as in Fig. 4, which represents the constant mesh gears 1 and 2. Normal to the center line lay off the pitch line tangential pressure to scale, and consider it as one of two components of the pressure along the line of action, the other being parallel to the center line of the gear pairs.

This pressure along the line of action is equal to the sum of the pressures on the bearings of gear 2 and to the sum of the pressures on the bearings of gear I, and for each shaft must be resolved into two parallel components acting at the centers of the bearings. These will be inversely proportional to the distances from the centers of the bearings to the centers of the gear faces.

The graphical method of finding these components is exactly the same as that for finding the reactions of the supports of a beam with a concentrated load. The solution for gear 2 is shown in Fig. 5, where the pressure on bearing IV is found to be 1,415 pounds and on bearing V 195 pounds.

In Fig. 6, the solution for gear I, it will be noticed that the pressure on bearing II is equal to the sum of the pressure on bearing I and the pressure on the line of action of gear I; that the pressure on bearing I acts in the opposite direction from that on bearing II, and that there is no pressure on bearing III from this gear pair.

These bearing pressures are then transferred to the end views of the gear pairs as in Fig. 4, thus determining their direction. Fig. 4 then shows the magnitude and direction of the pressures on all the bearings affected by the action of gears 1 and 2. Figs. 5 and 6 may be combined as in Fig. 7, thus reducing the number of measurements to be made, and consequently the liability of error.

Figs. 8 and 9 are the end views of gear pairs 3 and 4, and 5 and 6, respectively. Figs. 10 and 11 are the end views of gears 5, 7 and 8, Fig. 10 showing the reverse idler above the other two gears, and Fig. 11 shows it below. If, because of structural difficulties, the reverse can be placed in but one of these positions, the other, of course, will not be considered.

It will be noticed that the pitch line load on the first speed and reverse gears in Figs. 9, 10 and 11 is taken as 2,830 pounds instead of 2,850 pounds for the first speed, and 3,420 pounds for the reverse, which we found by figuring from the motor torque. However, we have seen that 8,500 inch-pounds is the maximum turning moment that can be applied to the pinion shaft without slipping the wheels. The radius of gear 6 is 3 inches and

$$\frac{8{,}500}{3} = 2{,}830 \text{ pounds, which is the maximum pitch line load on}$$

gear 6.

Although the pitch line loads on the first speed and reverse gears are the same, the point of application of the load is in a different plane, and so it is necessary to construct the equilibrium and vector diagrams for each case. The bearing load distribution is the same for Fig. 11 as for Fig. 10, the only difference between the two cases being in the direction of the pressures.

Fig. 12 is the load distribution diagram of Fig. 8. The pressure on the line of action, 2,100 pounds, is resolved into the two parallel components 1,100 and 1,000 pounds acting on bearings IV and V respectively, and also into the components of 1,355 pounds and 745 pounds acting respectively on bearings III and VI. The

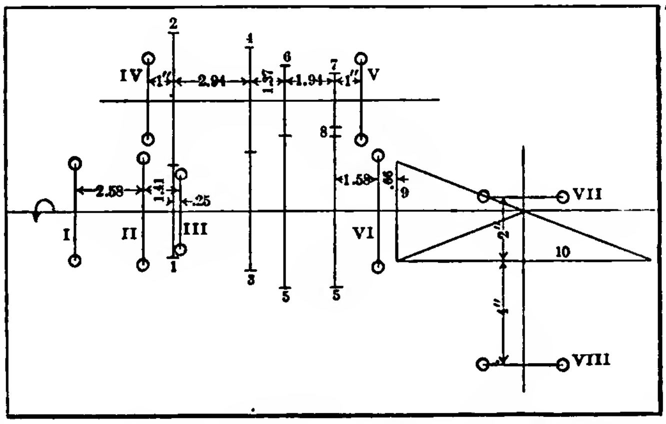
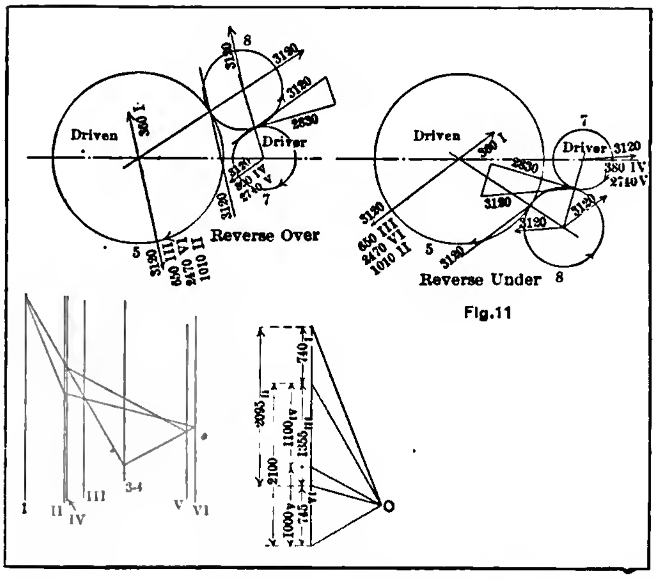


Fig. 3—Diagrammatic layout of transmission giving distances



Figs. 10, 11 and 12—Layout and stress diagrams for gears 5, 7 and 8

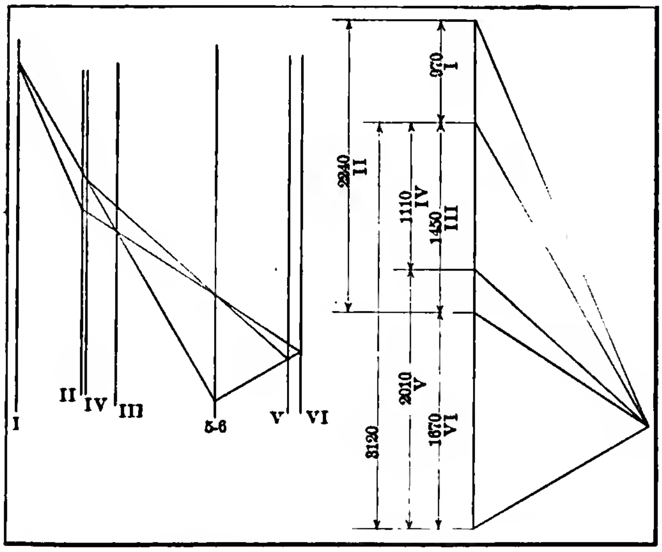


Fig. 13—Load distribution diagram for first speed gears

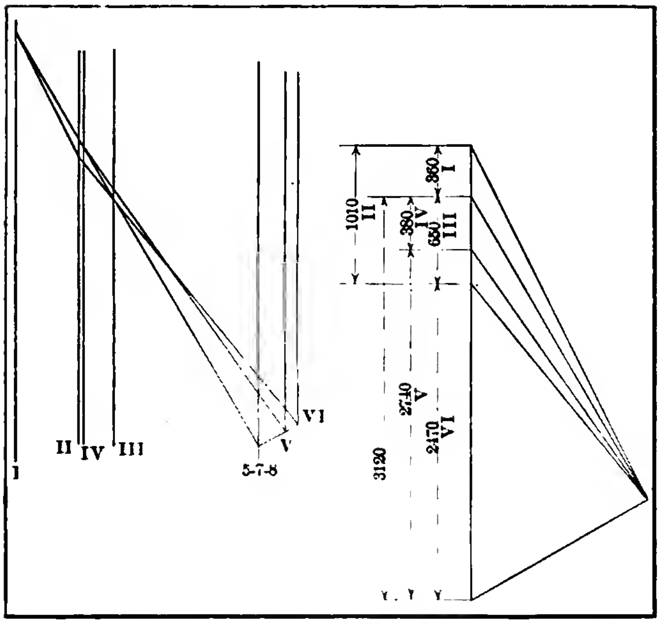


Fig. 14—Load distribution diagram for reverse gears

load of 1,355 pounds on III is then resolved into loads of 740 pounds on I and 2,095 pounds on II.

Figs. 13 and 14 are the load distribution diagrams for first speed and reverse, respectively.

The general equation for thrust on a bevel gear pair is:

$T = P \tan \alpha \sin \beta$, where

T = thrust.

P = tangential pressure on pitch line.

α = pressure angle.

β = pitch angle of gear.

The equation for radial load is:

$$L = \sqrt{P^2 + (P \tan \alpha \cos \beta)^2}$$

where L = radial load.

These mathematical expressions do not show the direction of the forces acting, and as these have to be taken into consideration, the graphical method which gives a complete solution is used. This is in fact the principal reason for the use of the graphical method throughout this analysis.

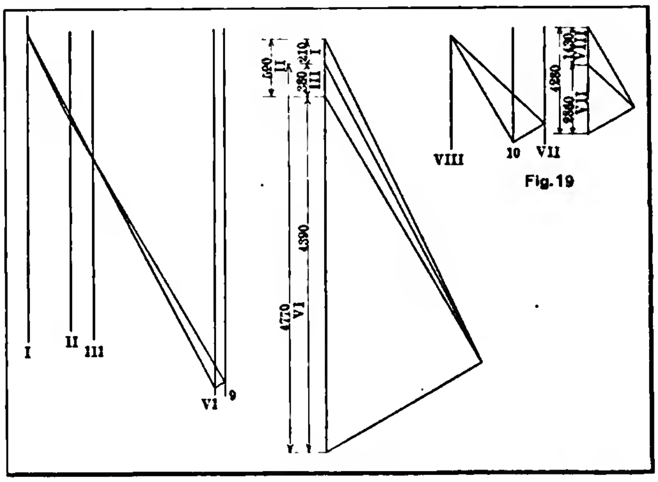
Notation for Fig. 15.

A = Driving pinion.
B = Driven gear.
α = Pressure angle.
β_1 = Pitch angle of gear.
β = Pitch angle of pinion.
P = Tangential pressure on pitch line.
P_1 = Pressure on line of action.
P_2 = Thrust component of P_1.
P_3 = Pinion thrust.
P_4 = Gear thrust.
P_5 = Pinion radial component of P_2.
—— 1,510 pounds (gears 1 and 2) 2,520 inch-pounds.
P_6 = Gear radial component of P_2.
P_7 = Pinion radial load.
P_8 = Gear radial load.

The black arrows indicate forces acting on the gear, and the light arrows the forces acting on the pinion. If the three large triangles, P, P_1, P_2; P, P_7, P_6, and P, P_8, P_6, were revolved downwardly about their shortest sides as an axis until in planes at right angles to the paper, they would represent the magnitude and direction of the forces acting in these planes or in parallel planes. The triangles P_2, P_3, P_4 and P_2, P_5, P_6 represent the magnitude and direction of the forces acting in the plane of the paper.

P is laid off on the common element of the two pitch cones. P_1 on the line of pressure and P_2 drawn normally to P precisely as for spur gears.

Care must be taken in determining on which side of P P_1 shall lie. This point is brought out more clearly by reference to the analogous spur gear diagrams in Fig. 16, in which it is seen that for the four cases the line of pressure has but two possible inclinations.



Figs. 18 and 19—Load distribution diagram for all bearings

P_2 is then resolved into two components, P_3 acting axially and P_5 radially on the pinion, and also into P_4 acting axially, and P_6 radially on the gear. Then the radial loads on the gear are P_6 acting in the plane of the paper and P acting vertically to the plane of the paper, and their resultant is P_8. Similarly the resultant of P_5 and P is P_7. These radial loads are then transferred to the end views of the gears as shown.

Careful attention should be paid to the direction of the forces and reactions, remembering that the direction of the resultant must be opposite to that of its components, and that the end views of the gears must be drawn on the same side as the force diagram. Thus, if the end of gear B was drawn on the opposite side (shown by the dotted lines) of the gear, the resultant radial load could not be directly transferred from the force diagram, but would have the apparent direction shown.

If in Fig. 15 the angle between the shafts become 90 degrees.

$$\beta + \beta^1 = 90 \text{ degrees.}$$
$$P_3 = P_6.$$
$$P_4 = P_5, \text{ as in Fig. 17,}$$

while if the shafts are parallel

$$\beta = \beta^1 = O.$$
$$P_2 = P_5 = P_6$$
$$P_3 = P_4 = O$$
$$P_1 = P_7 = P_8$$

which will be seen to be identical with the spur gear diagrams, in which the thrust is O and the radial load on both gears equals P_1.

We have seen that 4,250 pounds is the maximum pitch line load on the bevels, so that in Fig. 17 P equals 4,250 pounds and the radial and thrust loads are found to be as follows:

Pinion radial, 4,390 pounds.
Pinion thrust, 345 pounds.
Gear radial, 4,290 pounds.
Gear thrust, 1,035 pounds.

The load distribution on the bearings is shown in Fig. 18 for I, II, III, VI, and in Fig. 19, for VII, VIII.

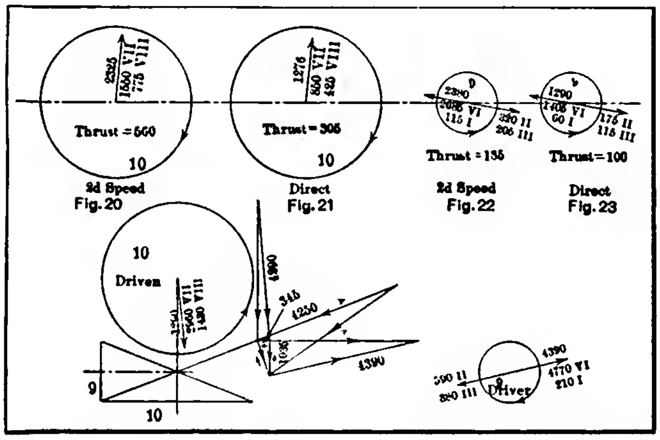
The maximum pitch line load of 4,250 pounds on the bevels occurs only on first speed and reverse. This pressure, on second speed, is equal to the tangential pressure on gear 3 times the ratio of the diameter of gear 3 to the diameter of gear 9.

$$1{,}970 \times \frac{4{,}666}{4} = 2{,}300 \text{ pounds}$$

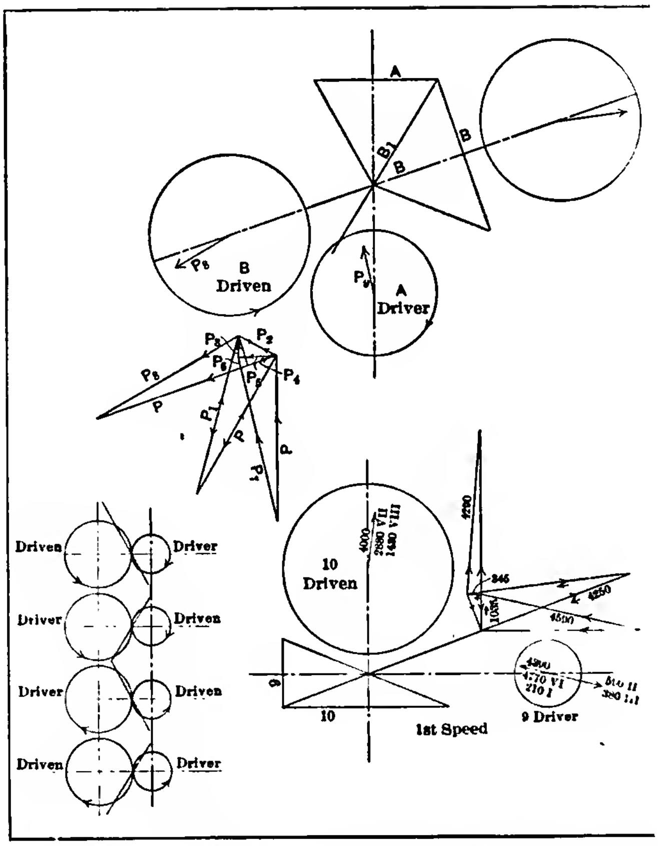
and on direct is equal to the turning moment of the motor divided by the radius of gear 9.

$$\frac{2{,}520}{.2} = 1{,}260 \text{ pounds.}$$

The bearing pressures due to the action of the bevels are proportional to the bevel gear pitch line tangential pressure, and as the forces act in the same direction they can be calculated and plotted from Fig. 17.



Figs. 20, 21, 22, 23 and 24—Differing pressures with varying speeds



Figs. 15, 16 and 17—Variation in thrust and radial load with angle

	DIRECT	2D SPEED	1ST SPEED	REVERSE OVER	REVERSE UNDER
I	60	560	600	840	900
II	175	1730	1880	2620	2860
III	115	1200	1150	270	590
IV	0	960	950	1100	1620
V	0	960	1860	2550	2820
VI	1405	3150	6150	7170	6150
VII	850	1550	2860	2860	2860
VIII	425	775	1430	1430	1430
Pinion Thrust	100	185	345	345	345
Gear Thrust	305	560	1035	1035	1035

Fig. 25—Tabular summation of all loads on each bearing

Fig. 20 shows the pressures thus obtained for VII and VIII, on second speed, and Fig. 21, the same bearings on direct. Figs. 22 and 23 show the loads on bearings, I, II, III, VI, for second speed and direct respectively.

The load distribution is quantitatively the same for reverse as for first speed, but as the direction of the forces are different, a new diagram must be made for this case, as in Fig. 24.

Figs. 25 is a further analysis of Figs. 4, 8, 9, 10, 11, 17, 21, 22, 23, 24, by means of which the summation of all the loads acting on each bearing on each speed is determined. It will be noticed that bearing I on direct is affected by the bevels only, while on second speed it has loads imposed on it by the action of three different sets of gears; the constant mesh, second speed, and bevels. The resultants are found for each case and tabulated as in Fig. 25. Knowing the percentage of overload on reverse allowable for the type of bearing used, this will form a sound basis for the design of the gear.

From a close inspection of this table and the values given therein, which are the result of some involved figuring, the student of such matters will find a great deal to interest him.

How Efficient Lubrication Reduces Maintenance

LUBRICATION presents to-day the same fertile field for thought or experimentation as it did in 1832, 78 years ago, when General Morin, the famous French engineer, first gave the world the now comparatively well-known laws pertaining to that subject. From that day to this, little has been done of a constructive nature, the worthy attempts in that field being more destructive or spasmodic. Instead of clarifying the situation, this later work has served to cloud the real issue, and even to-day, instead of a world-wide propaganda of education, the lubricating men are more likely to be found engaged in purely commercial efforts.

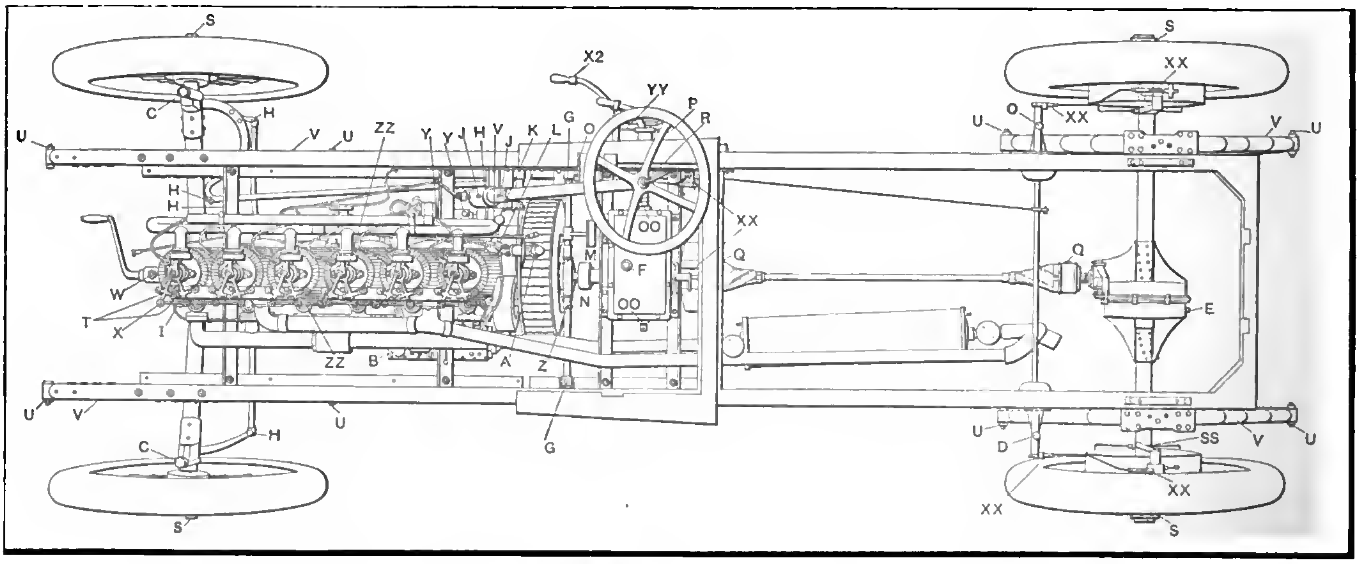
When a man buys a building, he insures it, engages a caretaker, looks after painting, repairs and other things, so as to keep the factor of depreciation down to the very lowest possible point. At that, the amount set aside or figured for replacement is on the basis of a shorter term of years than this type of building has been known to last. So, it happens that finally a time comes when an amount has been set aside sufficient to replace the old building with a new one, and still the old building stands and is of use. In short, due to forethought and care, the building is available for several years' use or to produce income without a corresponding outlay.

Why then is it that the same care and forethought is not applied to the purchase of some other class of realty, as, for instance, an automobile? Insurance, certainly; painting, surely; repairs, always; but care of the working parts, seldom. Under the heading of care should be included the most important item of all and by the same token, the most neglected, that of lubrication. By this is meant proper and complete lubrication.

This is a matter which may be capitalized in dollars and cents so as to show the owner of an automobile just what to expect for each degree of outlay of time and money in lubricants and lubrication.

Thus, at the bottom of this page is shown a lubrication diagram of a modern automobile. In this, the points to be oiled or greased are indicated by means of arrows pointing to them, while each one is lettered. The frequency of lubrication may be tabulated referring to the points indicated and using the letters as there shown. It has in fact been done on the opposite page, although at a casual glance, it is not apparent. The various points needing lubrication have been gathered into a list and a value, or length of time which each part may run without lubrication renewal, assigned to each. This gives when plotted a line of frequency of lubrication, or curve of necessity. Necessity because if not heeded or avoided, rapid depreciation, or even accident, may be the ultimate if not immediate outcome. Now since experts differ and differ somewhat radically as to the exact mileage from any one part before a renewal of lubricant is necessary, there is some excuse for the liberties taken with existing figures, one maker's table being given on a later page.

These renewals being plotted give a curve from these needing lubricant attention at all times, that is to say, practically continuously up to those others, like rod ends, which need scant attention in the ordinary course of running. As opposed to this, another curve is superimposed in which the work done by each part is given a relative importance value, and the whole of these values plotted to form a curve. Since the number of rotations per unit of time varies from the engine through all connecting and interrelated parts back to the wheels, as well as in the parts which never make a full turn, but rotate say 45 degrees once in awhile, it is apparent that the importance varies with these turns. Probably the most important part, the crankshaft, has the highest



Lubrication Diagram of Franklin Automobiles, Shown to Illustrate Number of Points Needing Frequent Lubrication

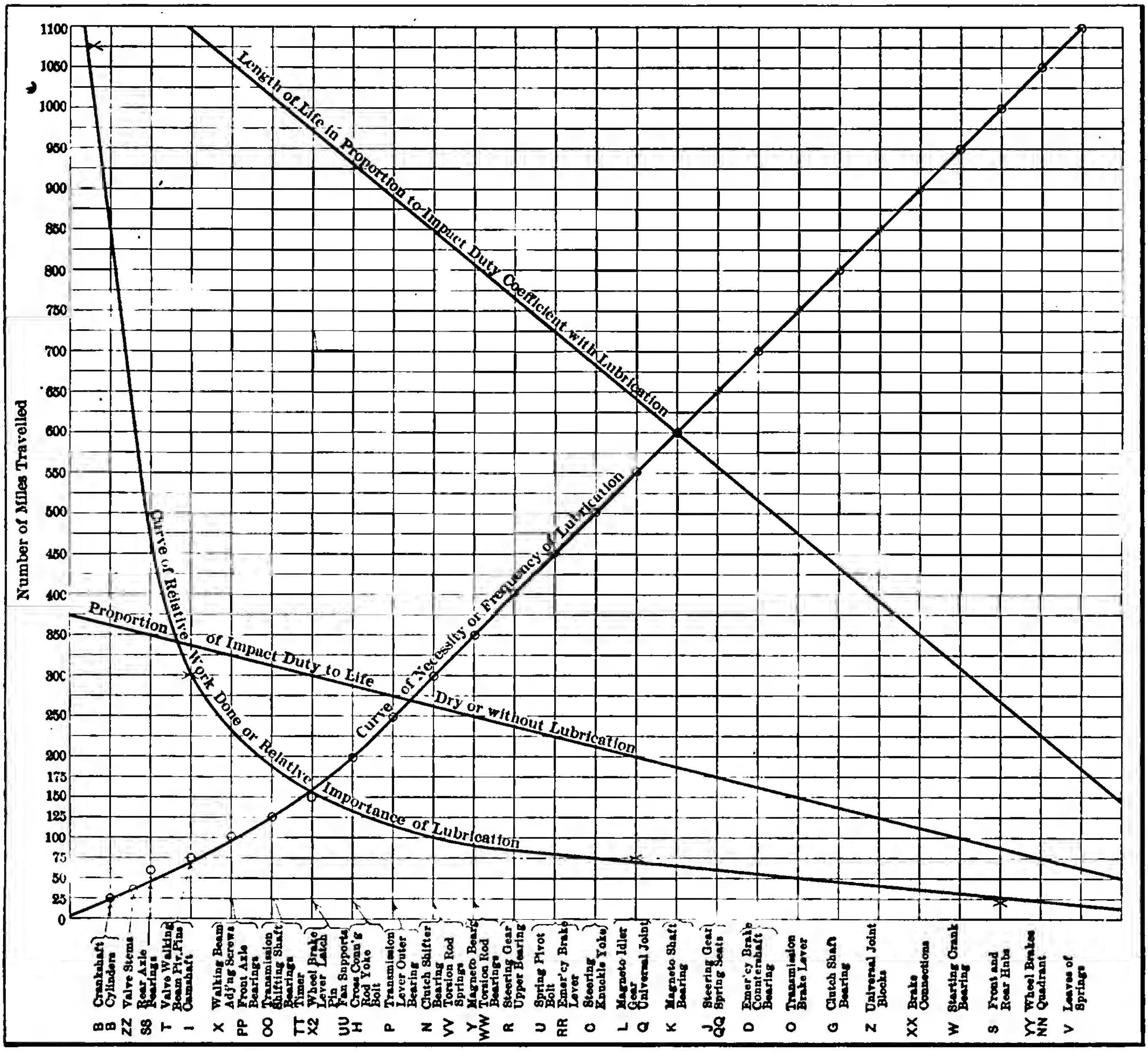
speed of rotation, while parts of partial rotation may easily be classed as of least importance. This, then, gives a relative relation of the turning parts, based upon number of turns. As the latter in a measure marks the necessity of or for lubrication, it is both logical and correct to label this curve, as has been done, relative work done or relative importance of lubrication. In inspecting this curve, it will be noted that it has a hyperbolic form due to the fact that the lineal or surface speed inducing friction and wear of any rotating part varies as the square of the number of rotations.

Of course, the nature of the curve, as just explained, is such that the highest point of the second curve is the lowest or starting point of the first. In other words, it is more important to always lubricate the crankshaft exactly on time, giving it an approximation to perfect lubrication, than it is to bother with the multitude of small and less important parts. This may be stated as follows: If you will neglect some parts, as to lubrication, by all means select those at the lower end of the second curve.

In this same chart will be noted a pair of additional curves. In plotting these, it was considered that the parts which make the greatest number of turns per unit time, and consequently, total, are those which have the greatest amount of duty charged against them. This duty has a direct and very close bearing upon impact so that the matter may be represented as an impact-duty coefficient, which would not be an ultra-difficult matter to determine in any one given case. This could be determined as a numerical quantity for purposes of pure reasoning, or simply as a series of results, for more general use.

Moreover, it is apparent that every piece in the machine has a certain length of life, which may be increased by superior lubrication. This length of life bears some close relation to the impact-duty coefficient, in that the greater the duty and impact, the more the care given to the design, material, workmanship, and assembling of the part, to say nothing of the lubrication care. All these combine to give the part of greatest importance a longer life, or at least a relatively longer life, when account is taken of the impact-duty coefficient. So, it is that this curve, length of life in proportion to impact-duty, will be found to slope continuously from the parts of greatest work done down to those of least work. In short, the curve is a straight line from the crankshaft to the rod ends.

To emphasize the beneficial effect of copious lubrication, another curve has been figured and plotted on the same co-



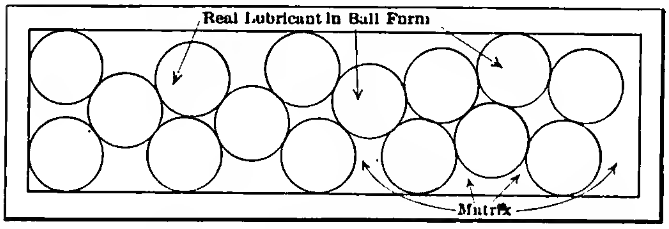
Curves Which Show Relation of Frequency of Lubrication to Relative Work Done and Impact-Duty-Life Coefficient

TABLE OF LUBRICATION ATTENTION NEEDED BY THE AVERAGE AUTOMOBILE CHASSIS

No.	Parts	Lubrication	Give Attention	Miles	No. of Places on Chassis
1	Front Hubs	Grease		1,000	2
2	Steering Knuckles	Grease		200	2
3	Springs	Oil	Every day	....	2
4	Carbureter Primer	Oil	Every day	....	1
5	Starting Handle	Oil	Every day	....	1
6	Steering Rod	Oil	Every day	....	2
7	Fan Support	Oil		300	1
8	Tie Rod	Grease		200	2
9	Fan Bearings	Grease	Every day	....	1
10	Springs	Oil	Every day	....	2
11	Springs	Oil	Every day	....	2
12	Valve Tappets	Oil	Every day	....	8
12A	Rocker Shaft	Oil		300	4
13	Magneto	Oil (light)		500	2
14	Magneto Connection	Oil	Every day	....	1
15	Magneto Bearings	Grease		200	1
16	Steering Post	Grease		750	1
17	Timer	Oil	Every day	....	1
18	Steering Post	Oil		200	1
19	Clutch Bearing and Brake Pedal	Oil		200	2
20	Clutch Bearing	Oil		200	1
21	Clutch Ring	Oil		500	1
22	Gear Shift Lever	Oil	Every day	....	1
23	Emergency Brake Lever	Oil	Every day	....	1
24	Transmission	Oil (heavy-1" deep in case)		....	..
25	Torsion Rod Spring	Oil		300	1
26	Torsion Rod Bearings	Grease		300	1
27	Torsion Rod Bearings	Grease		300	1
28	Ball Joints	Oil		200	2
29	Universal Joints	Grease		250	2
30	Sliding Joint (Universal)	Grease		250	1
31	Brake Bearings	Oil		200	2
32	Brake Rods	Grease		300	2
33	Brake Equalizer	Oil		300	2
34	Brake Rod Ends	Oil		200	2
35	Brake Rod Ends	Oil		200	2
36	Springs	Oil		200	2
37	Brake Arm Bearings	Grease		200	2
38	Brake Rod Arm Ends (upper and lower)	Oil		200	4
39	Brake Rod Ends	Oil		200	2
40	Rear Hubs	Grease		1,000	2
41	Spring Seats	Grease		200	2
42	Rear Axle	Oil (heavy) to overflow		750	1
43	Springs	Oil	Every day	....	2

ordinates as the one just described, this being the same proportion of life to impact-duty, but without lubrication. Being based upon the assumption that a crankshaft running 600,000 revolutions without lubrication would be absolutely spoiled beyond repair, it probably represents an extreme case, since one-tenth of this is more nearly the average case. This curve, too, is a straight line so that the difference in the slope of the two curves or the area between them represents the loss which a man will incur by just simply being careless. The combination of the four curves closely placed is worthy of some study.

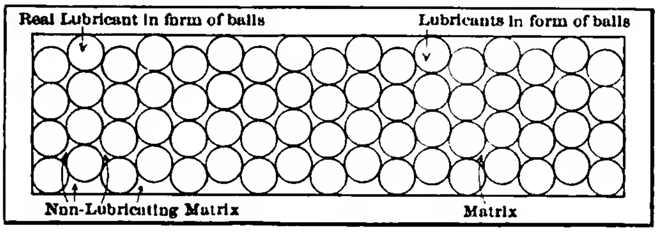
Lubrication as a subject is one that seemingly presents many angles, yet there are few things about it which will not yield to close application and study. Thus, speaking generally, there are two properties of all lubricants, in general, and oils or greases in particular, viscosity and body.



Imaginary Section Through Heavy Lubricant Showing Balls

The former, viscosity, is defined as that property by virtue of which lubricants form comparatively thick films between rubbing surfaces, thus permitting perfect lubrication. It has been defined by Davis as that property by which it clings to its own particles, or the degree of fluidity or resistance opposed to the separation of particles. This latter makes a difference between viscosity and adhesion, the latter being defined as the property of clinging to other particles than those belonging to itself.

The film spoken of as comparatively thick is in reality somewhat thin, having been measured by Reynolds as a minimum at .000375 in. in the case of a 4-in. diameter shaft, the bearing being larger by a radius of .00077, and the pressure being 100 pounds per square inch. Kingsbury in his experiments found the film to be of a thickness varying with speeds of from 80 to 190 revolutions per minute and loads of from 27 to 270 pounds per square inch from .00021 to .00023 inch.



Section Through Thinner Bodied Oil Illustrating Structure

These figures give some idea of the infinitesimal quantities, which are designated as comparatively thick. In the consideration of this film and the subject as a whole, a lubricant may be considered as a series of balls of one material, comparatively hard and resisting to some extent compression, these being encased in a body or matrix of non-lubricating or at least different lubricating qualities, the latter being very mobile. It is then conceivable that the shaft rolls upon the balls, the matrix simply serving to hold it together. Experimenters in this field find that the same lubricant often yields differing results in similar tests held under identical conditions. Is it not conceivable that this anomalous result is brought about by a variation in the quantity of matrix present, as well as the number and character of the balls, as to size, comparative hardness, comparative density of balls in the matrix and some other quantities?

This idea, as advanced and illustrated in several cuts on this page, is offered more for future than for present consideration.

One essential condition of film formation is that the rubbing surfaces should have a slight inclination to one another. This is furnished in the ordinary case by the difference in size of the shaft and the bearing. But when it is not furnished, lubrication is both imperfect and inefficient. Under these conditions, the effect of the lubricant in reducing friction between the two bodies depends upon that indefinable quantity called body or oiliness. This is not, like viscosity, understood, definite and measurable, but is considered as intensified viscosity in that part of the fluid which is within the region of attraction of the surface of the molecules of the metal, that is to say, it partakes of the nature of adhesion and attraction at the same time.

One bad feature of body from a testing standpoint is that it may be hidden by the effects of viscosity, which perhaps accounts for the lack of knowledge of it. In any one case under test, using a good fitting journal and bearing, the friction is determined definitely by three things: speed, pressure, and viscosity. Varying any one and holding the others stationary will give a varying result, but in each case a minimum value may be obtained.

In one test which the writer calls to mind, with a varying speed and pressure, this minimum was found at 180 degrees F. having a value slightly greater than .0005. In this test another point was brought out, the interrelation of viscosity and body.

TEST SHOWING RELATION OF VISCOSITY TO BODY

Increase of	Where Viscosity is Effective Coefficient of Friction	Where Body is Effective Coefficient of Friction
Pressure	Decreases	Increases
Speed	Increases	Decreases
Temperature	Decreases	Increases
Viscosity	Increases	Decreases
Body	....	Decreases

As the table above brings out, the variations in the two are diametrically opposite, one increasing when the other decreases.

(To be continued)

Interesting Test of a Centrifugal Pump

GENERALLY it is the understanding that the efficiency of centrifugal pumps will depend upon shaping of the vane to such an extent that great skill frequently falls short. There probably is something in this under certain conditions, as when very large pumps are required to handle vast quantities of water under high heads.

The following report made by H. Rees, for the E. R. Thomas Motor Company, seems to indicate that the main care is to have the vanes smooth and the inlet free from obstructions. The capacity of the pump, under automobile conditions, will then be up to the requirement.

The first pump tested was with rough cast impeller, the results being shown on the data sheet. The impeller rotating in such a direction that the convex side of the bucket or vane was forward. As the results were so close to those of the third pump tested the curve was not plotted.

A pump with the impeller inlet smoothed out and running in the reverse direction, i. e., with concave side of bucket forward, was then tested with the result as shown by data sheet, test No. 2, and small circles on curve sheet.

The third pump tested was identical with No. 1, excepting that the impeller inlet and deflector were smothered up. The curve is shown by the characters X.

The fourth pump had an impeller made up of sheet brass, the buckets extending tangentially from a 7-16 circle and being driven as shown on the curve sheet.

From the experiments it seems that it matters little which way the impeller is rotated, but considerable is gained by using smooth blades and an unobstructed inlet.

MODEL M CENTRIFUGAL PUMP

R. P. M. of Pump	Gallons Per Minute Test No. 1	Test No. 2	Test No. 3	Test No. 4
225				Impending delivery
413		Impending delivery		
435			Impending delivery	
445	Impending delivery			
600	7.38	7.34	7.25	
750	....	9.2	9.34	9.35
900	11.7	10.9	11.3	....
1050	....	....	13.3	....
1200	15.1	15.9	15.7	16.7
1500	19.7	19.3	19.7	20.8
1800	23.0	25.5	23.6	....
1950	....	....	....	28.4
2100	28.3	26.5	27.2	....
2250	28.9			....
2400	....	31.6	32.9	35.2
2550	33.2	....	....	....

While the subject is up it will be opportune to settle one other point in relation to centrifugal pumps, using for the purpose tests from the same source. It is generally understood that the capacity of a centrifugal pump is as the square of the speed, and if this law holds, it follows that the amount of water delivered will be vastly more than the requirement at the higher speeds. The tests as follows will show just what is the relation of speed to delivery and that the square law does not prevail in small pumps as made for this purpose.

TEST OF A CENTRIFUGAL PUMP FOR A LARGE MOTOR

Head on suction side was maintained about 2 inches below top of radiator and head on delivery side about 6 inches above.

R. P. M. of motor	R. P. M. of pump	Head pumped against inches H. G.	Gal. pumped per minute
400	600	0.5	....
500	750	1.1	6.5
600	900	1.7	8.5
700	1050	2.3	10.5
800	1200	2.9	12.5
900	1350	3.5	14.5
1000	1500	4.1	16.0
1100	1650	4.7	18.0
1200	1800	5.3	19.5
1300	1950	5.9	21.0
1400	2100	6.5	22.5

Head pumped against given below means increase of delivery head over suction. The two heads being measured just before and after leaving pump. Pump would just circulate water at 400 revolutions of motor or 600 revolutions of pump.

TEST OF A SOMEWHAT SMALLER PUMP

R. P. M. of motor and of pump	Head pumped against	Gallons pumped per minute
400	0.5	...
500	0.5	5.8
600	0.5	7.5
700	0.6	9.5
800	1.0	11.5
900	1.6	13.4
1000	2.3	15.2
1100	3.0	17.0
1200	3.3	18.4
1300	3.7	19.5
1400	4.5	20.2
1500	5.2	20.5

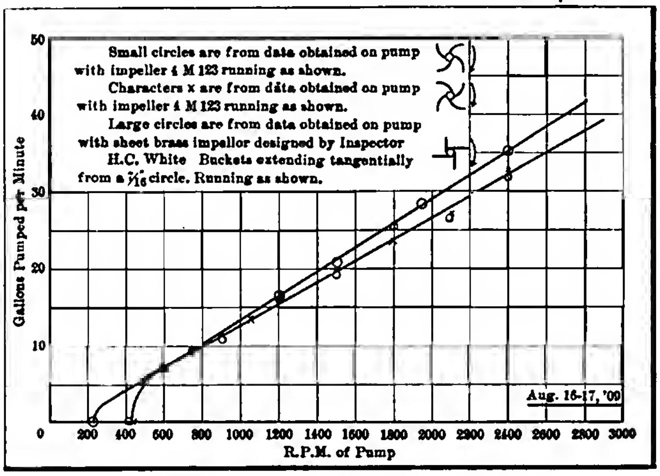
GEAR PUMP DELIVERY IN RELATION TO SPEED

R. P. M. of motor	R. P. M. of pump	Head pumped against inches H. G.	Gal. pumped per minute
100	150	0.5	4.5
200	300	2.0	9.5
300	450	4.0	14.5
400	600	5.7	19.0
500	750	7.2	23.5
600	900	8.8	27.5
700	1050	9.6	29.5
800	1200	10.2	30.5
900	1350	10.4	30.5
1000	1500	10.4	30.5
1100	1650	10.3	30.0
1200	1800	10.2	29.5
1300	1950	10.0	29.0
1400	2100	9.8	28.3
1500	2250	9.5	27.0

Neglecting delivery heads, the three pumps compared as follows:

R. P. M. of pump	Gallons pumped per minute Large centrifugal pump	Small centrifugal pump	Gear pump
100	...	...	2.6
200	...	...	6.1
300	...	...	9.5
400	...	...	12.8
500	...	5.8	16.2
600	...	7.5	19.5
700	6.0	9.5	22.5
800	7.3	11.5	25.1
900	8.5	13.4	27.3
1000	10.0	15.2	29.0
1100	11.0	17.0	30.0
1200	12.3	18.4	30.5
1300	13.5	19.5	30.5
1400	14.3	20.2	30.5
1500	16.0	20.5	30.4
1600	17.2	...	30.3
1700	18.5	...	30.0
1800	19.5	...	29.5

It will be observed that the gear pump performs admirably, excepting that noise must be considered at higher speeds, and, as the test shows, there is a certain falling off in capacity as the speed increases. Since the cooling requirement does not increase with speed to any great extent, it is only the noise that has to be considered, unless with gear pumps the wear is greater.



Test Curves of Thomas Model M Centrifugal Pump

*An Improved Absorption Dynamometer**

By C. M. Garland, Urbana, Ill.

In testing prime movers, the engineer often laments the dearth of efficient power-absorbing apparatus. Especially is this true in the testing of small high-speed machines, such as automobile engines and steam turbines. In many cases the number of machines to be tested is large; in fact, in some instances each machine is given a brake horsepower test before leaving the factory; and in every case where a high degree of reliability is essential from the output, the percentage of machines undergoing test must be large. The attention of the writer was forcibly called to this need several years ago in the testing of a small steam turbine running at 2,300 revolutions per minute, and through this experience the type of apparatus described below was designed and has been used with satisfactory results.

In the design of such a piece of apparatus the following points were to be considered. These are enumerated in the order of their supposed importance.

a. It should be free from binding or "seizing."

b. It should be free from producing changes in the load, due to changes in the apparatus itself, such as change of temperature, wear or friction of parts, etc.

c. It should be capable of absorbing and accurately indicating a wide range of loads, from zero to the full capacity of the machine.

d. The regulation of the load should be positive and instantaneous.

e. The apparatus should require a minimum amount of attention and be capable of continuous service.

f. It should be self-contained, occupy a small amount of floor space, and be free from noise and the splashing of oil and water.

g. It should be capable of being quickly changed from one prime mover to another.

h. It should require a small amount of cooling water.

In considering the above items, it will be noted that items *a* and *b* practically eliminate mechanical-friction apparatus from the field, while items *b*, *c* and *d* practically eliminate machines depending upon the friction or resistance of liquids for their operation. With these two classes of apparatus removed, there only remained the principle of magnetic induction for the construction of an efficient absorption dynamometer.

THEORY OF ACTION

From this principle we know that a conductor revolving in a field of variable magnetic intensity has an electric current induced in it. The reaction of this current upon the field that produces it causes a torque between the conductor and the field. There are two ways of dealing with the current induced in the conductor. In the one, the current may be collected by a commutator or slip rings and carried off from the machine; in the other, the current, or rather currents, generated in the conductor may be allowed to remain, and, circulating in the paths of least resistance, they will ultimately short-circuit among themselves and produce heat.

In the first case, we have simply a dynamo mounted in a cradle. This serves as a very efficient and satisfactory type of dynamometer. There are, however, objections to its use. The currents generated must be taken care of either by water rheostats or lamp banks or utilized in the performance of work. Water rheostats and lamp banks require considerable attention and occupy space. Owing to the irregularities in the testing, the utilization of the current for the performance of work is in most cases impracticable. The initial cost of a testing unit of this type is necessarily large.

If the currents in the conductor are permitted to short-circuit themselves, the conductor is heated; the amount of heat produced

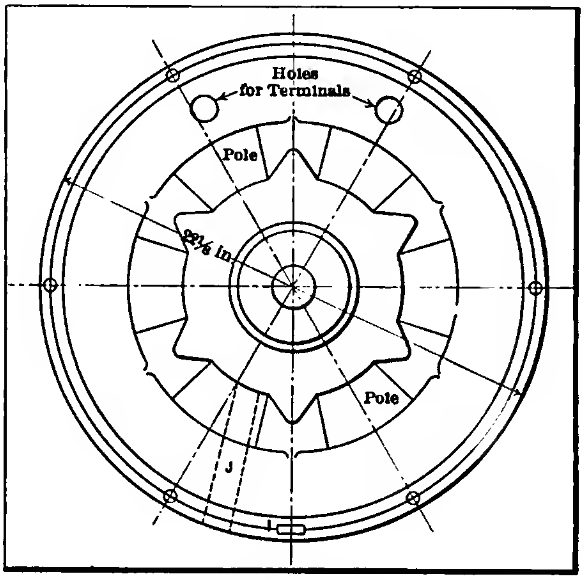


Fig. 2—Left half of field casting, Garland Dynamometer

is equivalent to the work absorbed by the dynamometer; and the heat thus generated may then be carried off by cooling water. This is the principle utilized in the design illustrated, a description of which follows.

DESCRIPTION OF DYNAMOMETER

In brief, the dynamometer consists of a metallic disc revolving between a set of pole pieces so constructed as to produce a magnetic field of variable intensity. Fig. 1 shows the front view of a machine designed to absorb 45 horsepower at from 1,200 to 1,500 revolution per minute. Fig. 2 is an end elevation and part section showing the construction of the dynamometer. It will be seen from this figure that it consists of a copper disc *A*, mounted on a bronze hub and revolving in front of pole pieces *B B'*. The magnetic circuit is made up of the casting *C*, the air gap and the cover plate *C'*. The castings *C* and *C'* are bolted together and carry the exciting coil *D* and the bearings *E* and *E'*. The magnetic yoke, made up of casings *C* and *C'* carrying the field coil and disc, is supported in ball bearings, and is prevented from rotating with the disc by the spring balance shown in Fig. 1. This latter measures the pull or torque between the rotating disc and the stationary yoke.

The magnetizing coil is encased in copper, the terminals being carried out through holes in the casting *C*, which are carefully sealed after the coil is in place.

The heat generated by the short-circuiting of the eddy cur-

* Paper read before the Boston meeting, American Society of Mechanical Engineers, March 11.

rents generated in the copper disc, is carried off by the cooling water which enters through the base connection at *F* (Fig. 2) and passes up through the bearings into the field casting. It then passes out through openings which are not shown in the illustration. This water not only carries off the heat generated, but serves as a lubricant for the bearings. That which passes through accumulates in the central chamber *E*, and is discharged at the base of the machine through the drains *G G'*.

Fig. 2 is a detail drawing of the left half of the field casting *C*, shown in section in Fig. 1. It will be seen that there are six poles in the machine. The circulating water enters at *I* and leaves through the port at *J*. Similar ports are provided in the cover plate *C*, Fig. 2.

OPERATION OF TEST

In operating, the engine under test is directly connected to the dynamometer shaft by means of some form of flexible coupling, the cooling water is turned on and the engine is started. After normal speed is reached the load may be thrown on by energizing the field coil. The amount of current and consequently the torque or pull on the spring balance is regulated by a rheostat connected in series with the coil. After running a few minutes the quantity of cooling water is adjusted so that the temperature of the machine does not exceed 150 deg. Fahr. In larger machines the coil may be wound with asbestos-covered wire and the temperature permitted to reach 212 deg., so that the cooling water is evaporated within the dynamometer. This reduces the quantity of cooling water required about 75 or 80 per cent.

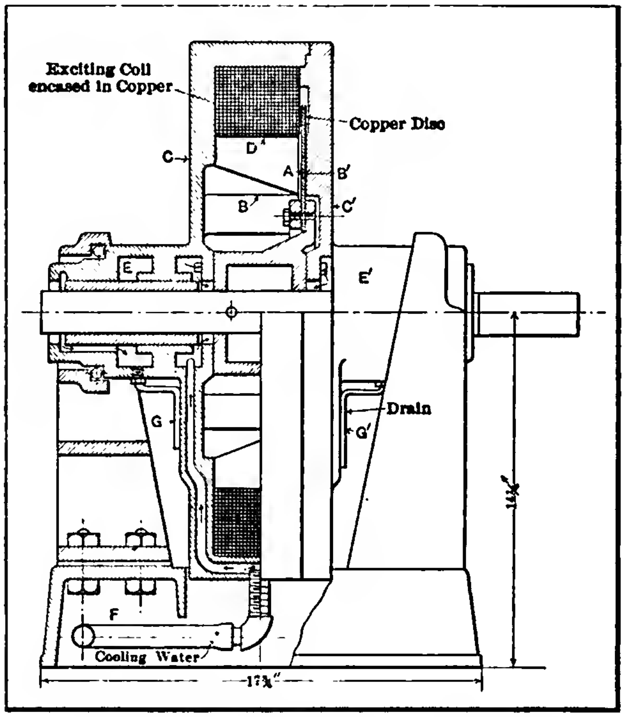


Fig. 1—Section through New Garland Dynamometer from end

The normal working temperature having been reached, the load on the machine remains absolutely constant, provided the line voltage is constant, for the mechanical friction, which is the bearing friction of the revolving disc, is small and practically constant, and changes in temperature due to changes in the supply of cooling water also affect the load on the dynamometer very little. The regulation hy the rheostat is instantaneous and positive. When the dynamometer is driven by a smooth-running engine, the torque as indicated by the spring balance will not show a variation of 1-8 pound, while the balance is sensitive to less than 1-16 pound. This indicates an accuracy that is not necessary even in the most refined testing work.

RELATION BETWEEN SPEED AND TORQUE

In the case of the present machine the torque is almost proportional to the speed and is maximum at about 600 revolutions per minute. From this point the torque props off about 15 per cent. at 1,200 revolutions per minute, and remains almost constant from 1,200 to 1,500 revolutions per minute.

The torque depends upon the speed, number of poles, thickness of air gap, thickness of the copper disc, shape of the copper disc, and shape and spacing of the pole pieces. By varying the number of pole pieces, and the thickness of the copper disc, the point of maximum torque on the speed-torque curve may be shifted anywhere from 25 revolutions per minute to 2,500 revolutions per minute.

CONCLUSION AND RESULTS

This type of dynamometer is well adapted either for the testing of high-speed motors with a wide variation in speed, such as the automobile engine, or for the testing of slow-speed apparatus having a small variation in the speed. It can be built in practically any size from 10 horsepower up. The principal disadvantage is the high initial cost, although this is not an item where serious and continuous testing work is going on, as in factories or in the laboratories of technical schools, for the labor saved and the increase in capacity resulting through the use of the machine will in a short time more than pay for the initial outlay.

The efficiency, which may be expressed as the ratio of the energy absorbed by the dynamometer, minus the energy supplied to the exciting coil, divided by the energy absorbed by the dynamometer, may be made anything up to 99.9 per cent. and depends upon the weight of copper placed in the coil. Ordinarily the efficiency is made about 96 per cent., or 4 per cent of the power absorbed by the dynamometer is required in the form of electrical power for excitation.

Electric Vehicle Operation Cheaper Than Horses

UNDER the above heading, the following masterly summary of the electrical vehicle situation was printed in a recent issue of the *Electrical World:*

"The investigation boils down to this: that in the case of the Commonwealth Edison Company, where a large number of electric power wagons and horse rigs has been employed side by side, the actual cost of operating the electric vehicles is shown to be sensibly less than that of operating the horse-drawn vehicle. The comparison has been made very carefully and thoroughly and the result is a triumph for the electric commercial wagon.

"Furthermore, the cost of operating electric vehicles is decreasing rather than increasing, whereas the reverse is true in the case of the horse-drawn rigs. The decrease in the case of the electric type is due to improved construction, greater care in operation and decreasing cost of electricity. The increase in the cost of operating the horse wagons is largely to be ascribed to the constantly rising price of feed. The electric vehicle has the advantage also in that it presents a better appearance and makes for a cleaner, more sanitary city. In the matter of maintenance of pavements, also, the electric vehicle possesses a decided superiority. Weight for weight, the electric wagon will cause less deterioration of the pavement than the horse wagon, to say nothing of a substantial reduction in the cost of street cleaning where the electrics are employed. Again, the greater ease of control and compactness of the electric vehicles tend to relieve the congestion on the streets of large cities.

De Lesseps at the Wheel of his Own Monoplane, "Le Frégate"

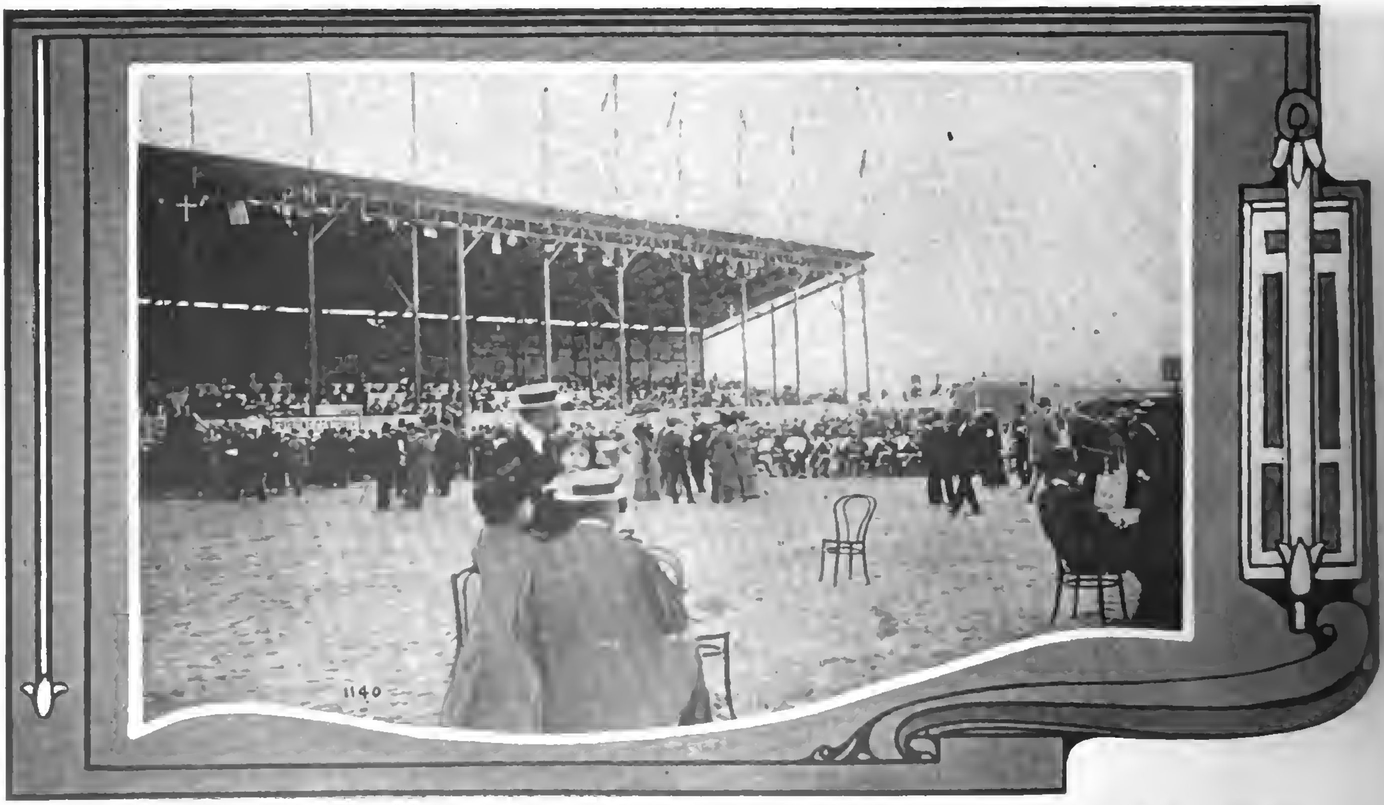
ACCIDENTS, both to men and machines, marked the aeronautical meet at Heliopolis, Egypt, in the shade of the Pyramids, from February sixth to thirteenth, eight days of flying. Nearly all the accidents were due to the winds, which were unusually severe at times. Such spells of windy weather were followed closely by unusual calms, so that, taken all in all, it averaged up to good flying weather. The accidents to men totaled four, one being somewhat serious, while no less than six machines were seriously damaged, three of them being reduced to scrap.

Some of the accidents took place before the week of flying actually opened, so that the aviators were not only deprived of the use of their machines, and in some cases, the personal ability to manage a 'plane, but were obliged to sit by later and see others win valuable prizes. The latter were indeed liberal, being distributed over the single days, for each of which there was a prize of $200, in speed, height, and distance, but also for the whole meeting, including as grand prizes the following: Prix de Baron Empain, for the greatest distance for a single uninterrupted flight, $10,000; second prize, $2,000; third prize, $1,000; fourth $500; fifth, $500 and sixth $200. Then there was the Prix d'Heliopolis for maximum height; first $10,000; second, $2,000, and third, $1,000. For the flight from Heliopolis to the Pyramids and return the prize consisted of a cup valued at $400, and $2,000 in cash added. Finally, for the greatest total distance for the whole week, made in official flights, the Grand Prix d'Egypte, amounting to $5,000 for first, $2,000 for second, and $1,000 to the winner of third. All in all, the stakes were rich, amounting to more than $40,000.

Of this Rougier gained the greater portion amounting to nearly $19,000, which he secured by winning the Prix d'Heliopolis for height, the Grand Prix d'Egypte for greatest total distance, as well as a number of the smaller daily prizes.

Next to Rougier, the prize winners were Métrot, who won the Prix de Baron Empain; Le Blon, who captured the prize for speed over a measured 10 kilometres (6.21 miles), and Balsan, the fastest over a measured 5 kilometres. The latter was numbered among the unfortunates, in that on the third day of the meeting, when the wind was unusually severe, he was the only one to attempt a flight. This, as it turned out, was a foolhardy thing to do, for on his first turn an adverse wind bore him to the ground and wrecked the machine. Fortunately he was not injured personally, and, being able to secure another machine. continued his spectacular flights.

On the first of February, five days before the meeting, Mortimer Singer suffered a deplorable accident, which, coupled with a similar accident to Latham, served to call attention to a



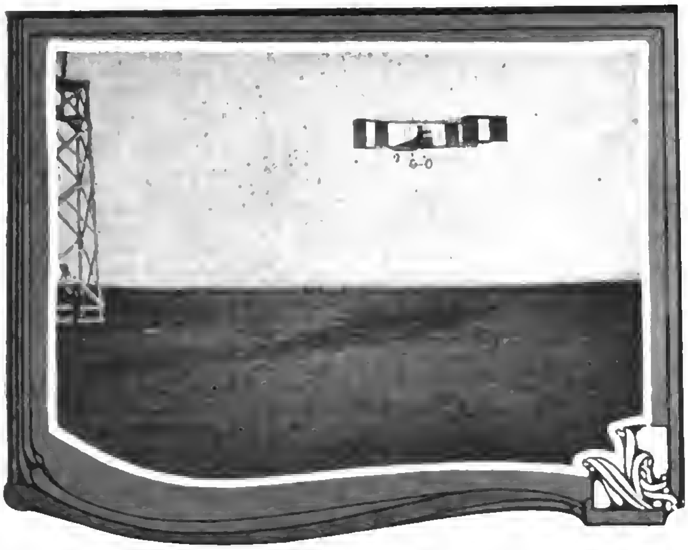
General View of Crowd and Grand Stand at Heliopolis Aero Meeting. The Khedive of Egypt Was an Interested Spectator

hitherto overlooked item, the effect of eddy currents upon an aviator. This accident to Singer, and the similar, though fortunately less disastrous, mishap which overtook Latham flying at the same place on his Antoinette monoplane, have once more drawn the attention of aviators to the dangers attending flight in what appears to be a dead calm of the atmosphere. It will be remembered that the first serious accident which happened to an aviator using a motor on his flying machine was due to the same cause as those which have just occurred at Heliopolis, or at least it took place under similar circumstances. It was in perfectly still air that Henry Farman, flying at Issy-les-Moulineaux on the Voisin aeroplane with which he had, about a month previously, gained the Deutsch-Archdeacon prize by traveling in the air a kilometre out and home to his starting point, was capsized by a rising current which caught only one of the wings of his machine. At least that was the impression of the pilot, who was stunned by the fall and cut about the face by the wire stays of the aeroplane. Since then numerous aviators have experienced the inconvenience of the eddies which rise from the ground in an apparently still atmosphere. Those eddies or little whirlwinds are most treacherous, and experienced aerial pilots quite agree with Latham's opinion that it is less dangerous to confront a fairly strong breeze than to fly in a dead calm. However, when in a still atmosphere the aviator has risen to a certain altitude the danger from the eddies is less, if it is not entirely absent, firstly because those eddies widen out and lose much of their strength before they reach a great height, and secondly, because the pilot, if caught by one of them, has time to right his machine, which is not the case when flying at a few yards from the ground. Also, the greater the speed of a flying apparatus the smaller the danger of its being upset by an eddy.

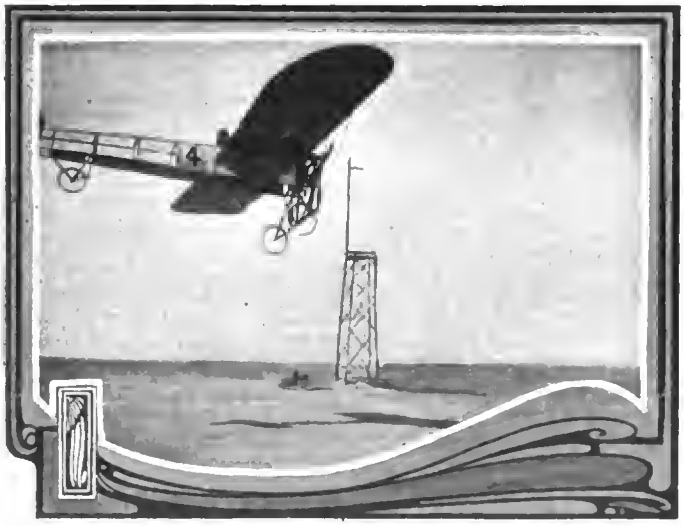
Goux, Voiturette Driver, at Wheel of Peugeot-Rossel Monoplane

The proceedings on Wednesday, the ninth inst., were extremely interesting. More of the competitors actually figured in the contests than on any of the preceding days, and the spectators were delighted by witnessing Duray, the famous motorist, break the world's record for five kilometres. His time for that distance was 4 min. 12 4-5 sec., and his machine a Farman biplane. The daily speed prize of $200, for a distance of ten kilometres, was won by Balsan (Blériot) in 9 min. 50 2-5 sec. Another feature of the day's proceedings was the appearance of Latham, who won the $200 prize for altitude, he attaining the height of 170 feet. The daily prize for distance was secured by Métrot on a Voisin biplane, who covered 85½ kilometers (57.2 miles). The day did not pass without an accident, for Hauvette-Michelin was wheeling his Antoinette monoplane into its shed when the machine toppled over and smashed a wing. Hayden Sands, an American, driving an Antoinette monoplane, succeeded

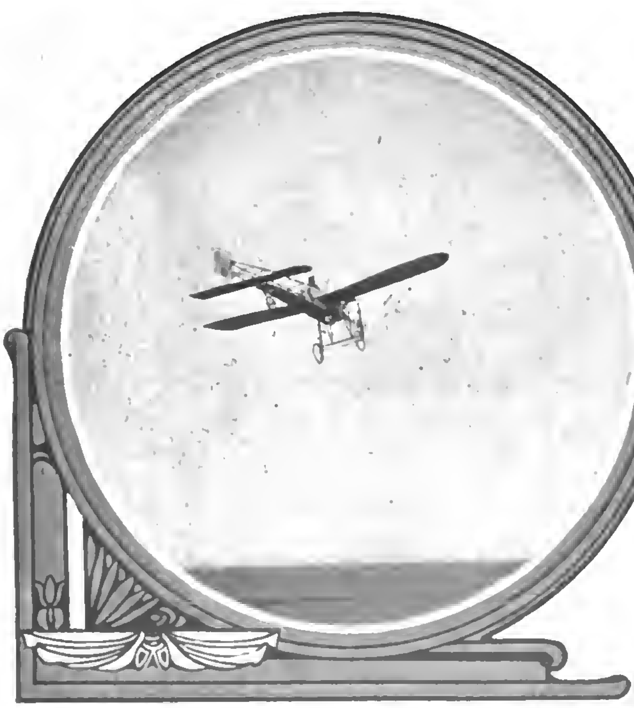
Wreck of Hauvette-Michelin's Antoinette Monoplane, Overturned on Wednesday in Front of the Aero Garages



Métrot in Voisin Number Ten at One of the Corners

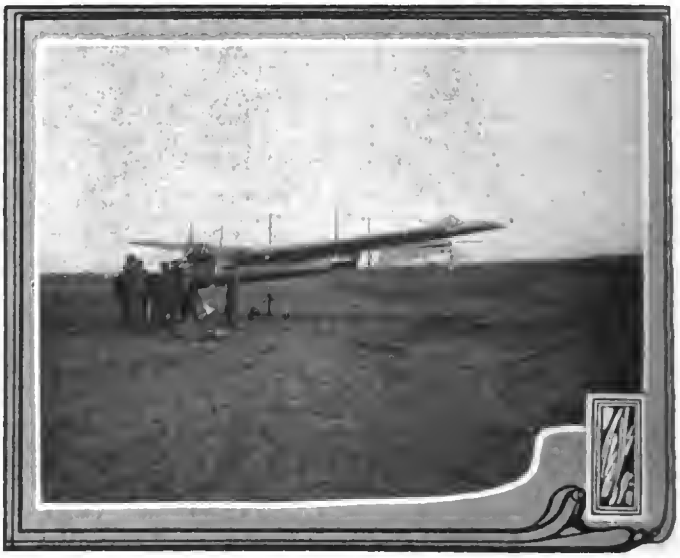


Near View of Le Blon in Blériot Four from the Rear



Le Blon in Flight Well in the Air. Blériot Number Four

in making a notable performance by flying five kilometres in 4 min. 22 sec. He was, however, not competing officially. Owing to the unfavorable weather there were no flights of importance on the tenth inst. In the morning Mme. Delaroche secured a pilot's license from the French Aero Club by flying four times round the course, a distance of over twelve miles. She is the first woman to win the distinction. On Friday, the eleventh



Latham and Antoinette Number One on Ground

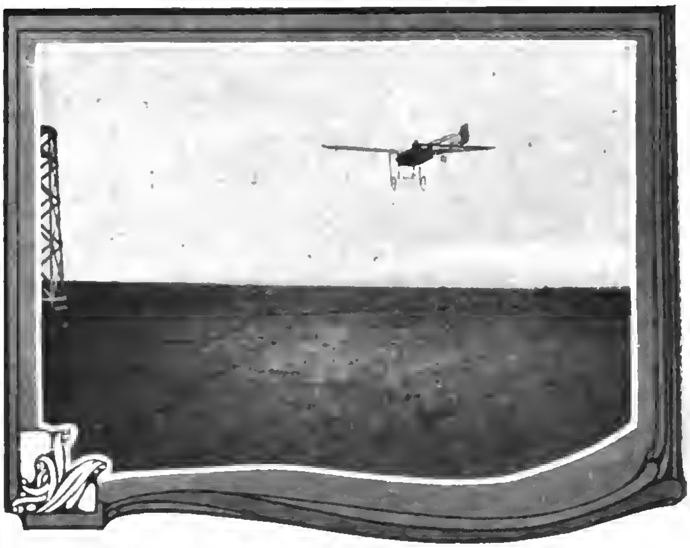
Details of New Darracq

PARIS, March 7—The construction of aviation motors has already attained such proportions that few automobile manufacturers can afford to ignore it. Thus it is not surprising to find that a firm of the standing of Darracq has also produced a light-weight for work in the air. A start was made by a request from Santos-Dumont for a two-cylinder horizontal capable of developing 30 horsepower for more than a few minutes, and not exceeding 4½ pounds per horsepower. Such a motor had been produced, but had never been capable of running at full power for any length of time. The preference for a two-cylinder horizontal was by reason of its shape, allowing it to be placed in the angle of the wings of a monoplane with a lower center of gravity than with vertical cylinders.

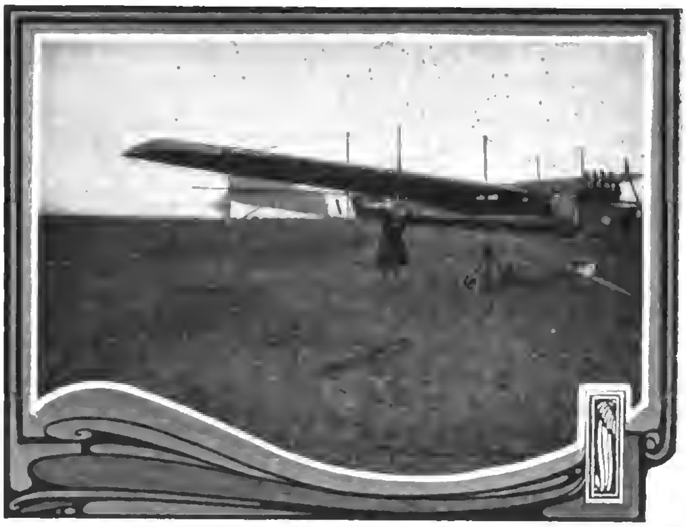
There is nothing very extraordinary in the general design; indeed, it is what Designer Ribeyrolles calls a retrograde motor, for the horizontal type was abandoned in France almost before it was given a fair trial. But there is considerable ingenuity in the working out of details and in the abolishing of parts hitherto considered necessary, with a consequent reduction in weight. The two cylinders, having a bore of 5 1-10 inches and a stroke of 4 7-10 inches, are machined out of the solid bar of steel until their weight is but 8 4-5 pounds complete. The head is separate, carying the seatings for the inlet and exhaust valves, is screwed onto the cylinder, and then welded in position. A copper water-jacket is fitted, and it is in this condition that the weight of 8 4-5 pounds is obtained. Steel pistons are employed, with light rods connecting up to a two-throw crankshaft.

The distinctive feature of the motor is to be found in the valve operating mechanism. There are but two pinions, two shafts, and two cams in the entire motor. On the main shaft is mounted a driving pinion with a slight bevel, meshing with the two-to-one pinion, the shaft of which carries the two cams, drives the magneto and the water circulating pump. The plunger type of lubricating oil pump is operated by an eccentric machined with the bevel gear on the main shaft. The reason for employing bevels in the timing gear is to avoid the use of an intermediary gear between the driving and the driven shaft, the maginst., Rougier carried off the distance and altitude prizes, while Le Blon on a Blériot monoplane secured the speed prize by flying ten kilometres in 8 min. 74-5 sec. At one time there were three aviators—Rougier, Le Blon and Grade—in the air. There were no flights on Saturday owing to the violent wind, but on Sunday Balsan established a new record for five kilometres by flying that distance on his Blériot in 4 min. 1 sec.

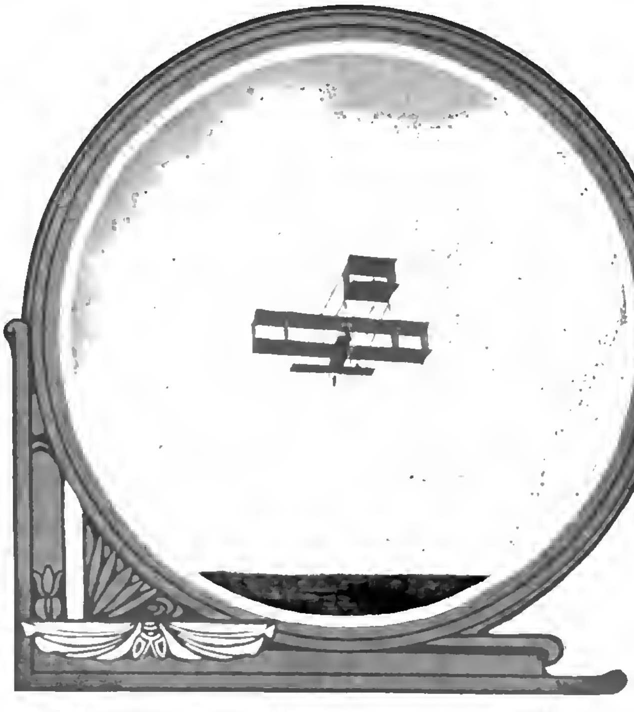
Grade (German) Monoplane Ready to Start Flying



Balsan, a Winner, at a Corner Post with His Blériot



The Unfortunate Latham About to Arise in His Monoplane



Métrot, Another Winner, in Full Flight. Voisin Biplane

Light Aviation Engine

neto necessarily being set too high to take the drive in the ordinary way. The push rods are not parallel, but gradually come together until they almost touch, this being necessary because of the placing of the two cams very close together on a short shaft. One cam operates two inlets and the other two exhaust valves.

Rocker arms are drilled to reduce weight, and the push rods are steel tubes with lock-nut adjustment to allow for wear. The spindle on which the two rocker arms are mounted is a steel tube passing directly into the cylinder and provided with a priming cock, thus fulfilling two functions without any increase of weight. The spark plug is mounted in the cylinder head midway between the two valves.

The carbureter is original by reason of the manner in which it is mounted. It is constructed of aluminum, and is of the float-feed type, the mixing chamber being cast with a sleeve fitting round the straight length of intake pipe uniting the two intake ports. A single vertical jet passes into the mixing chamber, and is heated at its base by a bypass from the exhaust. An additional air valve is fitted in the head of the mixing chamber, but in view of the fact that auxiliary exhaust ports are provided, is only given a very slight opening, a large quantity of air of course entering through the exhaust ports. A series of ten exhaust holes are bored in the cylinder at the end of the stroke, and occupy almost one-half the circumference. They are surrounded by an aluminum collector, the mouth of which is turned in the same direction as the main exhaust ports, thus allowing a manifold and a muffler to be fitted without difficulty, if desired.

On the bench, the motor has furnished 34 to 35 horsepower without any falling off in power at the end of a long run. Fitted complete with lubricating oil for three hours, water, magneto, carbureter, but without gasoline, its weight is 121 pounds, thus securing the very unusual result of less than 4 pounds per horsepower. A similar type of motor, with four horizontal cylinders, has also been produced and is being used for the first time on a Voisin biplane driven by Rigal, the automobile race driver.

RECENT CLUB ACTIVITIES

QUAKERS TO HAVE MANY ROAD EVENTS

Philadelphia automobilists are arranging for coming competitive events, including endurance and roadability runs, hill climbs, etc.—these to take place not alone in the Quaker City, but within 150 miles. This year the season will be opened with a three day roadability run of the Quaker City Motor Club to Atlantic City, N. J., from April 30 to May 2. It is expected that fully 100 cars will compete for the prizes in this event. Through a plan evolved by the secretary, Harry Harbach, there will be a prize given for each car that goes the route. A two day show of the competing cars at the Million Dollar Pier at Atlantic City, will form part of the program.

A number of local enthusiasts will enter cars for the big Harrisburg Motor Club run occurring in the first week in May. This run will in all probability end in Pittsburgh, and owing to the difficult route and strict conditions for which the Harrisburg Club contests are notable, the contest will be well worth while.

There will be the usual outpouring of Philadelphia car owners at Wilkesbarre next June at the contest known as the Wilkesbarre hill climb. An additional attraction will be that feature of the program embodying two events open only to the members of the Quaker City Motor Club. On Fourth of July and Labor Day, meets are arranged as usual.

President L. D. Berger, of the Quaker City Motor Club, has announced the personnel of that organization's Contest Committee, as follows: R. C. Ross, chairman; Fred C. Dunlap, A. T. James, G. Hilton Gantert, Paul B. Huyette, Evans Church, George M. Graham and A. E. Maltby.

NEW ADMINISTRATION FOR K. C. AUTO CLUB

Kansas City, Mar. 14—The Automobile Club of Kansas City, under a new administration, headed by Frank P. Ewins, will carry on the progressive policies of former administrations, with a few original plans of its own. The new president, Mr. Ewins, who succeeded W. W. Cowen, is prominent in motor circles. Permanent headquarters were opened March 1 in the Midland Building, where Secretary Stevens will have his office and where members will at all times have a place of meeting and bureau of information. Following is the committees for the present year: Finance—D. E. Gudgell, chairman; C. V. Purcell and Dr. E. M. Hetherington. Membership—H. T. Fowler, chairman; W. G. Whitcomb and F. E. Lott. House—F. P. Ewins, chairman; H. T. Fowler, Fred C. Merry, A. W. Peet and L. H. Fisher. Auditing—Edward F. Webster, chairman, Dr. G. L. Henderson and Charles H. Moore. Racing—Dr. F. George Curts, chairman; H. E. Rooklidge, R. E. Wiles, Carl J. Simons and R. M. Rigby. Good Roads—W. W. Cowan, chairman, F. C. Merrill, F. E. Lott, R. E. Bernheimer and J. M. Davison. Runs and Tours—W. G. Coumbe, chairman; H. N. Strait, W. G. Whitcomb, George H. Davis and W. J. Kupper (hotel manager). Legislation—W. F. Guthrie, chairman; M. M. Sweetman, B. J. Fradenburg, H. G. Blakely and B. E. Nace. Entertainment—Fletcher Cowherd, Jr., chairman; A. J. Davies, J. R. Mercer, R. H. Collins and E. H. Jones. W. F. Guthrie, counsel.

NEW OFFICERS FOR NUTMEG A. A.

New Haven, Conn., Mar. 14—At a meeting of the Connecticut Automobile Association held Friday afternoon at New Haven, Conn., the following officers were elected for the ensuing year: President, F. T. Staples, Automobile Club of Bridgeport; vice-president, John N. Brooks, Litchfield County Automobile Club; secretary, Philip E. Curtis, of Automobile Club of Hartford, and treasurer, C. H. Gillette, of the Automobile Club of Hartford. The home office of the association is by vote to be established permanently in Hartford owing to the fact that that city is the capital of the State. F. T. Staples, the newly elected president, was vice-president during the past year and now holds the office made vacant by the death of William F. Fuller some time ago. John N. Brooks, of Torrington, the newly elected vice-president, has served as secretary for the past year. C. H. Gillette, the treasurer, was a former secretary of the American Automobile Association. The membership of the State body is now about 900. The next meeting of the directors is to be held March 18.

SHOW BREVITIES

SIOUX CITY, IA., HAS ITS FIRST SHOW

Sioux City, Ia., Mar. 14—An unprecedented crowd of more than three thousand people packed the Auditorium on the first night of the automobile show, which opened March 1, and tried in vain to inspect all the exhibits. Every exhibit was in place at the opening hour, and every foot of floor space was occupied. Grecian pillars mark off the spaces, each being topped with a potted plant and signs with the names of the cars exhibited. Over each space hangs a sign of uniform size and lettering announcing the name of the firm. The scheme of decoration has been carried out thoroughly and artistically.

The cars exhibited are the Inter-State, Reo, I. H. C., Ford, Rambler, Buick, Velie, White, Knox, Cadillac, Stevens-Duryea, Baker Electric, Cartercar, Lambert, Apperson, E-M-F, Mitchell, Chalmers, Hudson, Overland, Marion, Jackson, Fuller, Firestone-Columbus, Maxwell and Thomas. Motorcycles and accessories are also prominent in considerable numbers.

Dr. F. A. Seemann, president of the Sioux City Automobile Club, which organized the show, has expressed himself enthusiastically over its success, and declares that annual shows are now assured in Sioux City. All the dealers who are taking part radiate smiles as they see their dreams materialized. In fact, the reality exceeds even the dreams.

TOLEDO WILL HAVE AN OPENING WEEK BUT NO SHOW

Toledo, Mar. 14—Toledo will have no automobile sbow this year but instead will have an "opening week." This has been definitely settled upon by the Toledo Automobile Dealers' Association, and the week beginning March 28 has been determined upon as the least conflicting with other similar displays in the country. Although having formerly decided to have a sbow beginning the same date and in the Coliseum where the show was held last year, the plans were altered on account of lack of room, that hall being much too small to afford space asked for within a few hours after the date of the show had been arranged. Under the new arrangement, each dealer will be limited as to the space he may occupy, only by his own quarters or by those which he may be able to lease. Practically all the vacant store rooms available have already been leased and arrangements thus far agreed upon call for displays on a much more magnificent scale than ever undertaken in this city heretofore, although the various displays will not be under one roof. Several new factories for the manufacture of automobile accessories are being or are about to be built in this city, all of which owe their removal to this city to the activity of the Willys-Overland company, which has more than doubled its number of employees during the past two months, the total number of which is now in excess of 3,000.

WINDY CITY WHEEL TAX UNPOPULAR

Chicago, Mar. 14—The wheel tax of two years ago, which has proved so unpopular, and has aroused so much protest on the ground that it is harmful to the sport, because it is unequal, is now up again for discussion. As matters stand now, motor cars are taxed on seating capacity, which works a hardship on the little fellow in that the owner of a $500 car has to pay as much wheel tax as does the man who drives a 70-horsepower, seven-passenger car, providing the little fellow has a rumble seat and is capable of carrying three passengers. But this is not all. The drivers of horse-drawn vehicles are favored in the taxes in that their rates are not half as much as the motorists'. A single-horse rig pays $5 per year, a two-horse rig $10 and a three-horse $15, while the smallest sum the motorists can get out for is $12 on a two-passenger machine. Added to the inequality in the rates the motorists are complaining of another clause in the law which allows each city, village or township throughout the State to impose a wheel tax if it so desires. If any number of these

ROAD BUILDING NEWS

A. C. OF PHILADELPHIA ACTIVE IN GOOD ROAD WORK

Philadelphia, Mar. 14—Few organizations in this country whose efforts are not wholly directed to the making and maintenance of good roads, are doing more along this line than is the Automobile Club of Philadelphia. And this despite its activities in sign boarding routes, map and road-book making and in forwarding legislation favorable to automobilists in general. Its apparent disinterestedness and "for-the-good-of-all" policy, however, is well worth while, for each succeeding month sees several scores of additional members on the rolls; so that having attained its ambition of reaching the thousand mark, the membership committee is now aiming to reach the 1,500 point, which, at the present rate of progress, should be attained by the middle of 1911.

Besides its work on the Delaware Water Gap route, whereby a 33-cent toll extortion was forever sidestepped and a good bit of road laid down where a quagmire formerly existed, the Club's Good Roads Committee is spending money here and there along the Philadelphia-Baltimore route, eliminating the bad spots until it is hoped that in a few months there will be a direct route between the two cities, via Perryville, that will do away with the long detour via Lancaster.

But the Club's most recent work and the most beneficial to a great majority of Philadelphia's automobilists, is its labor toward putting the old Haverford-Conestoga road in good shape for motor travel. This road parallels the old Lancaster pike, which, although always in tip-top condition, is anathema to all motorists by reason of its numerous toll-gates. Upon the completion of this work—and the club is now busily engaged in raising the necessary $2,000 to finish it—automobilists will be enabled to keep their coats buttoned, and be forever released of the necessity of constantly digging into their jeans.

Not content with the carrying out of these important projects, the Good Roads Committee has been agitating the dragging and rebuilding (where necessary) of the bad 10-mile stretch of the Lancaster pike, which lies beyond the toll zone, near Gap and Bird-in-Hand.

W. O. Griffith, chairman of the Club's Signboard and Touring Committee, attended the organization of the Inter-County Good Roads Association at Coatesville last Friday and not only announced that Philadelphia had $500 ready to hand over when wanted, but that the Automobile Club of Delaware County pledged itself to contribute $200 toward the work. This was followed by the announcement of the Lancaster Automobile Club, through Dr. Donald McCaskey, that it could be drawn on to the extent of $2,000 to carry out the project.

LAW AND THE AUTOMOBILE

did so it would mean the death blow of motoring in the State of Illinois, for there could be no touring unless at great expense, for motorists would have to pay out a small fortune in wheel taxes just to cross the State. The supreme court of Illinois has upheld the validity of the wheel tax, and while the motorists feel that they are right in their contention that such a law is unconstitutional, yet they believe they can obtain some relief by first having the city council of Chicago revise the wheel tax and cut the figures in two and later go down before the State Legislature and pass an amendment whereby it will be impossible to impose more than one wheel tax on any one person. The Chicago Motor Club has taken up the cudgel and is preparing to appear before the license committee of the city council, which is to meet Friday afternoon, at which time the club will ask that the rates be revised, taxing on horsepower instead of seating capacity, and making the fees $6, $8 and $10 instead of $12 and $20, as they now are. They also want to have something to say in the future regarding the expenditure of this money, desiring that the city provide suitable exits in order that tourists may get out of town without having to travel miles over poor pavements. Every day during one recent week mass meetings were held at the Chicago Motor Club headquarters in the New Southern Hotel which have produced many recruits, so that in all probability an army of determined owners will swoop down on the aldermen.

CAMPAIGN FOR ADOPTION OF FEDERAL REGISTRATION

That the automobilists of the country keenly realize the necessity for the Federal registration of automobiles has been well illustrated as a result of the recent legislative convention held in Washington under the auspices of the American Automobile Association. The strong plea made at the hearing in Washington before the Committee on Interstate and Foreign Commerce, which is now considering the Federal Automobile Bill, has been productive of most beneficial results in all of the large State associations and the more important clubs affiliated with the American Automobile Association.

A strenuous campaign has been inaugurated by many of the leading clubs, and particularly throughout the State of Illinois, toward impressing upon the members of the committee the great value of this National Registration Bill to the automobile industry at large, which has now come to be one of the greatest commercial interests in the country. While it is recognized that the benefits to tourists traveling from one State to another will be immeasurably improved by the adoption of this bill in Congress, the fact is also admitted that it will directly and indirectly aid every department of motoring, whether for business or pleasure.

The deep interest shown by the members of the Committee on Interstate and Foreign Commerce, and their admission that the broad principles of the bill were just and reasonable, have been a great encouragement to the active motorists who have been working for equable laws on this basis during the last three years. Some minor changes to the bill have been deemed advisable and these are now being made, and the bill as amended will shortly be ready for definite action by the committee.

Cincinnati's Superb Show

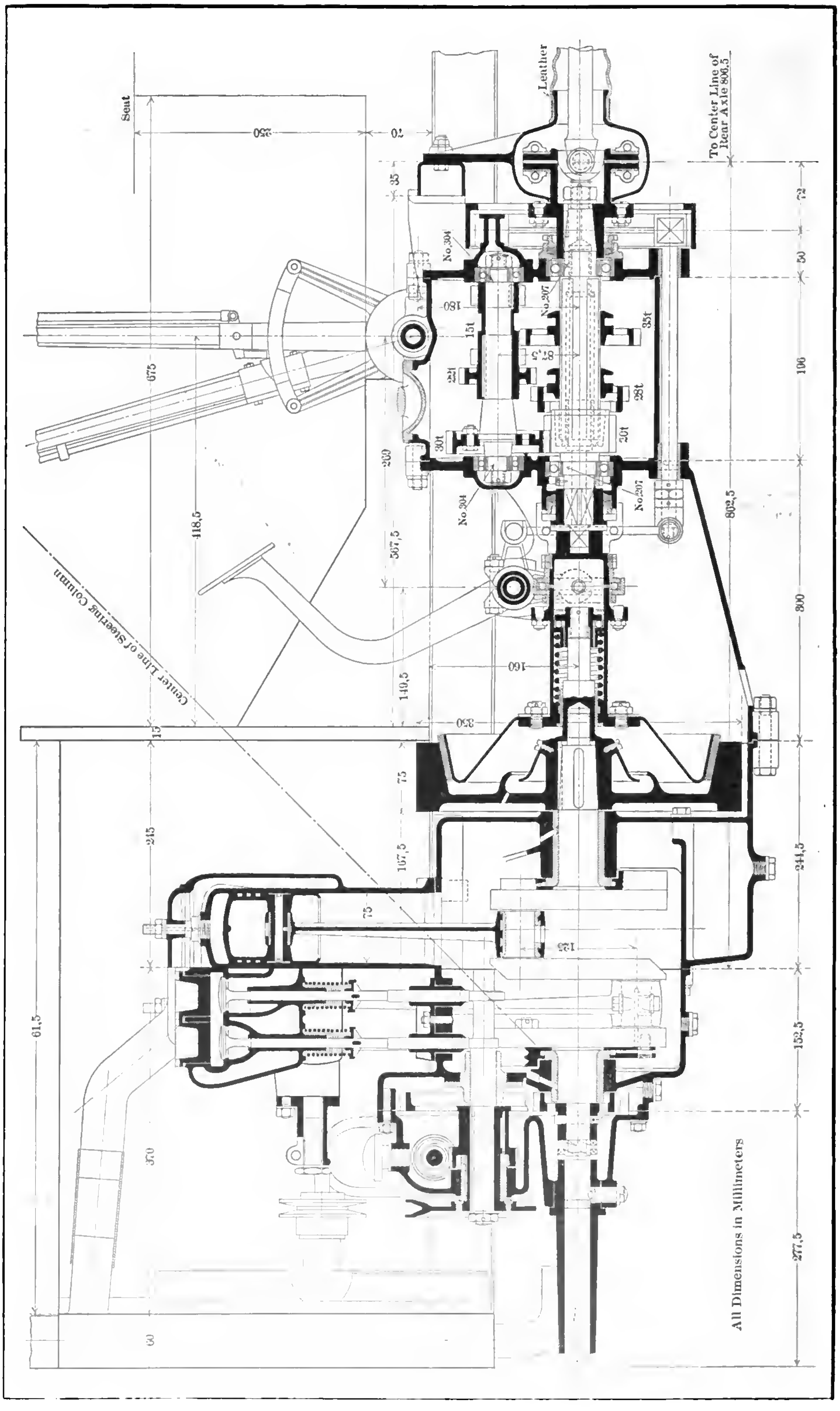
Fountain at Entrance to Music Hall, Where Cincinnati's Second Show Was Held, Amid a Profusion of Palms

CINCINNATI held its second annual show in Music Hall, the city's largest auditorium, and that the move was a wise one is evidenced by the 31,363 square feet of space sold to exhibitors. The hall was attractively decorated with pergolas of Doric columns, covered with Southern smilax, and potted palms and other semi-tropical plants were set about in profusion. Some fifty concerns exhibited 170 automobiles, besides many accessories. The aeroplane, without which no show seems to be complete this year, occupied a prominent position, and was accompanied by a small spherical balloon. The show was under the auspices of the Automobile Club of Cincinnati, with Rutherford H. Cox acting as general manager. Many sales were reported, and the dealers and manufacturers who participated seem well satisfied with the results. There can now be no doubt that the show will be an annual fixture. The list of exhibitors follows:

Atlas Motor Car Co., Interstate; Auto Jack Distributing Co., automobile jacks; Avondale Auto Supply Co., accessories; Louis E. Bedinger, Ferro marine engine, Mullen steel boats, K-W magnetos; Chas. Behler Sons Co., Brush, Maxwell, Columbia, Bailey electric; Buckeye Motor Car Co., Parry; Bumiller-Remelin Co., accessories; Cincinnati Automobile Co., Peerless, Pope-Hartford; Cincinnati E-M-F Co., E-M-F Thirty, Flanders Twenty; Citizens Motor Car Co., Packard; Coughlin & Davis, accessories; Covington Auto Co., Cole 30; Crown Auto Co., Cadillac; Robt. C. Crowthers, Elmore; L. C. Dennison, Winton Six; Enger Motor Car Company, Enger; Franklin Automobile Co., Franklin; Ford Motor Car Co., Fords; Garford Truck Co., Garford trucks; J. K. Gilchrist, Demot, Detroit-Dearborn; Haberer & Company, Cino; Hanauer Automobile Co., Pierce-Arrow, Locomobile, Corbin, Jackson, Hellman Auto Co., Haynes, Cartercar; Herald-Reo Co., Reo; Herschede Motor Car Company, Courier, Stoddard-Dayton, Rauch & Lang Electric Rapid truck;. Jungclas Auto Co., The Mitchell, Palmer-Singer, Baker Electric; Leyman-Buick Co., Buicks; Lexington Motor Car Co., Lexington; Metal Stamping Co., wind shields; Middleby Auto Company, Middleby; Geo. C. Miller Sons Carriage Co., Stevens-Duryea; Milton Motor Cycle Co., motor cycles; Ohio Motor Car Co., Ohio; Olds-Oakland Co., Olds, Oakland; Oskamp Auto Supply Co., accessories; Paragon Refining Co., oils and greases; Payne Motor Car Co., Thomas; Peerless Buggy Top Co., tops; J. H. Ratliff Auto Company, Chalmers Hudson; Special Motor Vehicle Company, Schacht; Chas. Schlear Motor Car Company, Hupmobile, Velie 40, National, Warren-Detroit 30; Schumacher, Boye & Emmes, Knox, Knox truck; Sheldon Axle Co.; Smith-Eggers Co., Stearns; Speedwell Motor Car Agency, Speedwell; Standard Oil Co., lubricating oils; Staver Motor Car, Co., Staver-Chicago; Ferd. Stenger, Motor Cycles, Merkel, R. S. Pierce; J. S. Stevens, Matheson; Suburban Auto & Garage Company, Overland, Marmon, Marion; Toe Water Auto Supply Co., accessories; U. S. Motor Truck Co., truck; Warner Pole & Top Co., tops; Welland-Pope Co., Columbus Electric; Central Brass & Fixture Co. accessories; Craig, Wilson & Craig, automobile wheel.

Central Aisle of Cincinnati Show, with an Aeroplane Overhead and Stoddard-Dayton and Rapid in Foreground

E[redacted] on Washington's Birthday, the islands of Hawaii [redacted] extensive celebration, principally to celebrate the [redacted] existing between the islands and the country of [redacted] was the father. With success and a most en[redacted] each year, the importance of the celebration has gr[redacted], until now it is by far the most important event of [redacted] So much has it grown that all patriotic Americans [redacted] of miles make it their business to be there and take a part in "the doings." The decorations this year, as shown in the pictures above, were fully up to if not actually superior to those of any previous year. In the main, the floats in the parade were of a patriotic character, as for instance the American eagle protecting the globe, which was illustrative of the relations between the islanders and the government at Washington. Beautiful women and the magnificent flowers in which the islands abound were very prominent not alone in the floats but throughout the celebration. Prizes were offered for the most beautiful as well as the most grotesque cars and the same in the bicycle class. Similar to last year, the evening saw a very extensive masked ball, lasting into the wee, small hours.



LONGITUDINAL SECTION OF THE UNIT POWER PLANT OF THE 5-10-HORSEPOWER TWO-CYLINDER N. S. U. LIGHT CAR, ALTHOUGH FOLLOWING STANDARD LINES IN MOST RESPECTS, THERE ARE MANY NOVELTIES EMBODIED IN THE DESIGN. NOTABLE AMONG THESE ARE THE UNSYMMETRICAL CONNECTING RODS, THE PRESSED STEEL CLUTCH CONE AND THE CLUTCH OIL GUARD, THE METHOD OF OPERATING THE SERVICE BRAKE, THE CONSTRUCTION OF THE GEAR CASE, AND THE LONG BEARING OF THE CHANGE GEAR PRIMARY SHAFT

Careful Design Revealed in "N. S. U." Light Car

SIGNIFICANT of the change of heart experienced abroad in respect to light cars is the design of the 5-10-horsepower runabout recently brought out by the Neckarsulmer Fahrradwerke, a German firm whose product goes under the trade name of "N. S. U." Both in its general features and in its carefully worked out details this light car ranks with the highest-priced products of the German industry. The longitudinal section of the unit power plant on the opposite page (reproduced from *Der Motorwagen*), will serve as a sample of the general excellence and also as the illustration of a number of detail points.

As to the general features, the motor has two vertical cylinders 75 by 125 millimeters (2.95 by 4.92 inches), cast in a pair. The cranks are at 180 degrees, which, with vertical cylinders, means that the firing is uneven. It has been demonstrated, however, that engines of this type can be balanced to run as smoothly as could be desired for this service, and the type is a very common one in Europe. The wheelbase is 2.10 meters (about 82 3-4 inches) and the tread 1.15 meters (54 1-4 inches); the tires are 750 by 85, or about 30 by 3 1-2. The same chassis is also built with a four-cylinder block motor 60 by 100 millimeters bore and stroke (2.36 by 3.94 inches), but no drawings of this type are available.

The chassis frame is of pressed steel, both side members being straight, and is 3.035 meters long between the hanger eyes of the semi-elliptic springs. The width of the frame is 0.700 meters. The channel sections of the side bars are 35 millimeters wide and 70 millimeters deep in the middle, and the gauge of the metal is 2.5 millimeters. There are but two cross members, one in the middle and one in the rear; this would hardly be good design for American conditions.

The block power-plant construction has been carried out very thoroughly, including, besides the motor and change-gear, all levers and pedals and the steering column and gear. The base of the plant is built up of a number of parts. The crankcase is divided vertically and transversely between the two cylinders; this seems to be a relic of single-cylinder design and does not allow very easy access to the connecting rod big ends. The front half of the case has two integral supporting arms, which reach to the frame. From the rear half of the crankcase a casting extends around the flywheel and forms the front end of the change-gear housing. This housing itself is unusual; it is cylindrical in shape, being formed of a cylindrical shell with end pieces bolted in. It is hung from the middle cross member by two lugs. The whole is practically a three-point suspension, as the two gear-case lugs are comparatively close together.

One of the neatest details is the method of connecting up the foot-brake. This is at the rear of the gear-case, and of the expanding type. The brake shoes are spread by a cam at the bottom, and this cam is on a shaft which extends under the gear-case and reappears in the clutch well. Here it is provided with a horizontal lever, which is connected by a ball-jointed link with the lever on the brake pedal.

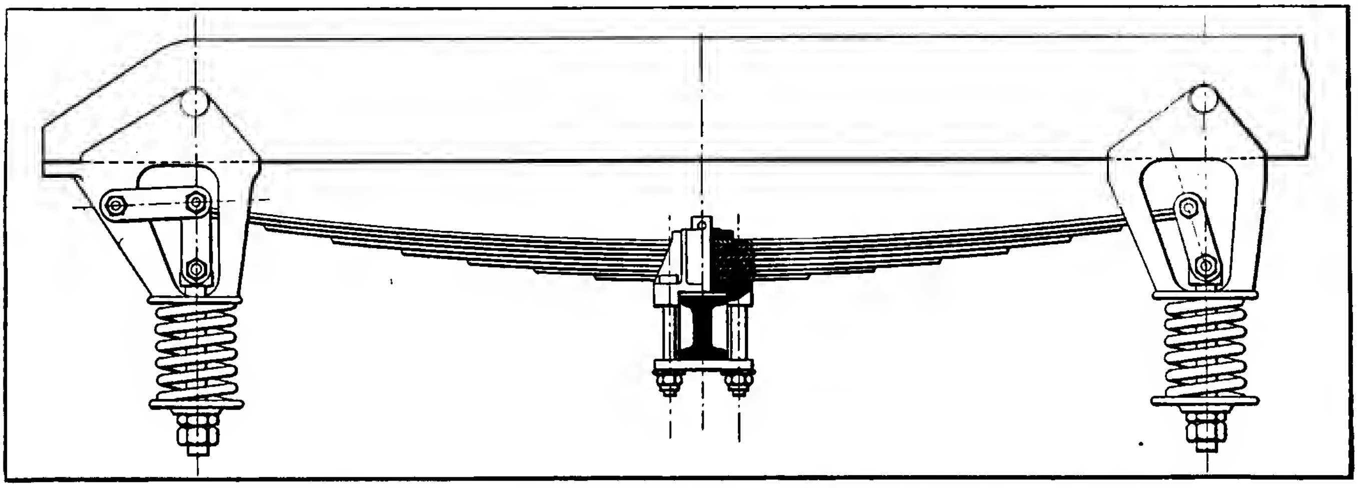
The clutch is a simple leather-faced cone, but differs from the usual design in having its cone stamped from sheet steel, instead of cast of aluminum. This is a cheaper construction and at the same time should give little, if any, increase in weight. At the same time the sheet steel has considerable natural spring, which should be useful in softening the clutch action.

The hand levers for the emergency brake and the change-gear are carried on an extension cast on the gear-case, and entirely independent of the frame. They are of the usual type; the brakes, on the rear hubs, are actuated by a wire cable which passes through the hollow shaft and provides for equalization. The steering column, which is raked at an angle of 45 degrees, is bolted on to the side of the crankcase. The throttle lever and the accelerator pedal are carried on the steering column at the point where it passes through the dash; the lever sets a minimum throttle opening, and the pedal is used to increase this temporarily as desired. The spark advance is fixed and requires no lever; thus the steering wheel is left unencumbered.

The magneto is placed transversely at the front end of the motor, and is driven by worm gears from the camshaft. This results in unusual accessibility.

Spring Suspension of German Truck

The illustration of the spring linkage of the Büssing truck, which appears below, is reproduced from the *Zeitschrift des Mitteleuropäischen Motorwagen-Vereins,* which recently published an instructive article on the steering and suspension of this car. The construction shown is used on the front springs only, for the protection of the motor and radiator, in the case of trucks, but is also used on the rear springs for omnibuses. The drawing is self-explanatory in so far as regards the design and operation. Another feature of the same car is the ball-joint of the steering link. The lever arm is split at its end into a sort of yoke, formed on the inside to receive the ball; when the ball is in place a pinching screw tightens up the yoke to hold it. The drag link has a yoke on its end which straddles the ball and is secured by a taper pin passing through it.



Combination of Semi-Elliptic and Coil Springs Used on the Büssing (German) Heavy Commercial Cars

Two Different Kinds of Magnetos

Editor THE AUTOMOBILE:

[2,191]—Will you kindly answer the following questions in your correspondence column: What are the advantages claimed respectively by makers and users of high and low tension magnetos? As I understand the matter, the low tension magneto requires a coil to transform the low tension current into a high tension current before it reaches the spark plugs, but the high tension magneto does not require any transformer. As simplicity and the elimination of unnecessary parts is the order of the age, why are not all magnetos made for high tension?

I feel that this is a question which will interest a number of your subscribers. C. W. FLEMING.

Toronto.

As showing just what the users and makers of the low-tension system claim for it, the two following extracts from the catalogs of makers adhering to this type are quoted:

"The 'Four' differs from the 'Six' mainly in that the ignition is by a particularly efficient make-and-break system, with alternating low tension Bosch magneto, geared direct to the motor. Only one main wire is needed to carry the current to all four cylinders. The motor can be started on the magneto by cranking."

And another says: "Our very simple and reliable low tension ignition, being the development and refinement of a type adopted by us in 1905 and used ever since. The simple electrical conditions established by the use of low-tension current exclusively, in combination with the exceedingly simple and effective mechanism, should make the strongest possible appeal to the purchaser who demands an ignition system that will be above all continuously reliable. Magneto is of the low-tension type, gear-driven. The simplest and consequently the most reliable instrument from which electricity can be generated. Because of its exceedingly simple electrical nature no peculiar electrical disturbances are met with, and the workmanship and special materials employed constitute an almost perfect insurance against trouble of any sort. Furthermore, if trouble is experienced, any good electrician can easily locate any trouble and correct it."

On the other side, although there are a greater number of parts used, and although the higher tension of the current passing through the wires makes for increased danger of short circuits, and other troubles, the fact of its well-nigh universal use speaks volumes more than lengthy argument could. Better results at high speed, and more particularly at low speed are claimed for the high-tension system; in fact, it is said that nearly all low-tension magnetos will not start the engine, batteries being relied upon for this purpose.

Thus, the argument sums up to simplicity, either real or apparent, on one side, and real proven reliability on the other.

How and Why of Steam for Power

Editor THE AUTOMOBILE:

[2,192]—I will be pleased to know what are the chief advantages and disadvantages of steam power plants for medium sized automobiles, similar to several well-known machines.

Peoria, Ill. L. MANSFIELD.

Steam has these disadvantages—many units, meaning large number of opportunities for trouble; necessity for an open flame in the presence of a highly inflammable fuel; low thermal efficiency of the whole system, length of time necessary for starting, necessity for keeping fire on or steam up while the machine is waiting, large number of controlling devices, absolute necessity for source of water supply at all times.

On the other hand, steam has many advantages; thus, the steam engine is very flexible, attaining a low speed, which is impossible with the gasoline engine; this flexibility allowing the maker to dispense with a transmission; moreover, it is readily reversible, doing away with reverse gears. In favor of the steamer, two or more years ago, its noiseless action was considered a big point, but that would hardly stand to-day, in the light of the very noiseless performance of the gasoline machines. To offset the open flame, ignition and electric current supply and timing devices are eliminated.

LETTERS INTERESTING

A Home-Made Automobile of Merit

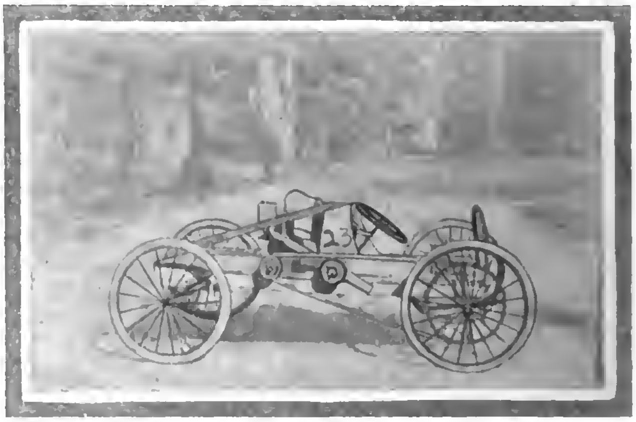
Editor THE AUTOMOBILE:

[2,193]—You will find enclosed several pictures of an automobile which I have recently finished, doing all of the work myself. It was in several races and showed quite a little speed, its two-horse-power engine turning the wheels as high as 15 miles per hour. I take your magazine, "The Automobile," and get many ideas from it.

Greenville, O. RALPH W. DUNKLE.

The four pictures shown herewith depict Mr. Dunkle's maiden effort as an automobile manufacturer, the pictures being used just as received. The whole construction shows ingenuity, being somewhat different from any type of automobile now on the market. One picture shows the mechanic, from which it is apparent that he is not very old, all of which makes the situation more interesting. There really is no reason why other young Americans should not imitate Mr. Dunkle and build their own automobiles.

The man with mechanical tastes can get much more instruction and pleasure through building a car himself than from using one already made, even though he draws largely on the parts makers for his material. The maker of his own car is never at loss if anything should go wrong on the road, for, knowing every part intimately, he can locate the slightest fault; usually his foresight prevents its occurrence.



Side View of Dunkle's Home-made Automobile

Rear View of the Dunkle Speed Car, Owner Driving

ANSWERED AND DISCUSSED

Black Lacquer for Brass

Editor THE AUTOMOBILE:

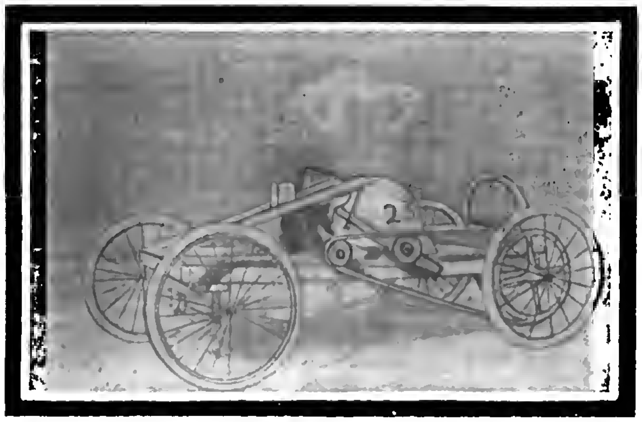
[2,194]—Will you inform me through the columns of "Letters Interesting, Answered and Discussed" where I can obtain a black lacquer suitable for the brass work and lamps of an automobile? I would like something with a gloss black finish that could be easily removed if desired. I have been a subscriber to "The Automobile" for less than a year, but find it very valuable. N. A. GOLD.

Stafford Springs, Conn.

Should one desire to make the lacquer himself, the following formula gives very good results: Dissolve one-half pound of best pale shellac in one gallon cold spirits of wine (so-called). When the shellac is dissolving, agitate it very thoroughly. After mixing, allow it to stand, then filter and bottle. It must be kept from the light as that would make it darker, this being a light lacquer. Now to make a dead black lacquer or finish for similar work, this may be colored black or the following receipt may be mixed instead: Fuse three pounds of Egyptian asphaltum. When liquid, add one-half pound of shellac and one gallon of turpentine.

The latter formula will give the dead black finish now so popular. The quantity of course may be regulated to meet the necessities of the case. For those who are tired of the incessant polishing necessary to keep brass lamps in condition, this lacquer will serve the purpose exactly.

Front View of Home-made Car Doing Fifteen Miles



Final Drive is by Rope, as Shown in Side View

Tire Inflation Pressure Discussed

Editor THE AUTOMOBILE:

[2,195]—What is the proper tire pressure to use for any given size of tire, that is, what I want to know is, is high pressure dangerous, rubber seems so dangerous a substance? Tire makers give pressures in their catalogs, but not all of them agree, some being lower than others. I would naturally use the lower pressures, but friends of mine say that this is wrong. What shall I do?

Albany, N. Y. CARL SPIRO.

Other things being equal, the highest safe pressure is the one to be used, and what the latter is, is hard to say, since manufacturers are now urging higher and higher presures. This they would not do unless their product were strong enough to stand the higher tension. Answering your question, the following advice from the Firestone Tire & Rubber Company is very appropriate:

"It has always been our policy to urge car owners to keep their tires fully inflated; thereby avoiding undue wear and saving their mileage guarantee," said an official of the Firestone Tire and Rubber Company, at the Auto Show.

"Remember that the tire manufacturer cannot make a pneumatic tire that will stand the work and give satisfaction unless the tires are kept inflated to the proper pressure intended for the different sizes of tires.

"Give them air and plenty of it—a pneumatic tire is intended to hold air. Air costs nothing—tires are expensive.

"The tire manufacturer guarantees his product under certain conditions. Meet him on the ground of proper air pressure in your tires and he will meet you on a better basis, if you have tire trouble due to other causes."

As for the variance in the tables of pressures given by the different tire manufacturers, it is probable that each manufacturer gives the pressures which he has found best adapted to his own particular make of tire; so get the table of the maker of your tires and follow that exclusively.

You are quite safe in putting all the pressure in your tires that you can possibly get in with an ordinary hand pump. Power pumps of course should be handled with more care. If you get in too much pressure it will make the tires hard riding and detract from the pleasure of using your car, but the danger of bursting them in this way is so slight as to be negligible.

Melting of Aluminum Alloys

Editor THE AUTOMOBILE:

[2,196]—Can you publish in "Letters Interesting, Answered and Discussed," information regarding the proportions of copper and other metals used in making the aluminum alloy used in transmission cases, motor cases and other automobile work? If possible give the methods used in melting, if it is best to cover the melting metal wtih a charcoal dust cover, or if other covers are used to this end. I have read somewhere, that the success of good aluminum castings was not obtained till a cover of some sort was used. The modern practice, I think will interest many of your readers. The old text books do not give much information about alluminum alloy. In Kent, it says that more than 11 per cent. aluminum with 89 copper will not make good castings, that they will be hard and brittle. The more modern work shows that this percentage has been very much increased. I will look for this with much interest. CONSTANT READER.

Jerome, Ariz.

Since one of the prime drawbacks of welding aluminum and aluminum alloys is its rapid oxidation, it would appear as if it were necessary to keep it covered during the melting process for the very same reason. Yet, as a matter of fact, many makers do not do so. In melting manganese bronze, which is much used in the automobile industry, a charcoal cover is a necessity, but this is because of the manganese content, manganese being a powerful and very rapid oxidiser. With white metals, white babbitts, and similar metals, the same advice is good, for the same reason, they all contain some—though little—manganese. In the near future a number of articles on materials of automobile construction will appear in these columns, and it is possible that something on the subject of aluminum may be included.

Discussing the Merits of the Point System

Editor THE AUTOMOBILE:

[2197]—I am much interested in your "Points of Merit in Selecting a Motor" in your issue of March 3, but fail to see how the civil service basis can be followed with enough accuracy by the purchaser of an automobile to enable him to check the motor with any degree of accuracy without elaborate and expensive tests which the ordinary buyer could not undertake. I also cheerfully disagree with your rating on many of the items. Numbering your conditions from 1 to 36, I fail to see how No. 1 could be determined by the purchaser of a motor until the motor had been worn out.

No. 3 lacks definite statements of conditions under which the cooling of the water should take place, unless you mean under the maximum power of the motor, in which case I should increase your points to 25.

In No. 4 thermal efficiency would be very difficult to determine.

In No. 5 it would be very difficult to obtain an absolutely straight line, and if such could be secured I should credit the motor 50 points.

No. 6—I would raise the points for accessibility, east of adjustment, to 50.

No. 7—Too difficult to determine.

No. 9—Perfection in this case should secure twice as many points.

Nos. 12 and 13 are neither quite clear as to where or when you would begin to remove pressure or depression. If you mean from the bsst practice the credit should be greater. If you mean from a normal exhaust or suction pipe, the points should still be increased.

In 16, 17, 18, 19 and 20 you credit the points for a satisfactory system, etc. This invalidates the points on this whole series, due to the indefinitsness of the word "satisfaction."

No. 24 I would eliminate. It is hardly the fault of the motor if the carbureter does not do its work, and you have already given a credit for proper carburetion.

The points on No. 25 seem entirely too high. A very good motor might require more than a quarter turn to start in zero weather repeatedly. I should cut this down to 25, also 26, for you have already provided for a tight compression.

In No. 28 you make the points for the motor depend on the car which it is to drive, which is not fair to the motor. This also applies to No. 29.

In No. 30 you make a big credit—100 points—for the size of the lubricating oil tank.

No. 31—as most motors have no exterior oil holes to be cared for it seems to me it should be eliminated.

No. 34 is a penalization of the motor for an item for which it is not in any way responsible.

No. 35 is evidently unfair to the large motor: if gasoline consumption is to be considered on the point system it can only apply to motors of a uniform horsepower, which also applies to No. 36.

Certainly this method of determining the value of a motor is very interesting, but I fear the amateur buyer or even the average engineer would be somewhat astonished at the result if he attempted to point up a motor from your basis. READER.

New York City.

In order to facilitate discussion, the suggested system as given in the March 3 issue of THE AUTOMOBILE is here repeated:

Points of Merit in Selecting a Motor

Conditions to be Considered	Points
1. For each year of service rendered	5
2. For a tight compression without an oil seal	10
3. For each 10 degrees reduction of the temperature of the cooling water below 212 degrees F. (to 170 degrees F.)	10
4. For each one per cent. increase in thermal efficiency	10
5. For a straight line torque performance up to 1,000 feet per minute of piston travel	20
6. For accessibility, ease of adjustment, etc.	20
7. For each reduction of 1,000 pounds per square inch of extreme fiber strain due to secondary moments at 1,000 feet per minute of piston travel, measuring the strain at any point desired on the section of the crankshaft	20
8. For tight cylinders under a hydrostatic test of 500 pounds per square inch	20
9. For perfectly round and parallel cylinder bores	10
10. For noiseless performance	25
11. For absence of packed joints	10
12. Per pound per square inch of back pressure removed	20
13. Per pound of suction depression removed	30
14. For a securely fastened flywheel	20
15. For integral or equally secure cams	20
16. For a satisfactory wipespark system of ignition	20
17. For a satisfactory system of high-tension magneto	20
18. For a satisfactory dual ignition system of ignition including a magneto	30
19. For a satisfactory double system of ignition, including magneto and a multi-coil	30
20. For a satisfactory double system of ignition with a magneto and a uni-sparker	30
21. For an ignition system in which the wiring is run in a proper conduit system	20
22. For a carbureter which will deliver gas of uniform density at all speeds of the motor	30
23. For a motor which can be assembled and taken down without having to use a special wrench or tool	20
24. For a motor which will not pop back in the carbureter under any condition of mixture	10
25. For a motor which will start on a quarter turn of the crank in zero weather repeatedly	100
26. For a motor which will start on the spark repeatedly after it is shut down for a period of 10 hours	100
27. For general appearance and exterior finish	20
28. Considering a given gear ratio; for a motor which will accelerate the car it is placed to drive, from a standstill to maximum speed in the shortest time	30
29. Considering a given gear ratio; for a motor which will drive the car it is placed to drive, up a ten per cent. grade, on "direct" at 1-4 (or better) of the best speed of the same car on a level	100
30. For a motor which is positively lubricated and capable of running 10 hours without having to be attended to (no addition of lubricating oil)	100
31. For a motor without any exterior oilholes to be cared for	40
32. For a motor which will not leak lubricating oil	10
33. For a motor which will not smoke	10
34. For an installation which is tight enough to exclude dust (a satisfactory system of pans)	100
35. For a motor which will deliver the power required on a gasoline consumption of one gallon for each ten miles	10
36. For each additional mile per gallon	10

No. 1—Should be taken to represent the number of years that a design may have been on the market. It is intended to represent the advantages which accrue from experience. The number of points given were limited, for the reason that a motor is not necessarily bad because it is new. At the same time, from the purchaser's point of view, he is bound to recognize the presence as induced by experience as against the risk which is taken in the purchase of any new device.

No. 3—Involves taking the temperature of the cooling water under the conditions as follows: (a) when the motor is running on a retarded spark with the car standing still; (b) after the car ascends a long, fairly severe grade; (c) under general running conditions. Obviously the water will boil if the temperature reaches 212 deg. Fahr., and incrustation is bound to form to the disadvantage of the system. It is even possible that a certain amount of incrustation will accumulate at temperatures above 170 deg. Fahr.; hence, the desirability of giving 10 points in favor of the motor for each 10 degrees below 212 degrees, and limiting the reduction to 170 deg. Fahr.

No. 4—As the correspondent states, it would be extremely difficult to establish by a purchaser, but it is indirectly possible to reflect thermal efficiency by noting gasoline consumption. The thermal efficiency is inversely proportional to the gasoline used.

No. 5—Presents an extremely important condition, and it may be that the chart line, when plotted, will be straight within the limit stated for very few motors. Such motors exist, however, and purchasers can well afford to examine into the characteristics of the motors they propose to purchase, with a view to ascertaining their performance with increasing speed. The performance will be best if the torque holds out.

No. 6—Certainly does represent an extremely important condition, especially to the motorist who confesses no skill as a mechanician. It would be interesting to hear from many motorists in relation to accessibility and ease of adjustment. The columns of The Automobile will be placed at their disposal.

No. 7—May be difficult to determine by any process which an unskilled motorist could bring to bear, but a reasonable retainer to an engineer of some competence will bring the information with sufficient certainty to make it worth while.

No. 9—Which refers to round and parallel cylinder boring, is of less importance at the present time than ever before, since the cylinders in nearly every automobile are ground, which process brings accuracy within allowable limits of tolerance. Even a variation of several thousandths of an inch, however, would not interfere with the working of a motor if the piston rings are properly placed.

Nos. 12 and 13—Represent a condition which is very serious, but any autoist can tell if the power of his motor increases enormously when the muffler cut-out is open; such an increase is direct evidence of back pressure; he would still be without a basis of comparison, but he would have his mind drawn in the direction which will result in advantage to him, even though he might not be able to put his conclusions into definite figures. No. 13 represents even greater trouble, but a motor which stalls with apparent ease may be suffering from the ills of excess depression.

Nos. 16, 17, 18, 19 and 20—Being based on satisfaction, represents nothing very definite, as the correspondent states. At the same time, the fact that ignition is included in the system is a warning to the prospective purchaser that he has something to investigate, and if he does not know from his own experience what constitutes satisfaction, from the ignition point of view, he might consult someone who does. At all events, this is a matter which will stand discussion.

No. 24—The carbureter is not at fault for popping back; the trouble comes from having a poorly designed intake manifold. Popping back will not transpire if the rate of travel of the gas in the manifold is greater than the rate of flame travel within the molecular structure of the gas.

Nos. 25 and 26—We would like to hear from other motorists in relation to these points.

Nos. 28 and 29—The point system as originally devised was intended to refer to a motor as it relates to an automobile. The method of utilizing the power under the circumstances must be taken into account. If the gear ratio is not in accord with the power of the motor, considering the car construction and weight, the motor may be capable of propelling the car on a hard, level road, but it may not do good work on grades.

No. 30—It does look like offering a premium for a decent-sized oil tank, but the importance of proper lubrication is sufficient to demand a relatively large tank, and the means by which the lubricant will be fed to the points to be lubricated with precision and certainty. Flooding a bearing may keep it in good order as long as the oil holds out, but if the flooding method is employed the tank must be big enough to supply the requisite quantity of oil for a reasonable length of time—10 hours would scarcely be too long.

No. 31—If, as the correspondent states, motors are not hampered with exterior oil holes, then it will not be necessary to give this matter consideration. It will be just as well, however, to glance over the power plant during selection, and make sure that provision for oiling is complete, in the absence of these exterior methods of feeding oil.

No. 34—It is not believed that dust pans would be used at all were it not for the presence of motors. One of the duties of the dust pan is that of compelling air to enter through the radiator; this is when the fan is in the flywheel. Even with the best possible construction, it is customary to allow for a leakage through the dust pan of one-third of all the air which the flywheel fan can handle.

No. 35—The fuel consumption may be measured on a basis of ton-miles, which is the custom in economy runs; but the practice of overloading the automobiles during these runs induced a false economy, which is rarely ever equalled under normal conditions on the road, considering an autoist of average skill. It also seems to be true that automobiles take about a certain amount of gasoline almost without regard to the types of motors employed. There are exceptions, of course; but the fact remains that 10 miles per gallon, considering an ordinary touring car, is a fairly common figure, and 12 to 14 miles per gallon is reached when the cars are in rather good shape, and handled under average conditions. This matter is open for discussion.

The Editor does not believe that this point system of selecting automobiles can be reduced to a level of good practice without being refined, and refinement will come as the result of discussion. The experiences of autoists should be of excellent value in this connection, and it is hoped that they will come forward and give intending purchasers the benefit of their experience.

If the motor can be examined in this way by an intending purchaser, then the same principle may be applied to the whole automobile, and even if the point system fails to satisfy the whole situation, it will at least compel intending purchasers to examine the cars in which they take an interest, with much more care than they might otherwise be induced to do.

Coming Events in the Motoring World

Mar. 15-19........Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

Mar. 15-19........Bridgeport, Conn., Automobile and Aeronautic Show, Bridgeport Automobile Dealers' Assn.

Mar. 17-19........Louisville, Ky., Automobile Show, Louisville Automobile Dealers' Association, in the Louisville Armory. Hubert Levy, Secretary.

Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 21-28........Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.

Mar. 26-Apr. 2...Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Mar. 26-Apr. 2...Montreal Automobile and Motor Boat Show, Official Motor and Sportsmen's Show Committee of the Automobile and Aero Club of Canada, in the Coliseum. E. M. Wilcox, Manager, 123 Bay St., Toronto.

Apr. 11-16........Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.

Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

Jan. 17-24, 1911.New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Feb. 18-25, 1911..Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Mar. 19..........Altadena, Cal., Hill Climb, Licensed Motor Car Dealers' Association, Los Angeles, Cal.

Mar. 20..........Hill Climb, San Francisco Motor Club, San Francisco, Cal.

Mar. 22-25........Daytona, Fla., Speed Carnival, Florida East Coast Automobile Association.

Mar. 28-29........Savannah, Ga., Endurance Run to Jacksonville, Fla., Savannah Automobile Club.

Apr. 8-10 & 13-17.Los Angeles, Cal., Inaugural Meet, Motordrome.

Apr. 30-May 2...Philadelphia, Roadability Run to Atlantic City, Quaker City Motor Club.

May 2............Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.

June 11..........Wilkesbarre, Pa., Annual Hill Climb Up Giants' Despair, Wilkesbarre Automobile Club.

THE AUTOMOBILE

Vol. XXII Thursday, March 17, 1910 No. 11

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager

231-241 West 39th Street, New York City

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GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Fire-fighting has advanced in many ways and there is ample reason for believing that the situation is well in hand from almost every point of view. Automobile methods are slowly but surely creeping in, and from now on it is scarcely to be believed that municipalities will indulge in the purchase of any more of the obsolete equipment which is likely to be offered. This field, now that it is awakened, will prove as a boon to makers of automobiles; it will give them an outlet for their surplus energy, and, in the event of overproduction in the pleasure vehicle line, it will serve, to some extent, as a safety valve for the industry. The conservatism of some of the municipal authorities as it is reflected in the relation of the purchasing representatives to the class of equipment selected, is now more favorable to the automobile side of the situation, and the actual merit of this class of equipment, of which there is not the shadow of a doubt, will soon bring to bear the potential weight of utility of a high order. That insurance exchanges will take to the automobile is easily reflected from the fact that fires will cease to so heavily draw money from their coffers, and it is the saving of money that counts for them.

Lubrication has its many angles; it is not limited to the mere process of floating bearings, nor is it usually given credit for all the good that it is employed to accomplish. Friction is represented by the energy dissipated in a bearing, and the total loss is lessened if the coefficient of friction is lowered. It is the function of lubricating oil to offer a low coefficient of friction and to shear in its section rather than to wipe off of the bearing surfaces. The energy which should be transformed into heat under working conditions, according to this theory, is that represented by the parting of the molecular structure of the lubricant rather than the rubbing of metal to metal which would transpire were the parts to contact, as they would in the absence of the lubricating oil.

It is the duty of lubricating oil, in addition to maintaining a condition of fluid friction, to seal up the journals and keep the silt of the road from penetrating and adding its abrading qualities to complicate the situation. Besides accomplishing these important duties, the oil acts as a "bumper" and it is quite as effective in this regard as a bumper on a freight car, or a shock absorber on an automobile. The life of an automobile, according to this way of reasoning, may be prolonged by the proper use of lubricating oil.

Cylinder lubrication is much misunderstood in all probability, and frequently, when carbon formations are charged to lubricating oil, they are due to excesses of gasoline which is partially burned in the presence of less than the proportional amount of atmospheric air to deliver to the requisite quantity of oxygen. If cylinder oil does lie at the bottom of the trouble, to the exclusion of carbon from gasoline, then there is an explanation wanting. Is it due to the difference between the flash point of the oil and the heat required to inflame the carbon in the oil, that carbon is formed? If so, the answer must be found in one of two ways, i.e., eliminate the carbon, or, elevate the flash point of the oil.

The point system, as originally suggested in THE AUTOMOBILE, for use in the selection of cars by relatively inexperienced autoists, is probably in need of much discussion, rather with the hope, perhaps, that it will ultimately be sufficiently refined to serve the intended purpose. With hundreds of automobiles to select from, the man who goes after his first car is confronted with a serious problem, which to him is all the more momentous if the size of his purse is in sparse conformity with the dimensions of his aspirations. It is a serious matter to make a mistake under such conditions, but it is annoying to a man of means to find himself in full possession of that which does not live up to his expectations.

In any event, even assuming that a system of examination cannot be perfected sufficiently to serve every end, it will nevertheless afford sufficient advantage to warrant its use on the ground that it will compel the purchaser to do two things, i. e. (a) consider his own requirement at some length, (b) ascertain by personal examination something of the makeup of the automobiles which would seem to conform to his expectations. In nine cases out of ten, men who have trouble with the cars they select are at fault in the main, because they have one idea in their head, and purchase another through the influence of their pocketbook. Disappointment is their sure, if not just, reward. They cannot by any manner of reasoning attach blame to the maker of the automobile so selected, and it is believed that the point system would help them to unify their thoughts with their actions.

BOSTON DEALERS FORM A LICENSED ASSOCIATION

NEW YORK DEALERS' ASSOCIATION TAKES ROOT--SIXTY MAKERS REPRESENTED AT PRELIMINARY BOSTON MEETING--EVERY MEMBER MUST REPRESENT AN A. L. A. M. MAKER

ONE of the interesting angles of the late Boston Show was represented in the coming together of the Boston agents for automobiles manufactured under the Selden Patent license. This idea which was first put into force by the New York dealers was enthusiastically taken up by the agents in Boston of sixty Selden makers. The new organization is being incorporated under the laws of Massachusetts, and will have for its main purpose the furthering of the Selden Patent interests as they relate to Boston agents for automobiles.

At the preliminary meeting the little formalities were disposed of most readily, because of the experience which was gained through the efforts of the New York dealers to organize, and the officers of the new Boston Association were slated as follows: President, John H. MacAlman, Columbia and Stearns; vice-president, J. S. Hathaway, White; treasurer, F. A. Hinchcliff, Winton; Secretary, Chester I. Campbell.

The directors include the above-named officers, and J. W. McGuire, of J. W. McGuire & Company, Pierce-Arrow; J. W. Bowman, of J. W. Bowman Company, Stevens-Duryea and Everitt; E. E. Wing, Marmon; S. P. Underhill, of the Underhill Company, Knox; C. F. Whitney, Park Square Auto Station, Alco and Stoddard-Dayton; E. D. Gilmore, Whitten & Gilmore Company, Chalmers and Hudson.

The Boston situation is such that about 40 dealers handle all of the licensed automobiles there represented. To show how completely the idea of association takes among them, it is only necessary to mention that 36 came in during the first meeting.

While it is not positively asserted that next year's show will be confined to licensed automobiles, it is quite generally understood that Manager Campbell will have charge of the show, in which event it is quite evident that his efforts will be confined to the character of automobiles that support a license tag.

A. L. A. M. LEGAL TECHNICALITIES UNTANGLED

DELAYED action of the A. L. A. M. has been due to some legal entanglements, due to the changing of the name of the Electric Vehicle Company to the Columbia Motor Car Company. Counsel for the A. L. A. M., Betts, Sheffield, Bentley & Betts, have advised their client (the A. L. A. M.) that they have secured from Judge Hough an order to show cause why the petition should not be granted and the supplemental bill filed in the matter of the Ford suit and the suit against Panhard & Levassor and Neubauers.

The order to show cause is returnable April 1, and defendants must serve complainant's counsel with answering papers on or before March 28. The order also provides that they must show cause why their time for pleading should not be limited to April 11, and why the time for taking the testimony should not be limited, apportioned, and the scope of the testimony limited to the transfer of the interest involved.

It has been claimed by many who profess to be on the inside, that the A. L. A. M. is holding back any action it might contemplate in its fight against independents until this legal formality is completed, and in view of the near settlement of this matter, it looks as if the outsiders will soon be in a position to learn of the real attitude of the licensed makers of automobiles.

FLANDERS DENIES RUMOR OF MERGER

When J. P. Morgan & Company purchased the E-M-F Company and paid $4,800,000 for the outstanding stock (not counting the stock which is held by the Studebakers and Frederick S. Fish, amounting to 30,817 shares in the aggregate), there was talk of a big merger and the situation looked threatening. It was stated at the time, in The Automobile, that there had been a transfer and that $5,000,000 was involved, but that the particulars were not to be had.

That the market has heard the last of the story is scarcely to be taken for granted but the time is not ripe for a big merger. Just now the papers are excited about the profits which were taken by the former owners of the E-M-F control and it is claimed that the plant, at Detroit, will be enlarged and that the new board of directors voted $100,000 for the purpose.

The real situation is that the fight of the Studebakers with the E-M-F has been disposed of by the purchase.

THREE MORE SELDEN PATENT LICENSEES

According to an announcement of the Association of Licensed Automobile Manufacturers made public Tuesday, three more companies have been licensed to manufacture automobiles under the Selden patent. They are the Speedwell Motor Car Company, of Dayton, O., which makes the Speedwell; the Courier Motor Car Company, also of Dayton, making the Courier, and the Ohio Motor Car Company, of Cincinnati, making the Ohio.

CLEVELAND MAY HAVE LICENSED DEALERS

Hardly had the Cleveland show season come to a close with the winding up of the Cleveland Automobile Club's exhibit, which was the second of the year, when the dealers started to discuss the show prospects for next year.

Until there is a larger place available than Central armory, two shows will be absolutely necessary. There is some talk of following the New York plan and having one for pleasure cars and another for the commercial vehicles.

Then again there is a plan on foot for the organizing of the dealers in licensed machines. If this organization is perfected, the shows in Cleveland next year will be held separately by the licensed and unlicensed dealers. The latter also promise to organize if the former do.

BRADLEY JOINS U. S. MOTOR COMPANY

L. M. Bradley, who for the past three years has been advertising manager of the American Motor Car Manufacturers' Association, and assistant to former General Manager Alfred Reeves until the latter accepted the general management of the Association of Licensed Automobile Manufacturers, has joined the United States Motor Company, the recently organized $16,000,000 corporation which has already absorbed the Maxwell-Briscoe Motor Company and the Columbia Motor Car Company. He will act as director of advertising and publicity. In his new position Mr. Bradley will direct an extensive campaign.

MAXWELL-BRISCOE DELVING DEEP IN REAL ESTATE

AS a further evidence of activity involving the Maxwell-Briscoe interests, attention is called to current reports referring to the transfer of the property known as the Tichenor-Grand Sales Stables and Riding Academy, on Sixty-second street just west of Central Park West. The property comprises a seven-story brick and stone building, with a frontage of 75 feet at 3-7 West Sixty-first street, with a depth of 210 feet, which runs through to Sixty-second street. It is claimed that this property is worth $600,000 in round numbers, and while it is reported that the Maxwell-Briscoe Company will occupy a considerable portion of the building after it is fitted out, it is said that other companies will be afforded accommodation within the same building. The Maxwell-Briscoe Company has a large building at the northeast corner of Broadway and Sixty-fourth street, and a further acquisition on this enormous scale is at the bottom of rumors of further efforts in the merger line.

STUDEBAKER DENIES INDIANAPOLIS RUMORS

It is understood by those who are familiar with the automobile situation that some interest is offering inducements to certain of the makers of automobiles in Indianapolis, the character of which would seem to indicate that there is a definite and well organized attempt on the part of some cluster of automobile making investors to bring about a merger on a large scale. William R. Innis, president of the Studebaker Brothers Company of New York, and a member of the board of directors of the company of the same name, with its plant at South Bend, Ind., goes to some pains to deny that the Studebaker interests are in this move. Naturally, the Studebaker Company would be regarded as likely to be in a move of this character, in view of the acquisition of the E-M-F plant by J. P. Morgan & Company for the Studebaker account; it is a habit the public has of interpreting the law of probabilities, basing their prognostications upon the efforts in the past. Therefore the automobiling public watches these concerns for new developments.

S.A.E. SUMMER MEETING WILL BE AT DETROIT

Discussion in relation to the doings of the Society of Automobile Engineers leads to the conclusion that the Summer meeting will be held in Detroit, with dates which will overlap the Grand Rapids Road Race, which has been sanctioned by the A. A. A., with precise dates to be filled in, with the understanding, however, that the middle of July is a good approximation. The society is now assuming active proportions, and President H. E. Coffin is handling the matter with a vigorousness which promises extra results in all directions. The Summer meeting is always one of the greatest importance to the society, and Detroit seems to be the most favored place for this year. Certainly Detroit offers an unusual number of attractions, among which it is almost unnecessary to mention the great aggregate of plants which are within trolley car reach of the center of the city, and it is fortunate that automobile makers there offer every facility and keep open shop for society members. The exact date of the meeting is yet to be fixed.

MORGAN MERGER RUMORS UNCONFIRMED

Despite the persistence with which rumormongers continue to discuss the possibility of a combination under the skillful guidance of J. P. Morgan & Company, involving Maxwell-Briscoe, United States Motor Company, General Motors Company and Studebaker, which rumors are bolstered up by statements emanating from Indianapolis and elsewhere to the effect that they have had opportunities to participate, it is impossible to discover any authentic source of information which would lead to the conclusion that any such matters are beyond the realm of speculation. In the meantime it is inexpedient to disregard the existence of activity by way of real estate purchases and other problems of moment which here and there float to the top and indicate to the observer of acumen the rumblings of a substantial volcano which are likely to lead to something more definite in the near course of events.

LOS ANGELES RACES WERE OPEN TO ALL

Los Angeles, Cal., Mar. 12—After being threatened with the recall of the sanction granted by the A. A. A., the Los Angeles Motor Racing Association, which is controlled by the licensed dealers' association, withdrew its decision to restrict the races at Ascot Park to licensed cars. Several entries were cancelled by the disgruntled licensed dealers, but the racing nevertheless was spirited and interesting.

One record was broken, Livingstone on a Corbin reducing Burman's 50-mile mark to 50:26 1-5, in a race in which he defeated Harroun and Matson on Marmons, Free on a Ford, Odell on a Pennsylvania, Edecott on a Cole and Seibel on a Sterling. Livingstone drove the first 20 miles in 20 flat. Harroun won two five-mile races and one ten-mile.

OFFICIAL SANCTIONS GRANTED BY A. A. A.

Sanction No.	Date of Event.	Kind of Event.	Promoter.
131.	March 22, 23, 24	Beach races.	Fla. East Coast Auto Ass., Daytona, Fla.
132.	April 8, 9, 10	Track.	Los Angeles Motordrome.
133.	April 13	Track.	Los Angeles Motordrome.
134.	April 15, 16, 17	Track.	Los Angeles Motordrome.
135.	March 12 to 16	Match race and speed trials.	Fla. East Coast Auto Ass., Daytona, Fla.
136.	May 5, 6, 7	Track.	Atlanta Auto. Assn.
137.	March 20	Hill climb.	San Francisco Motor Club.
138.	March 26	Hill climb.	Atlanta Journal & Fulton Co. Automobile Club.
139.	April 30, May 1, 2	Roadability run.	Quaker City Motor Club.

BUYERS OF VELIES WILL BE PROTECTED

The Velie Motor Vehicle Company has notified its selling agencies, as well as the owners of Velie cars, that all its product will henceforth be guaranteed not only against defects in material and workmanship, but also against all damages arising from patent litigation. The form includes the following clause: "We further agree to indemnify the purchaser of this car against loss through patent litigation arising in connection with the purchase of this machine by reason of alleged patent infringement." The Velie company further states that its full financial strength is behind this guarantee, and that any attempt to antagonize dealers in or owners of Velie cars will be met with prompt and decisive action.

CRESCENT ATHLETIC CLUB HAS AMBITION

The Crescent Athletic Club's challenge for an automobile team reliability contest of ten or twelve cars on a side, to be held over Long Island roads on some date in the Spring for the trophy offered by A. R. Pardington, has been accepted by the Long Island Automobile Club at a special meeting of their contest committee. That committee and the automobile committee of the Crescent will meet this week to take up and thoroughly discuss the matter.

FOUR NEW COMPANIES AND MUCH BUILDING IN DETROIT

DETROIT, March 14—The latest recruit to the long list of makers in the automobile manufacturing field is the T. H. T. Motor Co., which, capitalized at $100,000, plans to manufacture a four-cylinder touring car on designs of a sample which is listed as one of the assets of the company. Announcements of factory space and operating staff are expected shortly.

The Carhartt Company is another recent addition to Detroit's string of automobile manufacturers, having just filed articles of incorporation, with a capital stock of $500,000, of which $300,000 is common and the remainder preferred. Hamilton Carhartt, Sr., famous as a manufacturer of clothing, is president of the company, and Hamilton Carhartt, Jr., will act as vice-president. Ralph C. Lewis will have charge of the mechanical department, and will also be secretary. A factory has been secured at 1524 Jefferson avenue, and deliveries of the car, which will sell at $2,250, will begin in August.

The Sibley Motor Company, capitalized at $80,000, has been incorporated at Detroit. A four-cylinder 20-horsepower roadster, to sell at $850, will be produced. An experimental car has been in use for nearly a year with good results, and it is the intention to secure a factory at once and begin manufacturing this season.

The Cass Motor Truck Company has been incorporated with a capital stock of $300,000 to manufacture automobile trucks. W. Ferguson is the principal stockholder of the new concern.

Much building is now going on, and nearly all of it of a permanent character. The Cadillac factory is so cramped for quarters that the body-finishing department has been moved several blocks to the Detroit riding academy, which has been transformed into a finishing plant. Some construction work already is in progress on the site of the firm's new factory, and several of the carbarns which occupy the property recently purchased, adjacent to the plant, are in use, pending the time when they can be replaced with the factory's new buildings.

The Chalmers company broke ground Monday for a new building, 150 by 50 feet, of one-story construction, to be used for the block-testing of motors and the heat-treating of steels. The building will be of cement and steel exclusively, not one bit of inflammable material being employed in its construction.

The new factory of the Hudson company, located almost directly across Jefferson avenue from the Chalmers, is progressing rapidly, the walls being already up. The Watt Motor Car Co., which has been occupying temporary quarters on Porter street on the west side, has purchased a plot of property in Hamtramck and plans to have a factory built in the early Spring to enable it to complete its manufacturing schedule, which calls for 600 of the 1910 models. The Van Dyke company has bought the Lowrie Lumber Company property, at Junction and Leavitt, and has broken ground for a factory. The Owen Motor Car Company is now installed in its factory on East Boulevard, near the Packard plant, and is hard at it, working on the 500 high-power cars which will be manufactured this year.

REEVES DIFFERS WITH KNIGHT'S ATTORNEY

In THE AUTOMOBILE issue of February 17 Charles Y. Knight, through his attorney, discussed the merit of the Reeves Re-Issue Patent No. 12,991, which the Packard Motor Car Company has a license to use, and according to the Knight version of this re-issue, it is of little value because in the process of obtaining a re-issue the claims were enlarged and the scope of the patent was so altered that as a re-issue it is in conflict with court rulings bearing upon this subject.

It is now claimed by the owners of the Reeves Re-issue Patent, that Dugald Clerk in his discussion of the situation failed to consider all the facts and reached erroneous conclusions in consequence. The Reeves representatives go on to say that it is true of the re-issue that it shows several different arrangements of valves for compressors, motors, etc., including steam engines, and an examination of the re-issue will of course show that it differs in material respects from the preamble and claims as originally included. The Reeves interests are authority for the statement that it is entirely practicable to employ the essential elements of the valve structure, shown and claimed by the patent, in a gas engine. The Knight attorneys, on the other hand, base their contentions upon the rulings of courts, some of which were given in THE AUTOMOBILE, and they stoutly maintain that the Reeves Re-issue is not in conformity with these rulings. It is anticipated that opportunity will be afforded the lawyers on both sides of this situation to exercise their talents and acumen.

KEEN INTEREST IN ELMIRA'S SHOW

ELMIRA, N. Y., Mar. 15—The Elmira Chamber of Commerce is to conduct an Automobile Show between April 11-16, inclusive, in the New York State armory. All of the local dealers and those agencies that cover the Elmira territory are manifesting a keen interest in the show and the present indications are that we will have a very fine exhibition.

Handsome electrical and other kinds of decorations will be indulged in and band concerts will be held afternoons and evenings. There will be interesting displays in the nature of aeroplanes.

OLDFIELD ADVERTISES UNOFFICIAL RECORD

Barney Oldfield's publication of an unofficial record made by his Benz car on Ormond Beach has drawn a sharp rebuke from S. M. Butler, chairman of the A. A. A. contest board. The report was that on Sunday last the Benz, with Barney at the wheel, covered a mile faster than the world's record. When this was made public Chairman Butler immediately wired Oldfield that no so-called records must be published unless made with due timing supervision and sanction. This point is expressly covered by the rules of the A. A. A. Chairman Butler also withdrew the sanction granted for the Oldfield-De Palma match, which has been called off, and no official trials can be held on Ormond Beach until the meet of the Florida East Coast Automobile Association, March 22 to 25.

CROXTON-KEETON PLANS BIG INCREASE

MASSILLON, O., March 7—The Croxton-Keeton Motor Company is planning to increase its capital stock from $300,000 to $750,000, of which two-thirds is to be common and one-third preferred 7 per cent cumulative. A committee appointed by the local board of trade to investigate the standing of the company has made a favorable report, and the board will now stand back of the plan. It is believed that the additional capital can be secured in Massillon without the least difficulty.

The company now employs 200 men, and its entire product for 1910, estimated at 600 cars, has been sold. If the present plans are put through the capacity will be doubled. It will be the policy of the management henceforth to specialize to a considerable extent on commercial cars, especially taxicabs.

REGISTRATION OF RACING OWNERS

The following drivers have registered with the Contest Board: Registry: 1. George H. Robertson. 2. Ralph De Palma. 3. Frank L. Lescault. 4. David L. Bruce-Brown. 5. Ralph K. Mulford. 6. Louis A. Disbrow. 7. Edwin H. Parker. 8. Willie Haupt. 10. William Knipper. 14. Harry H. Cobe. 15. Jack Lavin. Amateur Driver: 1a. Caleb S. Bragg.

FLAG TO FLAG CONTEST IS RAPIDLY ASSUMING FORM

MANY of the manufacturers are looking toward the Flag to Flag contest which is to start from Denver on May 2 to the City of Mexico, a distance of 2,400 miles, which will be covered in 21 days, approximately 114 miles per day with 8 hours running time. The contest will be run under the sanction and rules of the A. A. A. Several handsome trophies will be given, the principal one by G. A. Wahlgreen, of Denver, who is manager of the race. G. A. Blanchard, of Denver, assistant manager, is in the East now calling on the factories explaining and securing entries. This run involves many novel features, and being in an entirely different country from any event yet promoted, should be of keen interest to the factories who are looking for territory in which to sell their cars.

Westerners are more universally wealthy than the Easterners, and have adopted the automobile more as a necessity than a luxury. Ranchmen who have thousands of acres to oversee can save many hours of their time, and can be in closer touch with their lands and conditions than by the old mode of riding horseback. The natural roads are generally very good; of course in the country there are many bad places, but it is understood that the trail of this tour is not hazardous, considering the long distance. The Business Men's Associations and Chambers of Commerce in all the cities that the tour goes through are making preparation for the entertainment of the tourists upon their arrival. The president of Mexico is taking a personal and keen interest in the event. Probably no body of automobile men will be more royally received and entertained than those who accompany this tour when they arrive in the City of Mexico.

In the City of Mexico there are probably 8,000 automobiles, 75 per cent of which are of foreign make. This seems very strange owing to the prominence of the American manufacturers, and this republic being a sister country. It is probably due to the fact that American manufacturers so far have found an outlet for their products in America, without being compelled to seek this new outlet. However, this condition will not always prevail in America, and it will not be long before they will look upon this country with indifference.

Everything is being looked after for the convenience of the tourists through the barren country. A Pullman train with dining car service will be made up at Denver and will accompany the tourists the entire route, stopping at each control at night, where the drivers and representatives from factories will be able to sleep and eat with all the comforts of home.

The management is trying to secure a special rate from the City of Mexico to New York for shipment of the cars in bulk so that they can hold a parade in New York. An automobile show in the City of Mexico is being arranged for the week following the arrival of the cars in that city where all the contesting cars will be exhibited free. If the show proposition does not go through they will have the "bull ring" in which to exhibit.

Needless to say, the car that makes this tour successfully and with a perfect score will prove to the manufacturers and the people that it is a mechanical masterpiece. The expense of the tour is not as great as one would imagine on a careless thought. It is estimated that $1,500 to $2,000 will take a car with two men from its factory through the tour and return, and considering the eagerness and interest which is displayed in the section of country which the tour will go through this expense will make a very profitable investment.

Manager Wahlgreen and his assistant Mr. Blanchard are well known to the automobile industry, and they have been connected with the automobile shows and races in Denver for the past eight years. There is no doubt but that they will look after all convenience and details for this contest to the satisfaction of the contestants.

The entries for this event will close April 15, the Premier entry being No. 1. A conservative figure of the cars which are expected to start is from 35 to 40. Many manufacturers are awaiting an interview with Mr. Blanchard before making their entries.

AUTOMOBILE ASSOCIATION ORGANIZED TO DEFEND MEMBERS

A NEW automobile association, unincorporated, has been formed in the State of New York for the purpose of furnishing attorneys to defend its members in New York and throughout the United States. This association has been organized by representative automobilists and has made application for membership in the New York State Automobile Association. A work similar to that to be carried on by this association, has been performed by the Automobile Legal Association of the New England States, which has its headquarters in Boston, Massachusetts. The New York Association which is known as the Automobile Legal Association of New York is a separate and distinct organization, and is not, as has been mistakenly stated, a branch of the New England Association.

The officers of the Automobile Legal Association of New York are: H. Walter Webb, president; Frederick H. Elliott, secretary, also secretary of the American Automobile Association, and William A. Thibodeau, general counsel and treasurer.

The organization possesses an Advisory Board of the following persons: H. Walter Webb, Guy R. McLane, Frederick Wm. Hill, S. M. Butler, A. B. Maynard, C. Arthur Benjamin, Edwin L. Thomas, Gorton Wm. Allen, F. A. Hodgman, Oliver A. Quayle, Dr. Edward G. Cox, H. A. Meldrum, Bert Van Tuyle, Frank G. Webb.

The benefits and privileges of the association as stated in its prospectus are as follows:

First—Its subscribers are furnished the services of its attorneys to defend them in any suit brought against them for injury to animals or damage to property (except to automobiles), where personal injuries are not an element in the case.

Second—Its subscribers are furnished the services of its attorneys in defending them, their chauffeurs, or any person operating their automobiles for any alleged violation of the automobile laws in any of the States.

Third—Its attorneys will appear for its subscribers in court.

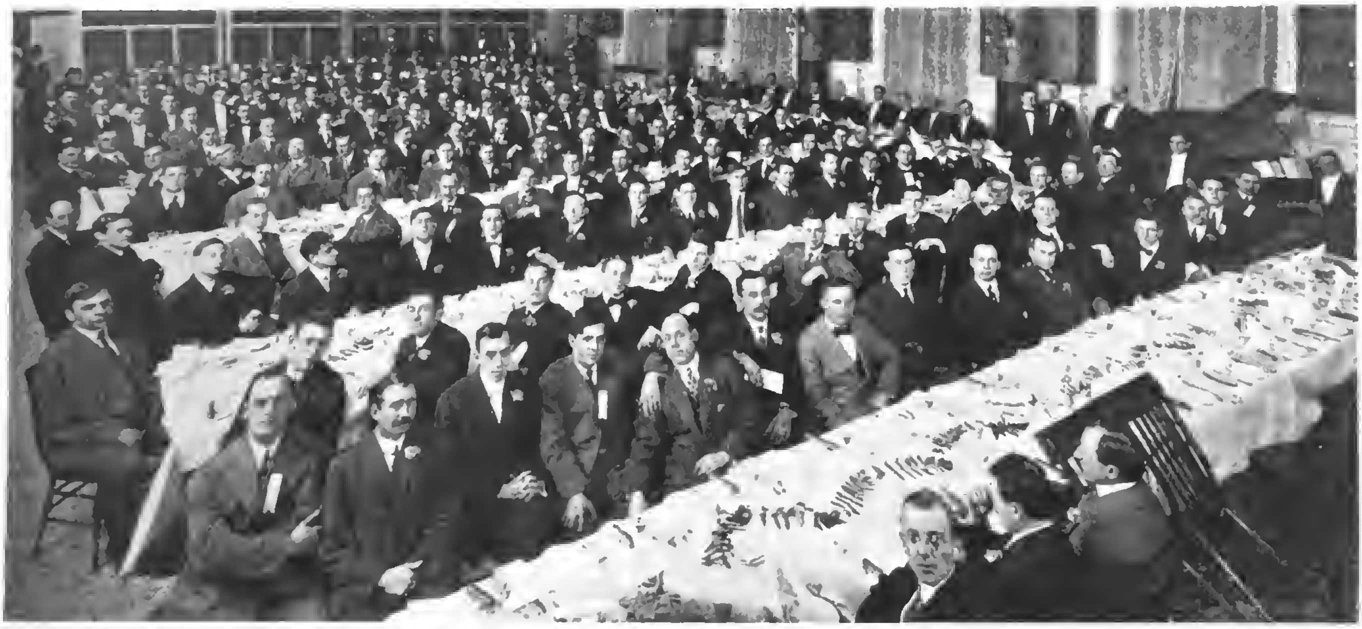
Fourth—Its attorneys will furnish its subscribers legal advice as to their rights and liabilities as automobilists.

Fifth—Its attorneys will protect the rights of its subscribers and their chauffeurs before the licensing authorities of the various States previously mentioned.

Sixth—Subscribers are furnished without charge with a copy of the A. L. A. Hand Book for each year.

Seventh—All subscribers are furnished a plate bearing the initial letters of the association.

Many automobilists carry liability insurance protecting them against liability for personal injuries, therefore this association does not enter this field, its main object being to relieve automobilists from the expense and trouble resulting from the trivial difficulties usually experienced on the road, but which cause great annoyance. Members of the association are relieved from paying all legal fees and expenses for the membership fee of $10 annually. The offices of the organization are at 50 Church street, in the Hudson Terminal Building, New York City.

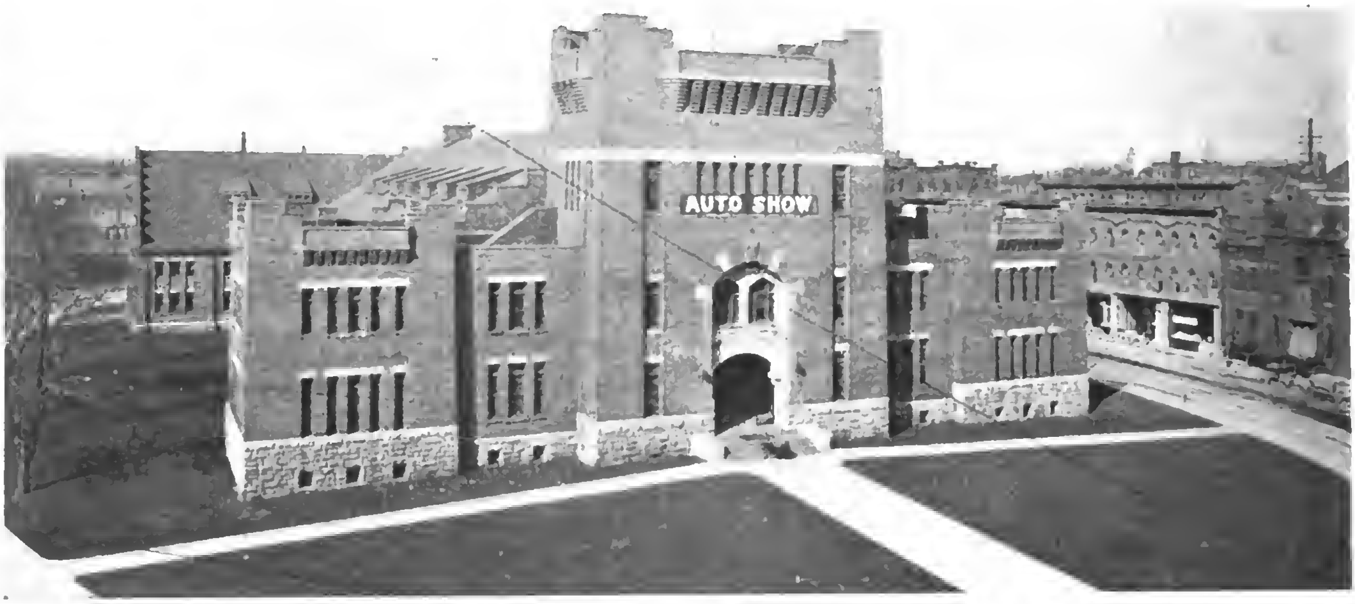


Banquet of the Chicago Motor Club, Which Was Attended by Many Prominent Automobilists

HAWKEYES HOLD GOOD SHOW IN IOWA'S CAPITAL CITY

DES MOINES, IA., Mar. 14—The show which closed here last Saturday was not only successful from an artistic standpoint, but also, what is more to the point, from the view of the business men, in the matter of sales. Opening in the Coliseum on March 5, under the auspices of the Des Moines Automobile Dealers' Association, the success of this, the first annual show, has been a source of gratification to all concerned, particularly to the hustling committee whose work was so well rewarded. The decorations were not extensive nor expensive, consisting simply of sign boards raised upon pillars, upon which signs the exhibitors names were painted. The posts were partly hidden by garlands of smilax and other greens, while a few strings of flowers were used to separate the exhibits. The show as a whole reflected great credit on its organizers.

Scene in Coliseum at Des Moines Showing Exhibits of Buick, Winton, Detroit Electric, Maxwell and Regal



Exterior of the State Armory at Syracuse, Which Is Occupied by the Automobile Show This Week

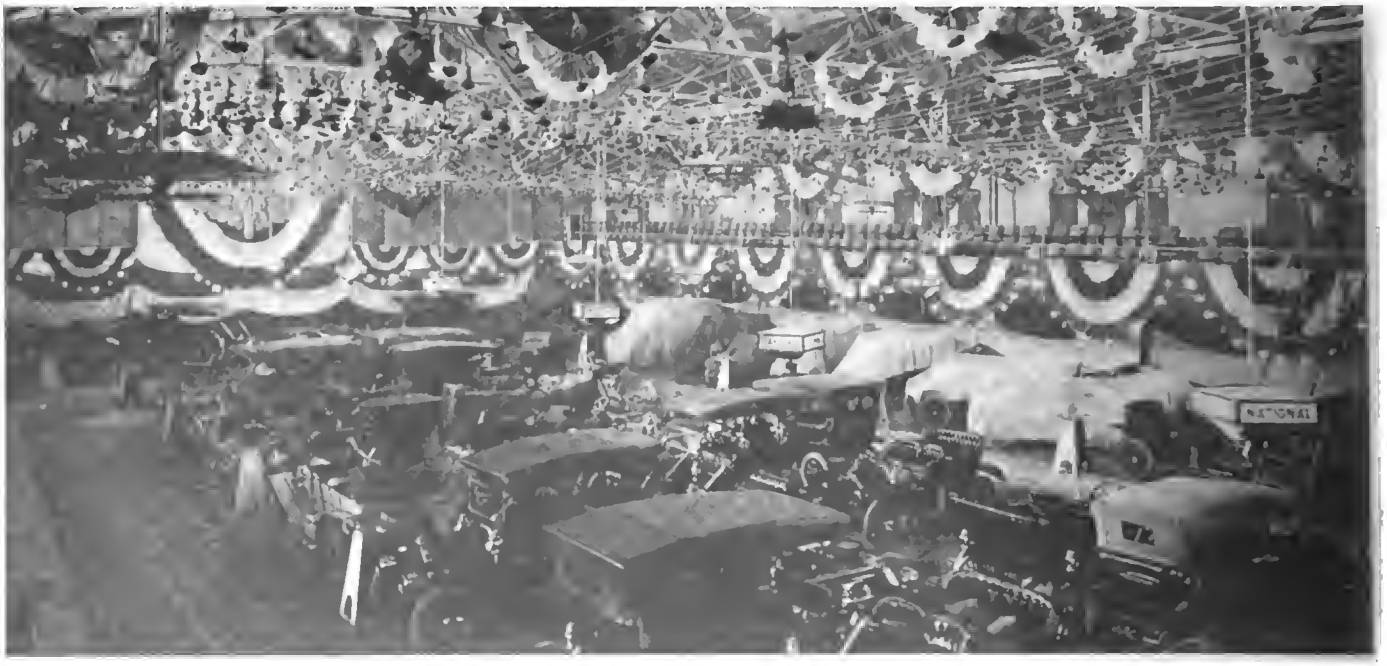
SYRACUSE SHOW REFLECTS EXPERIENCE AND ART

SYRACUSE, Mar. 16—Many of the local automobile enthusiasts, and not a few of the dealers expressed regret at the delay in opening the Syracuse Automobile Show, which is being held in the New York State Armory, the front of which is here pictured, which delay was due to the custom of utilizing the armory for State purposes on Monday nights, which are ordinarily known as drill nights. It is not believed that the Syracuse Automobile Dealers' Association, which is responsible for the high character of the automobile show, will have to lament at the delay, and in some measure, perhaps, the particularly good arrangement, readiness of the exhibitors, and splendid effect, may be traced to the very fact that ample time was available in which to prepare for the proper display of the 47 different makes, and 85 separate models of automobiles which were there arrayed, at the instance of 46 separate exhibitors.

The main floor and the basement are utilized, the former for the larger portion of the completed cars and the latter for the accessories and trucks. The decorations are not so elaborate as some others have been, but they are very pleasing and the building presents a splendid appearance. Here, again, lack of floor spaces has forced many of the dealers to cramp their exhibits and thus make the showing of their cars a difficult proposition.

The beams and rafters of the drill hall are hung in national colors and emblems. Then underneath is a veritable sky of drooping flowers of paper with lights both above and below. From the balconies are hung circles of bunting at the edges of which are myriads of lights. Palms and green flowers and plants round out the decorations nicely. At the center of the very entrance is a huge imitation pearl shell backed up with a wall of green that makes the entrance very attractive.

The revolving Thomas chassis that attracted so much attention at the Madison Square Garden show is also to be seen here and



View of Main Floor, Showing Baker Electric, Oakland, Oldsmobile, National, Ford and Others

Franklin Has a Notable and Very Complete Exhibit in Its Home Town Automobile Show. Torpedo at Right

is one of the drawing cards. In this same breath should also be mentioned the gray Franklin torpedo. This, too, was seen in the Garden and here as there it is almost unapproachable because of the enormous crowds surrounding it.

The Chalmers "Bluebird," winner of the Massapequa, also comes in for its share of attention. Elsie Janis' American Simplex or as it is now known Amplex with her photo gayly poised in one seat comes in for its share of attention among the novel-

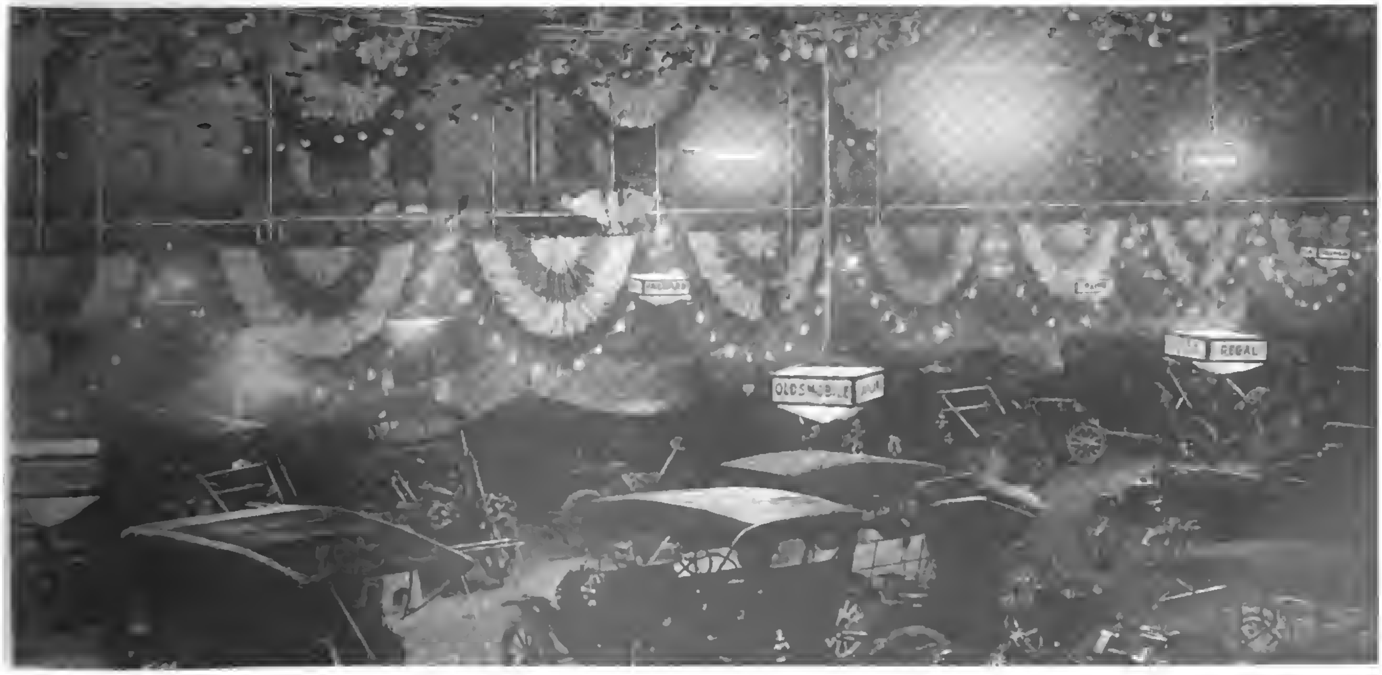
This in addition to opening night is Automobile Club night and the local club members are out in force. A vigorous campaign is being waged this week for members.

Wednesday is Chamber of Commerce day and the business men who compose that august body are expected to attend in a crowd. They seem to realize the value of the exhibit to the community and are dignifying it by their presence.

Thursday is society day with double admission. Friday is turned over for the benefit of the Mystic Krewe. This is a festival organization here corresponding to the Mardi Gras and other festivals of other cities. Saturday will see the University students turned out in force, and a gala time is expected.

The general management of the show has been in the hands of Harry D. Van Brunt and well has he looked after his end of the work. Not one jarring note could be found and the work of a master hand is in evidence on every side.

Billy B. Van, in vaudeville with the Beaumont Sisters, who is playing here this week, pulled off an original stunt on C. Arthur Benjamin, president of the local association. Mr. Benjamin has a Packard Thirty in the lobby of the Yates Hotel on exhibition. While he was at the show this afternoon Van tied on the hood a sign bearing this information: "Presented to Billy B. Van by the Hotel Clerks of Syracuse." 'Tis rumored that one Benjamin has said that he will buy freely.



A Corner of Syracuse Show Where Palmer-Singer, Oldsmobile, Packard, Regal and Baker Electric Held Forth

AMONG THE GARAGES

Reo touring car full of champions. Jeffries at the wheel; front seat, Jack McCormick and Frank Gotch; rear, Berger, Roller and Farmer Burns, all well known in sporting circles

James M. Beaver and Edgar Barber, of Lincoln, Ill., are having erected a garage building, 40 by 90 feet, of brick and concrete, on Logan street. The building will be well equipped with all modern conveniences. The agencies of the Chalmers, Hudson and Haynes cars have been secured.

Findlay, O., is soon to have a garage. Messrs. Johnson and Fortune have formed a partnership for this purpose and are remodeling the Edwards property on North Main street. They will take the agency for some car not yet decided upon and also will do a general garage business.

To accommodate the line of Regal cars, for which he holds the Trenton (N. J.) agency, John H. Ashton has begun the construction of a garage at 227 North Broad street, in that city. The building is to be three stories in height, and will make a handsome home for the Regal.

The Tynan & Reynolds garage, at 173 Van Houten street, Paterson, N. J., which was destroyed by fire recently, is to be rebuilt as soon as possible. M. A. Beekman, the owner of the property, is having plans made for a two-story structure 50 by 100 feet, to cost $3,800.

A garage is being built at 142 North Broad street, Philadelphia, by M. R. Dillin. It is a six-story structure 51 by 83 feet, and the cost will be approximately $80,000. The location is an excellent one, and there is every reason to believe that the venture will be successful.

The Woodsdale Motor Car Company, of Woodsdale, W. Va., a suburb of Wheeling, is now established in its new garage, which includes a well equipped repair shop. The Woodsdale Company has the local agency for the Chalmers and the Hudson.

The Central Garage Company, of Streator, Ill., has opened a garage at 125 South Park street. The building is a modern one of concrete block construction, 53 by 140 feet. The company has the local agency for the Moline.

Plans have been drawn for a garage to be located on the east side of Cleveland street, Orange, N. J., to be 40 by 100 feet. Robert Wright, of that city, is the promoter of the idea.

E. C. Sweet & Son, of Reedsburg, Wis., have opened a garage and repair shop and will distribute the Regal, with the Curtiss motorcycle as a side line.

Brief Personal Mention

Paul L. Snutsel, the well-known Belgian automobile engineer, sailed on the White Star liner *Adriatic* March 12 for an extended trip of six months or more through Europe in the interest of the Splitdorf magneto. Mr. Snutsel will go direct to Turin, Italy, and will have charge of the Splitdorf exhibit at the automobile show to be held there early in April, after which he will visit the different manufacturers of France, Belgium, Germany and England.

Will B. Wreford, well-known sporting writer, and for some years automobile editor of the Detroit *Free Press*, has severed his connections with that paper, and on March 15 will become sales manager of the Michigan selling branch of the Columbia Motor Car Company, handling the gasoline cars made by that concern.

W. C. Orrell, formerly manager of the Detroit branch of the Buick Motor Company, has been made purchasing agent of the complete Buick accessory department for the United States. His former place will be filled by C. C. Starkweather, up to the present time local sales manager.

President Miller of the Mar-Del Mobile Company, Packard agent in Baltimore, Md., gave a dinner to twenty-two employees and several visiting automobilists at the New Howard Hotel. The out-of-town guests were Messrs. Chalfant, Gilbert and Baines, of Detroit, Mich.

William F. Sanger, Milwaukee, Wis., representative for the E-M-F and Flanders and associated with the new Milwaukee branch of the Studebaker Automobile Company, is a Republican candidate for Alderman in the Eighteenth Ward, Milwaukee.

Walter E. Flanders, president of the Everitt-Metzger-Flanders Company, Detroit, Mich.

WITH THE AGENCIES

As is well known, our President is very fond of golf. The picture shows him at the Country Club, Augusta, Ga., in a Rambler 45 about to set out for home after an afternoon's play

One of the best appointed of the Hartford, Conn., salesrooms is that of the Packard Motor Car Company, of New York and Hartford. Previous to opening the local branch the Packard was represented by Brown, Thomson & Company. There is a large salesroom on the ground floor and large double doors render moving cars to the street an easy matter. There is also a large elevator to carry cars to the repair department on the top floor of the building. Charles Embeltin, of New York, is manager of the local branch and the repair end is left to the management of John Mead.

F. E. Avery, the Columbus, O., agent for the Packard, gave a dinner party Saturday evening, February 26, at the Ohio Club in honor of a number of the officials of the Packard company who are making an inspection trip of Packard agencies. In the party were E. P. Chalfont, sales manager; J. J. Ramsey, auditor, and J. F. Baines, manager of the service department. In addition to the above-named gentlemen the attachés of the Avery company were present.

The E-M-F and Flanders lines have been placed with the Sanger Automobile Company, 437 Milwaukee street, Milwaukee, Wis. The salesrooms are the same as used by the Milwaukee branch of the Studebaker Automobile Company, of which William F. Sanger, owner of the Sanger concern, is sales manager.

J. D. Maxwell, the creator of Maxwell cars and factory head of the Maxwell-Briscoe Company

Callahan, Atkinson & Company, Locomobile representatives, have opened up new spacious salesrooms and offices in the heart of Baltimore's retail district, at 328 North Charles street. The firm has two carloads of Locomobiles of various designs on display and these attract the attention of many passers-by.

Frank Brosn, Jr., son of Baltimore's former millionaire Governor, has joined the sales force of the Shaab Auto Company. This firm has recently taken on agencies for the Rainer, Marmon, Courier and Billy Four cars, which they handle in connection with the Renault and Stoddard-Dayton cars.

The Washington Automobile Company has opened up for business at 67 East Maiden street, Washington, Pa. D. A. Swart is proprietor of the establishment, which will handle the Lozier, Locomobile, Oldsmobile, Chalmers, Pullman, Cadillac, Overland and Hudson cars.

The Roe-Halverson Auto Company has been organized at Stoughton, Wis., to handle the Overland in Dane county, which contains Madison, the State capital. The partners are Carl and Gustav Roe and S. M. Halverson. They will also distribute the Marion in this territory.

The Taylor Motor Distributing Company has been formed by William T. Taylor, of Philadelphia, and Frank B. Cook and Philip N. Price, of Johnstown, Pa. It will establish an agency in the Real Estate Trust Building, in the latter city, for the Warren-Detroit cars.

William Beitz, of Lomira, Wis., has received the agency for the Black-Crow for Dodge and part of Fond du Lac counties. Dr. J. E. McCarty, of Eden, Wis., will handle the Black-Crow in eighteen counties in Central Wisconsin.

M. S. Keyes, formerly with the Maxwell-Briscoe Company, at the Tarrytown plant, has taken on the Regal agency for the territory in southeastern New York, exclusive of New York City, also Connecticut, Rhode Island, and northern New Jersey.

The Empire Tire Company has opened a branch house in Kansas City, Mo., in charge of Claude Beardsley, formerly a traveling salesman for that company.

The agency for the Clark cars for Kansas and western Missouri has been placed with H. B. Weils, operating as the Clark Motor Car Company, of Kansas City.

The Franklin Cycle & Supply Company, East Gay street, Columbus, Ohio, has taken the central Ohio agency for the Detroit-Dearborn line.

Leslie C. Dorland has secured the exclusive agency for the Demot in Dutchess County, New York, with headquarters at Poughkeepsie.

The Corbin agency for Wisconsin has been placed with the Curtis Automobile Company, of Milwaukee, Wis., State agents for the Reo.

REALM OF THE MAKERS

One of the new model Inter-State cars, in front of the factory at Muncie, Ind. This is the very latest idea in torpedo bodies

"First in the Western Hemisphere," the Aeronautic Supply Company, 3923 Olive street, St. Louis, has issued a catalogue of aeronautic materials and supplies similar to those of the big automobile supply houses. The company's line is very comprehensive, including Gnome, Curtiss, Holmes, Easton and Elbridge motors, Honeywell balloons and dirigible envelopes, Chauvière propellors, Hartford aeroplane tires, Livingston radiators, Warner anemometers, and various kinds of fabric, steel tubing, wheels, wire, turnbuckles, etc. In addition a number of books dealing with aeronautics are listed. Considering the newness of the business, this catalogue reflects great credit on the firm issuing it.

Parry 32-36 horsepower touring cars made good showing on two of the steepest hills of Baltimore recently. In the first test one of these cars made the ascent of the incline, which has a rise of 25 feet in 230 feet, at a speed of 15 miles an hour. J. M. Wright, president of the General Auto Company, local Parry agent, and F. C. Kitchin and G. J. Kessler, of the firm, and Harry Mayer, of the Auto Supply Company, were the passengers. In another test on a similar grade the car, which was driven by Mr. Wright, made the climb at a 20 miles an hour rate. The hills are paved with rough cobblestones.

It is said that the American Motor Car Company of Indianapolis, Ind., has announced that it will leave that city, and from current reports it is said that the Parry Automobile Company has also under consideration proposals to locate in some other city. Some surprise has also been expressed that the American Motor Car Company should move to Lafayette. This latter concern expects to make the change about June 1st, when it will begin on its 1911 line. Citizens of Lafayette have raised $150,000 for the company, $125,000 of which will be used as a bonus for purchasing ground and erecting and equipping factory buildings. The remaining $25,000 is to defray moving expenses.

Coker F. Clarkson, assistant general manager of the A. L. A. M.

The Hewitt Motor Car Company passed from existence Monday, becoming a part of the Metzger Motor Car Company, of Detroit, whose capital has been increased to $1,000,000. Although its corporate existence has been terminated, the Hewitt plant in New York will be operated until a Detroit factory can be erected, which will probably be about midsummer. Twenty acres of ground will be used as a site for the motor truck plant, which will be conducted entirely independent from that at which Everitt pleasure cars are now made, and some $250,000 will be invested in buildings and equipment.

One of the interesting features of the Milwaukee automobile show was a train run by the Kissel Motor Car Company from Hartford to Milwaukee during the show week. All the employees of the Kissel Motor Car Company were invited to the show at the expense of the company and, in order to make the trip conveniently, without interfering with working hours, a special train was chartered by the Kissel company itself, which hauled a large trainload of employees from Hartford to Milwaukee and back again, giving them opportunity to spend Sunday at the show.

Flint, Mich., is to receive a further boom as the result of two more important plants having been taken over by the General Motors Company and moved to that city. These are the Randolph Motor Car Company, of Chicago, and the MacClean Wheel Company, of Cleveland. The former company manufactures a motor truck, and will employ some 400 men. The latter makes a spring wheel of new type, which will be used on all motor trucks produced by the associated General Motors plants throughout the country, it is stated.

The keels (chassis) for the Moline "Dreadnought" squadron which has been entered for the 1910 Glidden run have been laid and work started in preparing this unique trio for the year's most popular endurance run. They will be put through some strenuous work among the hills in and around Moline before taking on the official war paint, which will be battleship gray, as of last year. The record achieved by the Moline in the 1909 run is evidence that it will be a prominent contestant in 1910.

The Clark Motor Car Company, Shelbyville, Ind., is now well under way, with cars coming through in quantities, and is making daily shipments.

Great Smith is now numbered among the ranks of the makers licensed under the Selden patent.

NEWS IN GENERAL

At the Boston show the White Company showed the practicability of the three-ton truck by using it to carry all material to the show

Eight prizes will be offered to automobilists who tour to Fort Worth, Tex., to attend the automobile show which will be held there March 14-19. Perhaps the most novel offer is that of E. O. Thackston and Tom Massey, of the Overland company, namely, a speedometer for the first out-of-town car which breaks the speed limit during the week. Other prizes are *Star-Telegram* trophy to the west Texas town or city sending in the greatest number of cars; Troy wind shield, by the Moline company, of Dallas, to the car which comes the greatest distance to the show; cup by the Maxwell-Briscoe-Handley Company to the group of cars which show the greatest combined mileage; silver cup, by the Texas Motor Sales Company, to the West Texas autoist bringing in the greatest number of ladies in his car; horn, by F. F. Simons, of the Stevens-Duryea Company, to the autoist bringing the greatest number of children in his car; speedometer to the first car, coming at least fifty miles, and reporting at the office of the Fort Worth *Live Stock Reporter;* eight-day clock, by the Buick company, to the car which has been in service the longest.

Increasing the size of the contest board of the Chicago Automobile Club from three to eight members would seem to indicate that President Ira M. Cobe is planning a vigorous campaign, although up to this time he has given out nothing official for publication. Joseph F. Gunther has been retained as chairman of the committee and his two 1909 associates, A. J. Banta and C. G. Sinsabaugh, also have been appointed. But President Cobe has added five others to the list, three of whom come from the trade—James E. Plew of the White, A. M. Robbins of the Oakland and Thomas J. Hay of the Ford. H. N. Scott and W. H. Thompson make up the rest of the committee.

At a special meeting of the Boston Automobile Dealers' Association, held last week, the matter of motor legislation was discussed. President L. R. Speare of the American Automobile Association was present and went over some of the bills presented. The various measures selected were discussed by the members who endorsed them, but owing to the rush incident to getting ready for the motor show they were not able to appear before the legislative committee. James T. Sullivan was appointed as representative of the association to outline their view at the hearing of the bills.

Local dealers in Baltimore have come out flatly with the statement that they and not the Automobile Club of Maryland will run shows here in the future. Club members, on the other hand, through Assistant Secretary Hutchison, assert that they have no intention at this time of discontinuing the idea of being the moving spirit in any shows to be held in Baltimore. The result is that if both sides stick to their declaration Baltimore is likely to offer two shows to the local public.

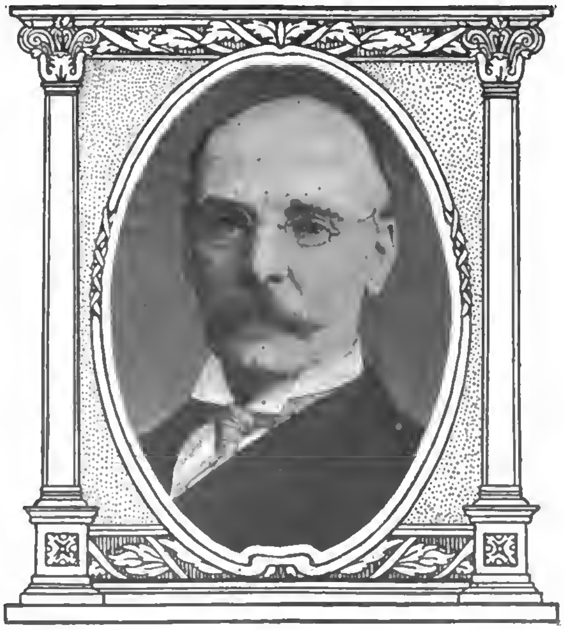
The Venango (Pa.) Automobile Company, composed of C. E. Trace and Charles H. Sheasley, and the Myers Carriage Company, have been sold to the Franklin Commercial Truck Company, which will manufacture, buy and sell automobiles. The main interest in the two old companies will control the new concern, which will be in Franklin, Pa., and will have its plants at Thirteenth and Buffalo streets in the same city. The capital is $100,000.

The American Taxicab Company is a new Pittsburg concern located at 307 Arrott Building. The officers are: President, George J. McGinty; vice-president, James N. McGinty, and secretary and treasurer, A. A. Firestone. The company is already operating several taxicabs and will soon add a large number and establish substations in different parts of Pittsburg. This is the third taxicab company now operating in that city.

Washington, D. C., has been added to the list of cities where Alco taxicab service now exists. The Auto Livery Company has placed an initial order for a lot of cabs; the first shipment has been made. This company plans eventually to replace all of its old stock with the same type of Alco cabs now in service in New York, Philadelphia and a number of other large cities.

Six automobile shows were held during February in the Middle West and Far West, these being Los Angeles, Salt Lake City, Denver, Kansas City, Minneapolis and Omaha.

The tent erected for the Los Angeles automobile show is the largest ever raised in America. It covers 40,000 square feet.



Thomas Henderson, vice-president of the Winton Co., Cleveland

REGARDING REISSUES OF AUTOMOBILE PATENTS

By XENOPHON P. HUDDY, LL.B.

AMONG the various branches of the law in which we find the automobile and its operation the subject of legal controversies, the Law of Patents, so called, is the one branch of our jurisprudence that is at the very foundation, basis and life of the automobile industry. Independently of statutory enactment and under the common law an inventor possesses no right to restrain others from using his invention, but in order that the public may enjoy the benefit of an invention, the State grants to the inventor the exclusive right to make, use and vend the invention for a limited period, provided that the originator furnishes a full, clear and exact description of his invention so that after the patent has expired, the article may be manufactured generally for the benefit of the public.

DEFINITION AND NATURE OF PATENT

So it may be said that a patent is a grant by the government to the inventor of the exclusive right to control the manufacture and use of the article for a definite time. It has the essentials of a contract. Of course, the law governing automobile patents is not different from the law controlling other inventions. We will now direct our attention to reissues of patents.

REISSUES OF PATENTS

A patent being originally granted to secure certain rights to inventors for a limited time, a reissued patent is one which secures those rights more definitely in some particular wherein the original patent was defective. A reissued patent is in the nature of an amendment of the original. There are limitations, however, on the right to secure a reissue.

LAW GOVERNING REISSUES

The Revised Statutes of the United States, Sec. 4916, provide for the reissue of defective patents as follows:

"Whenever any patent is inoperative or invalid, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his own invention or discovery more than he had a right to claim as new, if the error has arisen by inadvertance, accident or mistake, and without any fraudulent or deceptive intention, the Commissioner shall, on the surrender of such a patent and the payment of the duty required by law, cause a new patent for the same invention, and in accordance with the corrected specification, to be issued to the patentee."

SEVERAL PATENTS FOR SEPARATE PARTS

There are other provisions of the statute authorizing the Commissioner to cause several patents to be issued for distinct and separate parts of the invention patented, upon request of the applicant and payment of the fee for a reissue for each reissued letter. The specifications and claims in every such case are subject to revision and restriction in the same manner as are original specifications.

INTRODUCTION OF NEW MATTER

No new matter, however, can be introduced into the specification, nor in the case of a machine patent can the model drawing be amended, except each by the other, but when there is neither model nor drawing, amendments may be made upon proof satisfactory to the Commissioner that the new matter or amendment was a part of the original invention, and was omitted from the specification by inadvertence, accident, or mistake.

STATUTORY PROVISIONS LIBERALLY CONSTRUED

The provisions of the statute governing reissues are to be construed liberally, but the mistake or accident before referred to must have been *bona fide* and not purely an error of judgment, and it is held that the patent must have been inoperative and invalid.

WHEN REISSUES WILL BE GRANTED

Prompt action should be taken by one who desires a reissue, since laches and unreasonable delay may defeat the right. A reissue obtained after unreasonable delay and for the purpose of expanding the patent claims to embrace devices appearing since the issuance of the original patent and which are not infringements, has been held to be void. In some cases a delay of two years has been held to be unreasonable. If, however, there exists a reasonable and lawful excuse for the delay in making the application for a reissue, the application will be recognized For instance, where a patent was obtained June 6, 1882, and was held to be void by the United States Circuit Court, June 19, 1894, and by the Circuit Court of Appeals, October 22, 1894, a reissue dated March 11, 1895, was held not to be void by reason of lapse of time, in Maitland B. B. Goetz Mfg. Co., 86 Fed. Rep. 124.

WHAT MAY BE CLAIMED

Generally speaking the reissue must call for the same invention and no new matter can be included. A broader claim may, however, be made if it is for the same thing. New features may also be included. In other words, all that could have been claimed originally may be requested in the reissue. But if letters patent fully and clearly describe and claim a specific invention, complete in itself, so as not to be inoperative or invalid by reason of a defective or an insufficient specification, a reissue cannot be had for the purpose of expanding and generalizing the claim in order to embrace an invention not specified in the original. So also letters patent for a machine cannot be reissued for the purpose of claiming the process of operating that class of machines; because, if the claim for the process is anything more than for the use of the particular machine patented, it is for a different invention. See James vs. Campbell, 104 U. S. 356; Burr vs. Duryee, 1 Wall, 531; Powder Co. vs. Powder Works, 98 U. S. 126.

TERMS OF REISSUE

A reissued patent is valid only for the remainder of the term of the original patent.

MODIFICATIONS OF BELGIAN PATENT LAWS

Consul H. Albert Johnson, of Liege, reports that a national association has been organized to study industrial proprietorship, reforms and modifications of Belgian laws concerning patent rights and trademarks and international agreements relating thereto. He says:

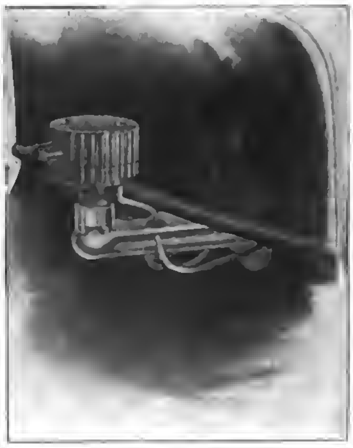
The National Belgian Society for the Protection of Industrial Proprietary Rights has been organized, with the co-operation of the Director-General of the Department of "Industrie et du Travail," the Director of the "Office des Brevêts" (patent office), a number of the leading legal specialists, and prominent industrial concerns. The Belgian patent laws now in force date from 1854; those controlling trade-marks from 1879. So far as the submission of models and drawings is concerned, procedure is regulated under the decree promulgated during the time of Napoleon I, dated March 1, 1806.

It appears that under the method of procedure at present in force, in the case of an application for a patent, no provision is made either for a preliminary examination of existing patents or for printing a description of the patent issued. As these matters are considered of prime importance, the association proposes to direct its efforts toward the enactment of legislative action that will result in providing as speedily as possible for such an examination and for the printing of the description of the patent. Another important point to be urged by the new association is that of arranging the Belgian patent laws in conformity with the rulings of the international convention.

It is also claimed that there are various matters regarding the routine work incidental to procuring a patent in Belgium that can be greatly simplified in the interests of inventors, and it is asserted that, out of consideration for the many important industries in Belgium, all legislation concerning industrial proprietary rights should be given new life and be placed on a thoroughly up-to-date basis.

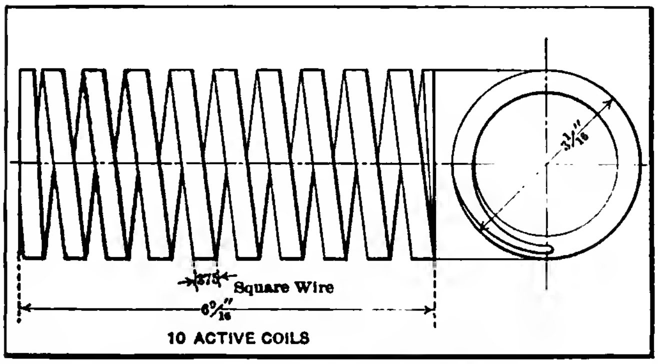
PROMINENT ACCESSORIES

HART & FULLER, of Hartford, Conn., have brought out a device for electrically lighting acetylene lamps which operate on the ignition circuit. The advantages of the device are that it requires no separate source of current and no individual spark coil; these economies are reflected in the consequently low price. In fact, the only parts of the device are a switch, the gas-tank valve, the "spark plugs," the points of which project across the jets of the acetylene burners, and the wiring. The switch is conveniently located under the overhang of the front seat, so that it is practically invisible and at the same time is easily reached by the operator.



Hart Gas Lamp Lighter

This switch is so connected into one of the high-tension circuits that the latter can be short-circuited across the lamp spark plugs. These have their points rather closer together than the cylinder spark-plugs, and do not work under compression, so that this circuit offers considerably less resistance than the regular one, and the current flows through it by preference whenever the switch allows. The valve of the gas-tank is disposed by the side of the switch, convenient to the operator's hand; the gas is first turned on, and after a suitable interval, to allow it to reach the burners, the switch is turned on and the spark jumping across the jets ignites the gas. This system offers the excellent advantage of permitting the autoist to control the intensity of illumination from the lamps by the mere process of adjusting the flow of the gas by the means which is ready at hand.

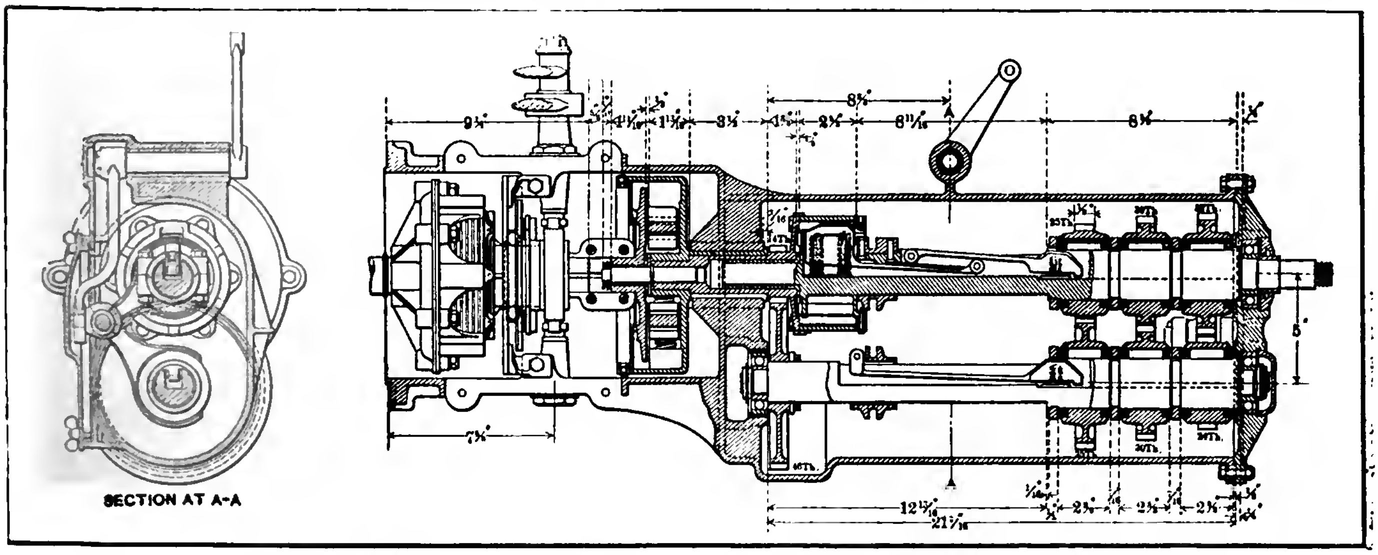


Square Wire Clutch Spring Used on Alden-Sampson Trucks

Among the interesting features of the Alden Sampson trucks, made by the Alden Sampson Mfg. Co., of Pittsfield, Mass., is the clutch spring, an illustration of which is offered herewith. The spring, contrary to the usual practice, is formed of square instead of round wire, the cross-section being 3-8 inch in each dimension. The spring is wound on a special machine, and the ends are ground off at right angles to the axis. There are ten complete coils. The overall dimensions are 6 9-16 inches long and 3 1-16 inches in diameter.

PARKER AUTOMOBILE TRANSMISSION GEAR

CHICOPEE FALLS, MASS., is the scene of a new undertaking which is attracting the notice of automobile engineers of discrimination. The Parker transmission gear, a section of which is here given, is responsible for the excitement, and it promises to overcome the mechanical objections to the clash type of sliding gear now in common use in automobiles. The Parker gear, as the section shows, is of the type which allows the sets to remain in constant mesh, but by means of sliding members which are flush in grooves of the respective shafts. The speed changing gears may be selected to suit the exigencies of service, and the remaining gears are idle. The system has been tried out under severe conditions of service, and the new design will economize space considerably, as compared with the first model, as here illustrated. In this case, the multiple disc clutch is within the gear housing, but this is a detail which may be altered at will. The same thing, of course, applies to shaft centers and other details.



Section Through and End View of New Parker Automobile Transmission Gear, Showing Operating Means

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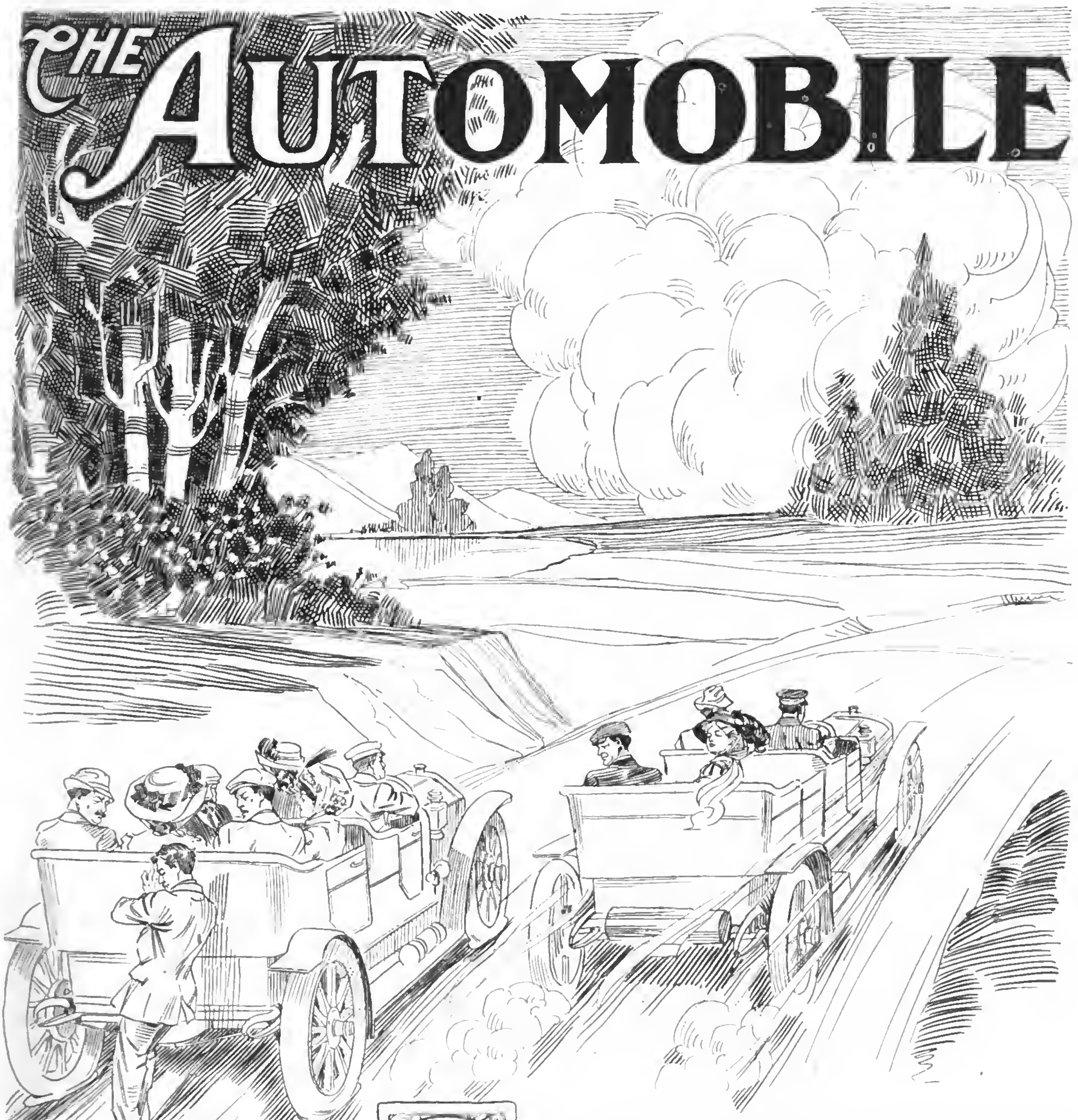


SPRINGTIME offers its lures, and the budding autoist with his recent purchase will find himself within the zone of a double attraction, and he is to be congratulated when the air becomes balmy, the roads dry up and the sweet running automobile, fresh from the maker, offers him every facility with which to enjoy life. If it is the first car and it will be for better than a hundred thousand recruits to the ranks to the users of automobiles this year, each one of them in contemplation of the pleasurable advantages to be derived will have to consider the responsibilities as well, and, if the advantages are not to be dimmed by adverse incidents, certain important requirements will have to be given the attention they deserve.

All men are not, by right of birth, mechanics; some men cannot even acquire a reasonable degree of mechanical proficiency, and even those who can, unless they practice daily in the mechanical arts, overlook the important considerations, allowing their training to fall into disuse, and take pattern after the environment in which they live, so that when they acquire their first automobile they accept it as a mere substitute for a horse, excepting that they give it credit for a wider range of activity, and assume that it will withstand abuse almost without limit, hoping, perchance, that steel has life everlasting. The trusty horse has something of an advantage over an automobile, due to his ability to lay down when he is tired, but the automobile must go on and on until it pulls asunder, and in the process presents the only evidence of abuse that is acceptable to the non-mechanical mind. In the case of the horse, it is very rarely that the loading is so excessive as to stall the animal; humane considerations have their wide and useful influence, but it is very rarely that the human attribute influences for good when an automobile is taken into account.

METAL MUST BE TREATED IN CONFORMITY WITH LIMITED LIFE

The first point to consider when an automobile is being placed in commission must be that the life of the material is positively limited, and that it will be prolonged in proportion to the care with which it is handled. Metallurgists, while they fail to give definite reasons in many of their statements in relation to the life of structural material in actual use, quite generally agree with each other, to the effect that strains, shock and especially alternate vibrations tend to shorten the useful life of the material, and this tendency becomes very marked indeed when the material is overworked.

This is by no means a place in which to indulge in a technical discussion of the vibratory value of steel and other structural materials which are in common use in automobiles, but there are two or three plain truths which the new autoist can afford to take under advisement until experience will come to his assistance and enable him to think rationally for himself. In order to properly understand this situation, it is necessary to go back into the history of the automobile to the time when the designs were so crude that the weight of the cars was in considerable excess of that which could be tolerated. Designers, in view of this consideration, exerted themselves to the utmost to reduce the weight of the component parts in order that the weight of the cars as a whole would come within the requirement.

Reducing weight, while it was an evolutionary process, involving four or five years of persistent effort, demanded two things, *i. e.,* (a) the utilization of dynamic material, (b) the careful working out of the proportions of the parts in order that the extreme fiber strain would be within practicable limits. Engineers are very fond of quoting what they call a dictum, "a chain will be as strong as its weakest link." This dictum sounds as if it were the very essence of wisdom, but a chain is by no means an automobile, and while it is a relative simple process to make all the links nearly of the same strength in a chain, it is extremely difficult to make all the members of an automobile so harmonious in their several relations that they will each of them serve under precisely similar conditions.

There are a thousand reasons why designers are not yet prepared to assure equality of work of the several parts in the make-up of a car, although the situation at the present time is almost up to the point where standardization may become a reality. In the meantime when the new automobile is put into commission, it will be well to remember that legitimate expectation is positively limited to the loading of the car within the limits as fixed by the number of seats available as it comes from the maker. Any extra weight which is placed as a burden upon any automobile is bound to react against the owner, and it is sure to add to the cost of maintenance besides reducing the useful life of the car.

A CAPABLE KIT OF TOOLS SHOULD BE CARRIED ALONG

In discouraging the undue addition of burden to a car, it should not be understood that a reform will be wise, if it results in the undue limiting of the tools which an autoist should have available. It makes no difference who builds an automobile, of what material it is made, or how good a design, it is subject to all the fundamental laws, and its parts are likely to become deranged under road conditions, so that good tools are of the greatest importance and, unfortunately, the conditions under which they are usually required are those which do not permit of falling back upon a repair shop. Even if repair shops were so closely spaced as to permit one to rely upon them entirely, the fact remains that it is an expensive experiment to call for help at the nearest repair shop, under such conditions. It is reasonable practice to trust the repair man whose capabilities are established and known to the owner of a car, but it is not safe to call for help, in a remote district, from a repair man who does not feel the responsibility of doing work for a regular customer.

A roadside repair is best made by the owner of the car, and in order to be able to do so it is necessary to have in hand, for ready use, a wise selection of capable tools. In the selection of tools, account must be taken of the market conditions in which it seems that there is a wider variety, from the point of view of quality, in the hardware line, than there is in any other class of trade. To the inexperienced autoist, for illustration, all files look alike, but the experienced mechanic is perfectly aware of the great differences which exists between them. At all events, the autoist, as he must face a breakdown on the road, is compelled to regard a file as his substitute for a lathe, shaper, planer, grinder and all the other machine tools which are at the disposal of the builder of the car.

If a file becomes of such extraordinary importance, and it surely does, considering the fact that one good file will outlast a thousand bad ones, it is a mere illustration of the same condition as it obtains in connection with all the tools which should be carried along. Emphasizing the necessity of having available a competent tool kit is by no means licensing a burdensome excess. Tools are difficult to store, and when they are in excess they defeat prompt work, because the useless devices invariably get in the way, and the trouble involved in finding the right ones is accentuated. A self-contained condition of autoing, considering a car which starts out in good working order, should be a reasonable expectation, were a kit of tools to be made up as substantially set forth elsewhere in this article.

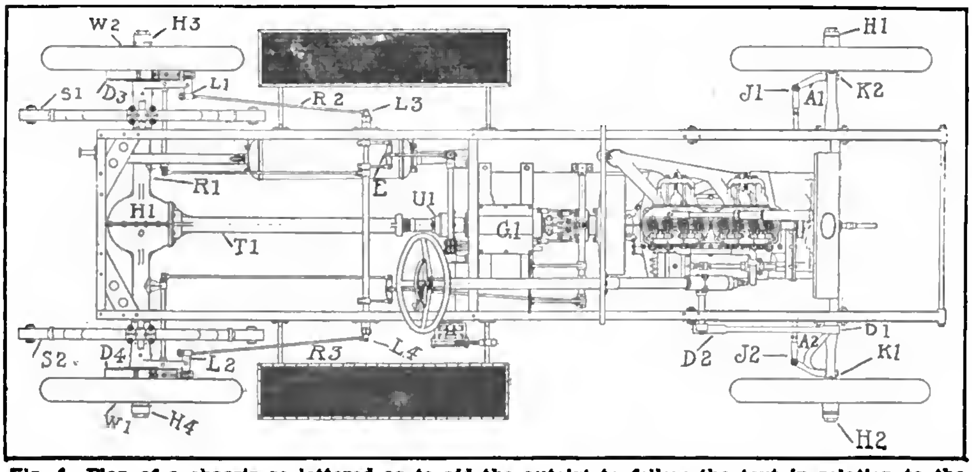


Fig. 1—Plan of a chassis so lettered as to aid the autoist to follow the text in relation to the putting in commission of a new automobile.

CLOSE INSPECTION IS DESIRABLE

A new automobile is supposed to be in good working order; it even offers evidence of this necessary qualification when it is delivered to the owner's garage under its own power, or when it responds to a sufficient demonstration to warrant its owner in making the purchase. Even under the most favorable conditions it is wise, especially for a new autoist, to expend quite a little of his time in going over the mechanism in detail, partially for the purpose of becoming familiar with the construction, and finally with a view to ascertaining if all the units are properly related to each other, and if the bolts are fetched up with their heads against the bosses, the nuts in tight relation and the cotter pins in place.

Fig. 1 presents the outline of a chassis, and will be utilized in a further discussion of this part of the subject for the purpose of aiding the reader. Beginning at the front of the car, the knuckles K1 and K2 should be examined to see if there is lost motion, and by jacking up the front axle, it will then be easy to find out whether or not the joints are too tight, and it must be remembered that there is just as much chance of future trouble in a joint that is too tight as there is in one when it is slack. While the front knuckles are receiving the attention they deserve, it is an excellent time to back off the hub caps H1 and H2, then remove the knuckle spindle nuts, take the wheels off and carefully inspect the front wheel bearings. If the grease looks offcolor, it will be an excellent idea to clean the bearings and the cavities of the hubs, using a scraper in so far as it becomes necessay, and kerosene oil for the most part. At all events, it is well worth while making sure that the bearings are with a little "shake," which means that they should respond to pressure and show that they are not bound, and they should be scrupulously clean and then reassembled, after which the wheels can be returned to the spindles, the hub nuts screwed on, cotter pins put back, and the last operation should be to pack the bearings with a suitable grade of grease and screw the hub caps H1 and H2 tightly into place.

It would be regarded as a careless undertaking, were an autoist to consider the front axle inspection completed without examining the steering arms A1 and A2, the joints J1 and J2 and the drag rod connections D1 and D2. These joints should be dissembled, cleaned out most thoroughly, and after reassembling they should be packed with a suitable grade of lubricating grease. Many of the better grades of automobile makers boot these joints in order to protect them against the silt of the road, and also to keep them in a state of copious lubrication, which is due to the means afforded to keep the grease in.

LIVE REAR AXLE OFFERS EXTRA OPPORTUNITY

The front axle should be given attention on account of its relation to steering, and the hazard which comes if the steering functions are not on a substantial basis. The rear axle is of equal importanc,e since, if it becomes deranged, power may not be transmitted to the point of contact of the tires with the road. It is the front axle then, which must be examined on the ground of safety, and the rear axle, for the reason that it is a power transmitting device. Referring again to Fig. 1, the rear axle R1 takes its power from a shaft which connects between the transmission gear G1 and the bevel drive, which is in the housing H1 of the axle. The shaft is enclosed in a torsion tube T1, and a universal joint U1 takes care of the relative moton between the axle and the chassis. The wheels W1 and W2 are in rigid relation with the jackshafts which connect with the bevel drive through the differential, all of which members are enclosed in the axle tube, with its central enlargement H1. It is not believed that a new autoist should be so venturesome as to attempt to dissemble this aggregation of extremely important transmission members, but he should understand that all the covers should be screwed down tight after the parts to whatever extent they are get-at-able through handholes are inspected, rendered perfectly clean and properly packed in a suitable lubricant. The hub cap H3 and H4 should be screwed into place last, and a very good way to make sure that lubrication will be profuse is to fill the caps with grease before screwing them into place.

BRAKES SHOULD BE ADJUSTED WITH DISCRIMINATING CARE

There are several problems in connection with brakes which have to be coped with almost independent of the design of an automobile. The rods R2 and R3 are diagonally placed in their relation between the lever L1 and L2 and the cross-rod levers L3 and L4. The result is that the tightness of the brakes will be variable depending upon the extent of loading of the body as it varies the compression of the rear springs S1 and S2. It is for this reason that an overloaded car, when it is going down a grade, is likely to have its brakes deranged, and accidents are thereby courted.

The extent to which the brakes are likely to become deranged as a result of excess loading will depend upon the length of the rods and the angularity. The length is intended to be sufficient for automobiles that are not overloaded, but the angularity will increase with overloading, and experienced autoists take into account the variable which is present and make brake adjustments accordingly. In some automobiles it is necessary to so adjust the brakes that they will press slightly against the drum faces when the load is light, in order that the brakes will work when the load is normal.

When the brakes are applied, the pressure to the two sides is equalized through the use of an equalizer E, but the adjustment must be so nicely made that the equalizer will be free to act. Unless pressure is applied equally to the drums D3 and D4, the brakes will fail to perform their function satisfactorily, and the tires will be subjected to undue strains. The ability of any set of brakes is limited to the tractive ability of the tires in contact with the roads, and if the equalizers fail to work, and the braking effort is thrown entirely to one road wheel, skidding is induced and the results are but little better than if no brakes are used. The maximum brake effect is always present when the shoes press on both sets of drums uniformly, and just to the point which approaches the maximum adhesion. The instant adhesion is overcome, the ability of the brakes falls off to a nominal point.

THERE IS A PROBLEM RESIDING IN THE TIRES

It is inexpedient to discuss brake adjustments without taking up the tire problem, and it is the new autoist who fails to appreciate the true situation. A car will respond most willingly to the pressure of the brakes if the same is applied skillfully and without undue haste. It takes four measures of power to

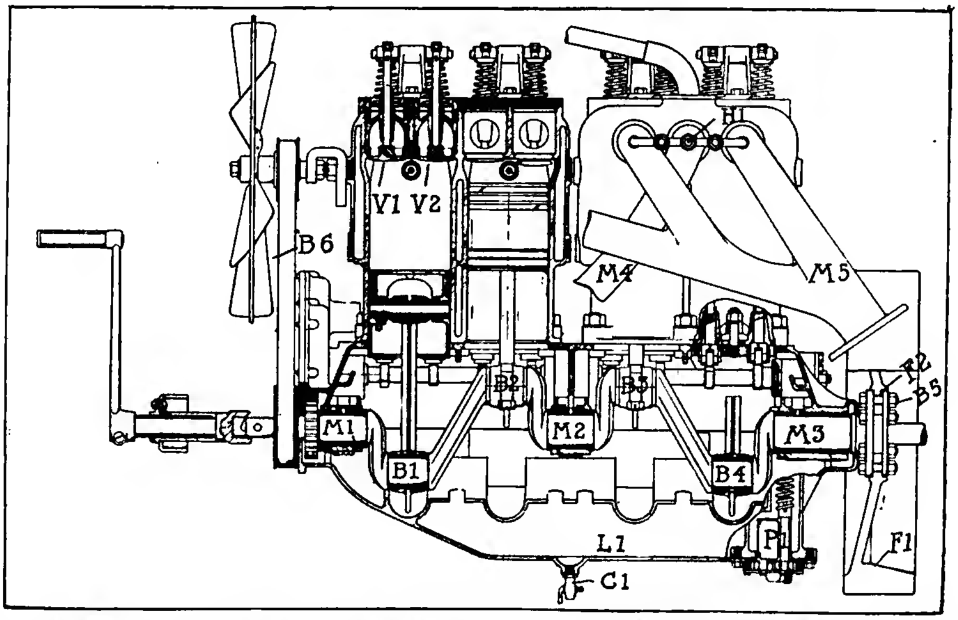


Fig. 2—Section of a 4-cylinder motor so lettered as to help explain the text in relation to the inspection of a new motor before extended use

accelerate the speed of a car to double a given value in a given time, and this statement when inverted may be rearranged as follows: It puts four times as much work upon the tires if the motion of a car is arrested within half of the given distance. This will be true if the wheels are not induced to skid, but after skidding begins the damage which may be done to tires must be confined to the realm of speculation. The tire situation, in view of what has been said, will be less of a problem if the brakes are applied with deliberation and soon enough to permit the car to be brought to rest without the expenditure of a great effort.

There are very few autoists who are able to get away from the idea that tires may be inflated to excess by means of a hand pump. It is quite impossible to inflate any set of tires such as are used on automobiles to a point where the pressure will be greater than that which the fabric should be capable of retaining. The life of tires is enormously reduced when they are flexed repeatedly under load as they invariably will be if the air pressure is insufficient. The one rule which, if observed, will make the most marked saving in cost of maintenance, is that involving the inflation of tires to a point considerably beyond the present average practice.

Tire life is much shortened if the tire on one side is inflated differently from that of the other. The wheels will not then cover the same distance over the ground per revolution, and as a result they tend to roll around in a circle, but since they are restrained from doing so they drag. It is this continued and useless effort which is expended at the point of contact of the treads of tires with the road bed that is at the foundation of much of the tire depreciation which is experienced.

The safe rule is to inflate all the tires equally, and to employ a gauge in order that the pressure may be observed with certainty. It is not possible for any man to decide in the absence of a gauge the extent of pressure in a tire. If the tires are inflated sufficiently, they will cease to do the work which properly belongs to the springs, and if the springs are stiff or improperly designed, the performance of the car on which they are used will be unsatisfactory at high speeds, even on a good road. Under such conditions it will still be good practice to inflate the tires sufficiently to protect them against flexure, and the remedy to take advantage of in order to limit undue vibration lies in limiting the speed of the automobile on the road to the point which will eliminate evidences of excess vibration. At all events, referring to Fig. 3, A represents a side view of a tire when it is properly inflated, B is an end view of the same tire, C is a side view of the tire when it is not properly inflated and D represents the same tire looking at it from the other plane. These views, which were furnished by the Diamond Rubber Company, indicate very clearly what tire makers have in view from the point of view of insufficient inflation of tires, and, as they point out, it is impossible to expect good result if the fabric is flexed as it will be if the tires are not fully inflated.

SOME FURTHER MOTOR CONSIDERATIONS

Referring to Fig. 2 of a motor in part section, F1 is the flywheel, the function of which is to store energy for a part of each cycle and deliver the same to the transmission system during the remaining portion of the same. The very fact that a flywheel is capable of absorbing energy is reason for believing that it must be securely held in place. Were the flywheel to come loose it would do much damage, the reason for which lies in the amount of energy which would be set free in so short a time. As a rule, the flywheel is flanged F2 to the crankshaft and the holding bolts B5, of which there are usually six, should be tightened up, and it would be a good idea to see that they are properly locked into permanent relation.

Lubricating oil L1 is held in the pan at the bottom of the case and the cock C1 is placed to afford a means for drawing off the oil at frequent intervals. It will be proper for the owner of a new automobile to draw off all the oil before the car is taken out, and after cleaning out the case, new oil, of a proper grade, should be put back. The oil pump, if it is located in the case P1, should be examined to see if it is in good working order, or, if it is located elsewhere, it may be examined for the same purpose. The pump drive will demand a moment's attention and if a "dog" is utilized in the system of driving, it will be well to observe if the parts are tight and in good working order.

The connecting rod bearings B1, B2, B3 and B4 should be so fitted that there will be little heating, and, if the case is provided with a hand-hole, it will be a simple task for the autoist to remove the cover, take ahold of the connecting rods, one after the other, and feel the shake or lost motion. There should be a little lost motion, but not enough to be more than barely noticeable.

LIST OF TOOLS TO TAKE ALONG

1 8-inch Stillson wrench.
1 14-inch Stillson wrench.
1 Hawkeye Stillson wrench.
1 6-in combination pliers.
1 10-inch combination pliers.
1 machinist's screw plate with taps and dies in hardwood case, for 3-16 to 5-8-inch U. S. thread.
1 adjustable hack saw frame.
2 dozen hack saw blades.
1 8-inch Coe's monkey wrench.
1 12-inch Coe's monkey wrench.
1 set of S wrenches for 1-4, 5-16, 3-8, 7-16, 1-2 and 5-8 hexagon heads.
1 B & S adjustable spanner wrench.
1 geared breast drill with Morse twist drills up to 5-8 inches in diameter by 1-32 increments, preferably of high speed steel with duplicates of below 1-4 inch.
1 substantial gasoline blow torch.
1 pound of stick solder.
1 package of soldering flux.
1 substantial hand vise with jaws to open 1 inch.
1 6-inch round second cut file.
1 8-inch round second cut file.
1 12-inch round second cut file.
1 8-inch half-round second cut file.
1 12-inch half-round second cut file.
1 10-inch half-round bastard file.
1 10-inch half-round smooth file.
1 8-inch flat second cut file.
1 12-inch flat second cut file.
1 10-inch flat bastard file.
1 10-inch flat smooth file.
1 10-inch feather edge bastard file.
1 10-inch feather edge smooth file.
NOTE.—All files to be Black Diamond or equal quality.
1 assortment of file handles.
1 pair of circular snips, length 11 inches.
1 center punch.
1 4-inch machinist's screw driver.
1 6-inch machinist's screw driver.
1 10-inch machinist's screw driver.
1 small India oil stone.
1 2-pound ball pein machinist's hammer.
1 7-16-inch cold chisel.
1 5-8-inch cold chisel.
1 7-8-inch cold chisel.
1 diamond point chisel.
1 cape chisel.
1 roll insulating tape.
1 bundle copper wire.
1 roll 18-ounce copper.
1 sheet of asbestos packing.
1 kit of substantial tire tools.
1 set of patches for tubes.
1 package of tire cement.
1 package of acid cure for tube repairs.
1 substantial tire pump with pressure gauge.
1 foot of hose of a size to repair joints in water piping.
1 extra pair of hose clamps.
1 bundle of No. 14 B. & S. G. iron wire.
1 gallon can of lubricating oil.
1 can of grease for lubricating.

The main bearings M1, M2 and M3 are not so readily examined, but it will be possible to run the motor for a time and then feel the bearings to determine the extent of heating.

The man of no experience will make mistakes when bearings are being examined, he will find that they do heat up quite a little, and he will be likely to reach the conclusion that the heating effect is in excess. All bearings, when they are running under the most efficient conditions, will heat up so much that they will feel quite warm. Good service may be had from a bearing even when the increase in heat is all that the hand will stand with comfort.

The manifolds M4 and M5, one from the carbureter and the other from the exhaust transfer ports, should be examined to see if the holding bolts H1 are tight. If the manifolds (especially the intake) are not tight on their seats the motor will fail to perform properly. In the same way it will be a good idea to go over all the bolts and tighten them up, but the inexperienced man must be careful not to put too much pressure on, especially if a long wrench is used. It is on this account that S-wrenches are recommended; they are made in proper lengths considering the sizes of heads of nuts that they will accommodate. Even then pressure must be carefully limited to prevent pulling a head off.

1 extra tire case.
1 cover for tire case.
5 inner tubes.
NOTE.—If front and rear wheels are different sizes, provide extra tubes and cases for each size.
1 set of special tools if demanded considering the design of the automobile.
1 jack.
1 box of tire powder.
1 box cotter pins.
1 set of bolts, nuts and screws.
1 foot of proper size key stock.
1 box assorted rivets.

SMALL GARAGE TOOL EQUIPMENT

NOTE.—In addition to the tools specified for the automobile, which will be available for use in the garage the following equipment will be proper:

1 4 1-2-pound blacksmith's hand hammer.
1 20-pound blacksmith's hammer.
1 heavy machinist's pein hammer.
1 set cold chisels.
1 2-inch hide-faced hammer.
1 extra set of files.
1 7-inch toolmaker's swivel, universal vise.
1 400-pound blacksmith's anvil.
1 anvil block.
1 substantial machinist's bench.
1 scientific portable forge.
1 post drill with self-feeding mechanism. Chucks to take 3-4-inch drills and down.
1 heavy pattern breast drill.
1 extra set of high speed steel drills from smallest up to 5-8-inch, inclusive.
1 rachet drill set.
1 set of ratchet socket wrenches.
1 18-inch Stillson wrench.
1 set machinist's clamps.
1 set of spring dividers and calipers.
1 B & S combination square, with 12 and 18-inch graduated blades.
1 graduated hardened T square of medium size.
1 blacksmith's rule.
1 surface gauge.
1 depth gauge.
1 micrometer set.
1 thread gauge.
1 set bearing scrapers.
1 cross oil filter.
1 60-gallon lubricating oil tank.
1 gasoline storage tank.
1 set of oilers.
1 waste can.
1 waste storage box
1 set fire extinguishers.
1 washing set.
1 box for washing materials as soap, chamois skin, etc.
1 vulcanizing set.
1 dark closet for tires.
1 box assorted rivets.
1 box assorted bolts and nuts.
1 assortment of mild steel for stock.
1 assortment of key stock.
Such other tools as the situation warrants.

The belt B6, which transmits the power to drive the fan, should be tight enough to serve the purpose, and a general examination of all the small parts, as well as the bearings and drives for the pump and magneto, will lead up to the last point, i. e., the grinding of the valves V 1 and V 2, which are the inlet and exhaust valves in each cylinder. This is a process which will have to be undertaken sooner or later after an automobile is put into service, and it is of such importance that it will be treated as a separate matter and at some length in THE AUTOMOBILE at an early moment. In view of the wide variation in valves and the arrangement of them it is necessary to illustrate the points to be made.

AT FIRST GLANCE MECHANISM LOOKS COMPLICATED

Fig. 4 shows the right side of a four-cylinder motor in its right position in a chassis, with the bonnet off, presenting the accessories in their correct relation. To a man of no experience, a look under the bonnet must have a very disconcerting effect. The carbureter C1 occupies a midposition between the cylinders, and the intake manifold M1 completes the connection between the carbureter and the two pairs of cylinders. The magneto M2 is partially hidden by the chassis frame S1, but the wiring passes almost vertically up, thence across the top of the cylinders to the spark plugs S2, of which there are four in sight on the right side of the motor, and the timer T1 stands above the level of the cylinders in a midposition with its wiring, which passes across to the opposite side of the motor connecting with four spark plugs which are there placed. The coil C2 is on the dashboard D1, which connects to the spark plugs through the high-tension wiring system, and to the timer T1, thence to the battery, forming the low-tension system.

The steering post S3 passes through the dashboard to the steering gear G1, and the spindle of the gear connects with the steering arm A1, through a square end and a clamping bolt C3. It is extremely important that the clamping bolt C3 be examined and tightened up sufficiently to eliminate any evidence of lost motion, and if the autoist cares to disassemble the parts, he will find that the bolt intercepts the spindle when it is in place, a groove being furrowed out for the purpose, and in this way the arm is prevented from jarring off of the spindle.

The opposite side of the motor, which is shown in Fig. 5, presents the exhaust manifold M1, and the lubricator L1 is shown a little to the fore and below the exhaust manifold, partially hidden by the chassis frame. The lubricator is kept sufficiently warm in this position to serve a useful purpose, but it is important that the pipes be tightly connected and the lubricator kept scrupulously clean, in order that a glance will suffice during the inspection period, to indicate that the parts are in the right relation and in good working order. The radiator R1 is connected to the water jackets of the cylinders by a piping system, in which the rubber hose R2 and R3 complete the piping, and this method is employed in order to abort the ills of vibration by inducing a sufficient measure of flexibility.

In the operation of the car, it is necessary to avoid overheating of the cooling water, and this will be accomplished if the spark is not retarded after the motor is started. It is generally true that overheating follows if the motor is run without load on a retarded spark, and it is economy in every possible way to stop the motor if the car is to stand for any length of time.

The best position of the spark, when a motor is running, depends upon speed. This question of timing is one which will have to be taken up in the long run as a separate subject, but for the present it will be desirable to observe that the running conditions of the average motor, considering a magneto, demand that the spark be advanced from 20 to 30 degrees, depending upon the speed of the motor. This statement should be qualified by calling attention to the practice in taxicab and some other work of running on a fixed spark, in which case the advance is not far from 30 degrees, but this is not the common practice among the several builders, nor do they seem to agree as to the best fixed advance. The probabilities are that account must be taken of the characteristics of the ignition system, and it is true that there are differences in the performances of the several makes of magnetos sufficient to demand that each case be investigated upon its merit. The makers of automobiles are supposed to look after details such as this, and it will be enough for the autoist of small experience to acquaint himself with the structural details sufficiently for him to make necessary adjustments. It would be ill advised on the part of any new autoist to tamper with the ignition system. It is scarcely likely to give trouble unless it is neglected for a long period of time and it is too complicated for the layman to tamper with. The autoist who desires to enjoy riding in the absence of petty annoyances will take particular pains to keep the entire ignition system scrupuously clean and to study the particular ignition apparatus employed in his car so that its wants will be fully appreciated.

TRANSMISSION GEAR DETAILS

There are four types of transmission gear systems in common use:

(a) Planetary gear systems.
(b) Progressive sliding gear systems.
(c) Selective sliding gear systems.
(d) Friction drives.

The planetary gears are invariably housed, and they should be so well encased that semi-hard lubricant will remain within. If the case has bolted ends and they do leak lubricant, it becomes necessary to go over the bolts and tighten them up sufficiently to stop the leak. It is quite useless to attempt to run a planetary gear unless the sun and planets are substantially submerged in the lubricating material. The sun, in this case, is the central pinion, which is fastened to an extension from the crankshaft of the motor, and the planets are made up of relating square cut pinions of which there are either two or three sets disposed around the periphery within the case, the idea being to establish a balanced relation, which could not be done were there but one planetary set rotating around the sun. It is true, however, that a single planetary set would serve from a purely mechanical point of view, disregarding static and kinetic balancing conditions, of course.

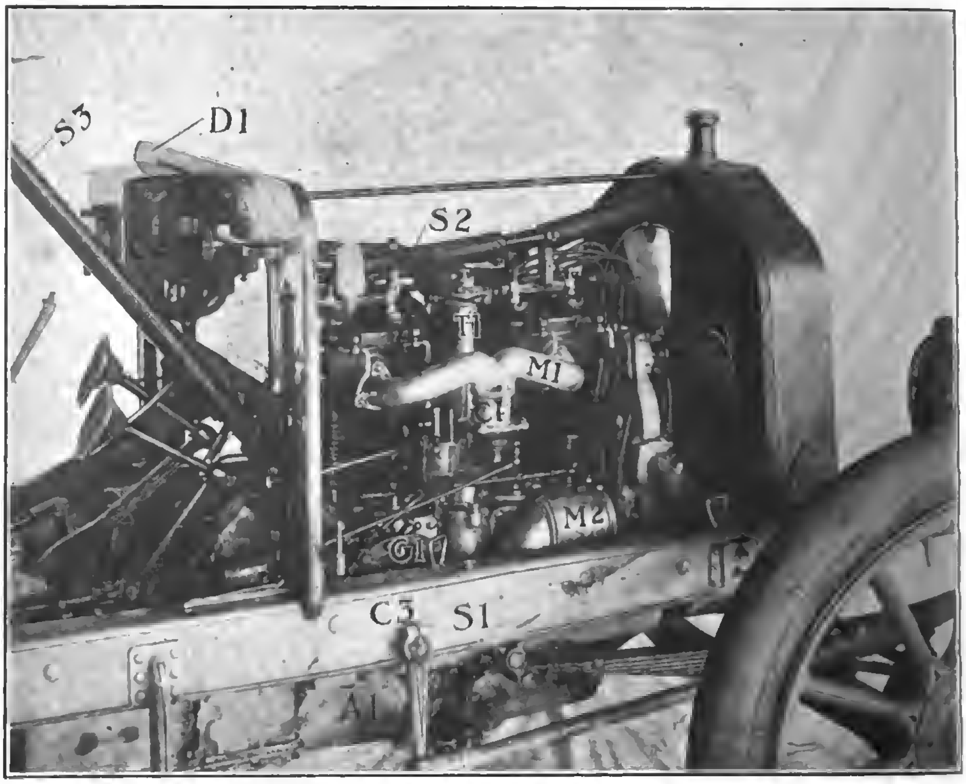


Fig. 4—Right side of a 4-cylinder water-cooled motor used to point out relations of accessories and relating parts

When the planetary gear is in the position which drives the car at the maximum speed (on high) the entire set of planets, and the relating sun, rotate as a unit, and the only work which they do is that of transmitting the torque of the motor, so that if they are strong enough to stand the torque stresses, there is nothing more required of them, and the transmission is done noiselessly and well. When the second speed is utilized (also reverse) the planets revolve around the sun, and, no matter how well the system is made, it is apparently impossible to so perfectly fit such an intricate system of gearing as to eliminate noise entirely. Grease seems to be the cure for this noise tendency, and the only danger lies in allowing the grease to remain within the case too long. The new autoist may take it for granted that the lubricating qualities of grease or oil wear out in time, just as everything else depreciates, and when these lubricating qualities depart from the mass, what is left is a slimy grit holding non-lubricating product, which it is well to be rid of. Perhaps kerosene oil, if it is forced in by means of a gun, will help to rid the internals of the case of this undesirable worn-out grease, but if the autoist does not like the undertaking which he may thus impose upon himself, the remedy lies in selecting a rather heavy grade of lubricating oil, instead of semi-hard grease. The trouble with the lubricating oil is that it will not stay in unless the case is quite tight. Under the circumstances, a good deal of importance should be attached to having a tight case on a planetary gear.

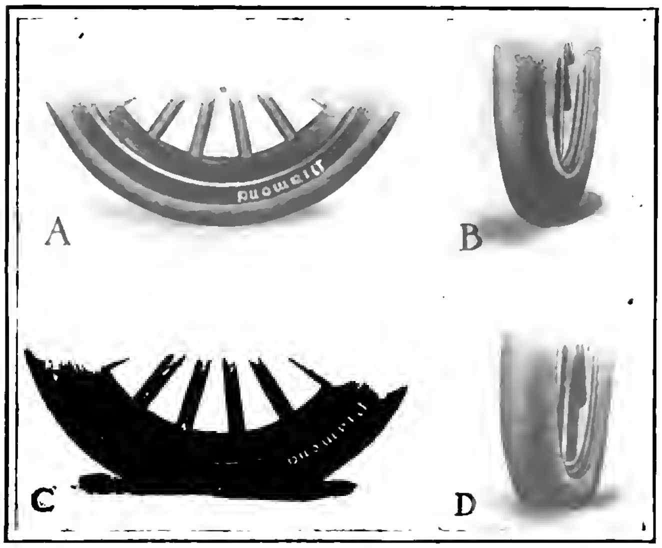


Fig. 3—Diamond tires under different conditions of air pressure and used to illustrate the need of proper inflation

Considering sliding gears, there are certain details which may be regarded as common to them, whether or not they are selective or progressive in their scheme of design. Before proceeding it may be well to point out that in the progressive system, which is used on a very few of the larger and more powerful cars, it is impossible to slide from one speed to another shifting and skipping at will. It is what the word implies, the sliding members are so arranged that the speeds are changed from low to second, to third and fourth, or vice versa, and from low into reverse. In the selective system, the operator may slide the gears for any one of the combinations at will, but it devolves upon him to maintain a proper relation as between a gear ratio, speed of the car, and ability of the motor.

With a new car, it would be a good idea to remove the handhole covers from the top of the transmission gear case, take out all of the lubricating material therein contained, wash the system out most thoroughly, and inspect all the bearings, the bottom of the case, and the crevices everywhere, with a view to making sure that there are no stray bolts, nuts, or other foreign substances laying around loose. The next operation will be completed when it is determined for a certainty that the gears register with each other with flush faces when the lever

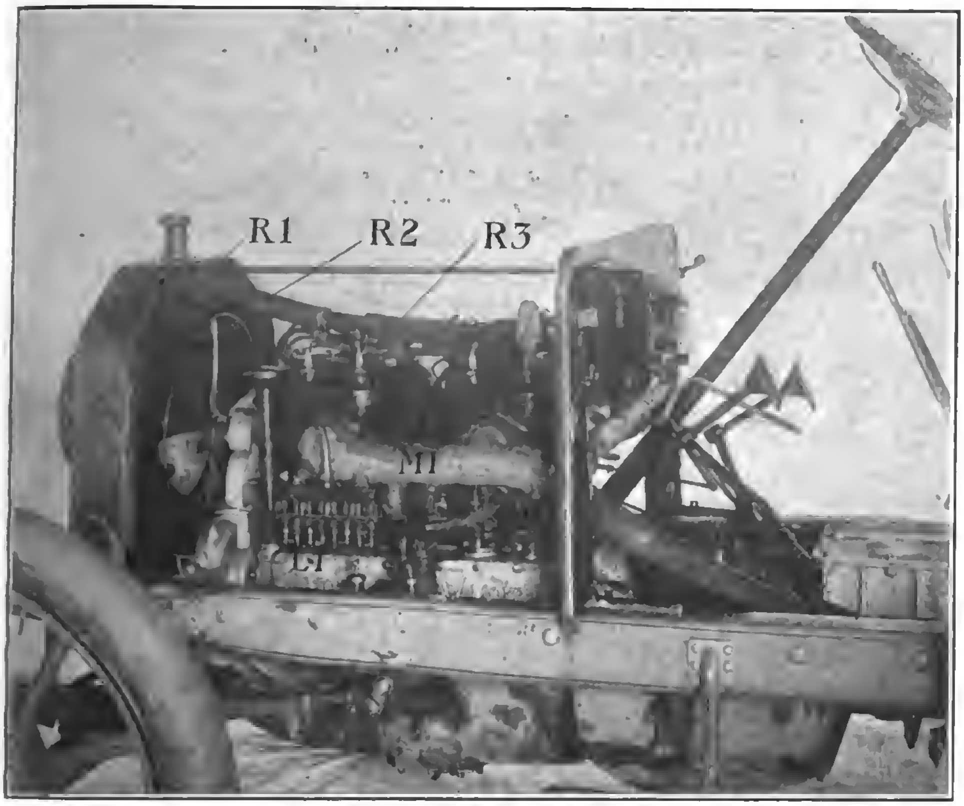


Fig. 5—Left side of a 4-cylinder water-cooled motor in a chassis showing the location of the oiler and manifold for the exhaust

The leather faced clutches are usually provided with flat or other suitable springs by means of which they are pressed into intimate contact with a relating member of the clutch, and unless the leather is maintained in a pliable state free from the excesses of lubricating oil, it will slip, and if it does slip, the excess heat generated will char the leather and it will cease to be pliable, after which it will fail to serve any useful purpose at all. The remedy lies in keeping the clutch free from accumulation of oil, and to permit soft but firm engagement, rather than to allow the clutch to slip. The other types of clutches should be kept clean, free from excess lubricant and in order.

STEERING ADVANTAGEOUSLY

Racing drivers, despite their apparent carelessness, may well be patterned after by those who have yet to learn the best way to grasp the steering wheel and be in a position to act in precise accord with the varying requirement. Fig. 6 is taken as representative of the racing driver's position, and attention is called to the point on the rim below the horizontal center, where the right hand firmly grasps the rim with the forearm horizontally disposed, describing a right angle. Inexperienced autoists take a hold of the wheel very much as if they were afraid of it, and with both hands they hang on, generally grasping the rim at diametrically opposite points, or, what is worse, at points above the horizontal center. The arm muscles, under such conditions, are in the position of the greatest disadvantage, and body bracing becomes impossible. The illustration is sufficiently clear on this point to require no further discussion at length, and it is recommended that inexperienced autoists study this situation until they are able to determine for themselves the most natural and advantageous position it is possible for them to assume, considering the location of the wheel, with respect to the seat, in the car they elect to drive.

is thrown into its respective notches. Unless the sliding system is properly adjusted, the mating gears will not register with each other, and if they overhang, it follows that the work will not come over the whole face of the engaging teeth. Under such conditions it is only a matter of a short while when the faces of the teeth will have furrows worn in them, and it is just possible that the teeth will be broken off because the work will be concentrated upon a relatively small section of the metal. Then, too, the pressure will come on less than the whole surface at the pitch line, and this may be the cause of additional trouble. If it is found that the registry is not perfect, there is nothing to be done but to make such adjustments as will overcome the difficulty. It is not a situation to be tolerated under any circumstances.

It will be well worth while to examine the bearings before putting the cover back on the transmission gear case, and if possible they should be thoroughly washed and especial notice should be taken of the presence of any foreign matter as metal filings or other hard substances which, if not removed, would destroy the highly polished surfaces of the balls, and score the raceways as well.

In view of the presence of ball bearings which owe their great utility to the use of alloy steel of particularly hard selections and highly polished surfaces, care must be exercised in the selection of the lubricant which is to be used in the transmission gear-case and in the ball-bearing housings. If the lubricant has an acid reaction, or if it is made up of materials which will soon bring about the destruction of the polished surfaces of the balls and the races, thus introducing a high depreciation factor of the car as a whole, due to the relatively high cost of the bearings.

The autoist will have to deal with some one type of the clutches, as follows:

(A) Leather faced cone clutches.
(B) Leather faced cone clutches with cork inserts.
(C) Multiple disc clutches.
(D) Dry-plate clutches.
(E) Disc types of clutches.

Fig. 6—Offered to illustrate the manner in which racing drivers grasp the steering wheel

How Efficient Lubrication Reduces Maintenance

BODY of lubricants while it is hard to define and equally difficult to measure, may be arrived at from a consideration of its results, which, after all, is the desideratum. Thus, this desired quality may be found as follows: Select the lubricant for which the body quantity is desired, test it in any recognized means for coefficient of friction. Then turn through some known or measurable angle of torsion, retaining the same size, same load, same pressure per square inch, and same temperature, measuring the coefficient of friction for the same oil again. This will give a series of results for the same oil under similar conditions, but for different angles of torsion, from which results proper deductions may be made.

One series of tests which were made some time ago resulted as follows:

WINTER STRAINED LARD OILS

Test Number	Torsion in Deg.	Coefficient of Friction	Temp. F.
1	33	.0233	72
2	26	.0176	—
1	31	.0218	—
2	24	.0169	—
1	30.5	.0215	—
2	23.5	.0166	—
1	29.5	.0208	—
2	23	.0162	72

ENGINE OILS.

Load 200 lbs.	Pressure 1,700 lbs. per sq. in.		
29	11.5	.0124	69
28	15	.0161	69
29	11	.0118	69
28	15	.0161	69
Load 100 lbs.	Pressure 850 lbs. per sq. in.		
28	8.5	.0182	120
29	4.0	.0086	120
28	6.0	.0107	120
29	3.5	.0075	120

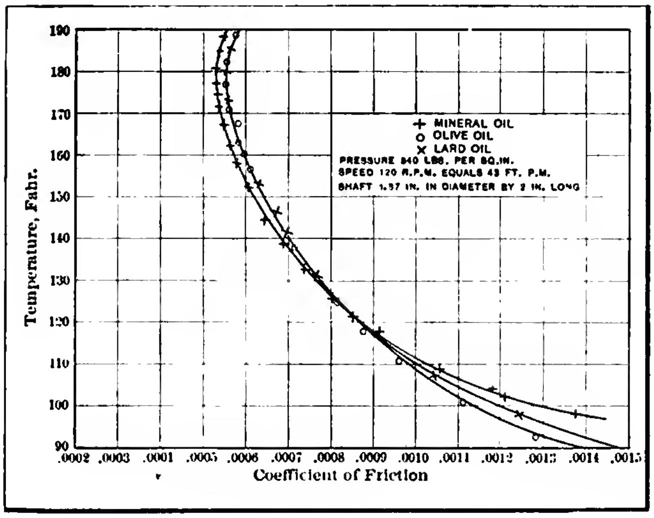


Fig. 1—Result of test showing relation of friction to temperature

From the above record of tests, one may make the deduction that, while the coefficient varies with any one oil, the one effecting the greatest reduction in friction, as indicated by the resulting coefficient of friction, is readily selected and may be considered as having the greatest body. Thus, specimen 29, varied from a coefficient of friction of .0124 at 69 deg. F. and a 15 deg. angle, under a pressure of 1,700 lbs. per sq. in. to as low as .0075, at an angle of 3.5 deg. at 120 deg. F., and under 850 lbs. pressure per sq. in. This is a reduction of .0049, or nearly 40 per cent. Specimen 28, on the other hand, shows a total reduction of but 34 per cent, being consistently higher throughout the test by nearly 40 per cent. By comparison, then, number 29 is much the better oil to use. Not alone is this true under high pressure and low temperature, but also under lower pressures and much higher temperatures. The final saving, for instance, if it could be applied to the entire lubricating system of an automobile, from the engine bearings straight through to the axle bearings, would raise a brake horsepower at the wheels figure from say 25, a fair average, to 35. This, too, without any additional weight or other disadvantages. Body then, is of prime import.

The above tests bring out another important point, namely, that the product of the coefficient of friction and the pressure is practically a constant, so the total frictional resistance is not affected by a change of load on the bearing, because of the hyperbolic nature of the coefficient curve.

While much of the theory of lubrication, as to work done, heat generated, pressures, and many other quantities, is involved, it is not so involved but that it may be readily followed through by anyone deeply interested in the subject. Thus, considering a bearing having a radius r_1, a length l, turning at n revolutions, with a mean intensity of pressure p, distributed over an angle of rotation θ, then the work done is:

$$\text{Work } U = 2\pi r_1^2 f p l n \theta$$

In which, the additional quantities, not mentioned above are: f is the mean coefficient of friction, U is the work done in turning the shaft in the bearing through the angle θ.

If there is no pressure from the bearing cap, θ equals π and the equation assumes the form:

$$U = 2\pi^2 r_1^2 f p l n$$

Again, with a tight bearing cap, θ may equal 2π, in which case the equation becomes:

$$U = 4\pi^2 r_1^2 f p l n$$

from which equations, the fact is deducible that with a fixed load, the intensity of pressure varies inversely with the area, so that the quantity $p l r_1 \theta$ becomes a constant, and the work of friction and energy wasted become proportional to the diameter of the journal or shaft. Both of these are independent of the length, except as it effects the coefficient of friction. In that case:

$$U = 2\pi K$$

K being a readily determinable constant.

Since the heat due to friction is proportional to the work done.

$$H = \frac{U}{J}$$

in which, U represents the work done, and J, the mechanical equivalent of heat.

Now, in a perfectly lubricated bearing, a theoretical case but one which is closely approximated by a flooded bearing, in which an excess of oil is always present, the distribution of pressure is:

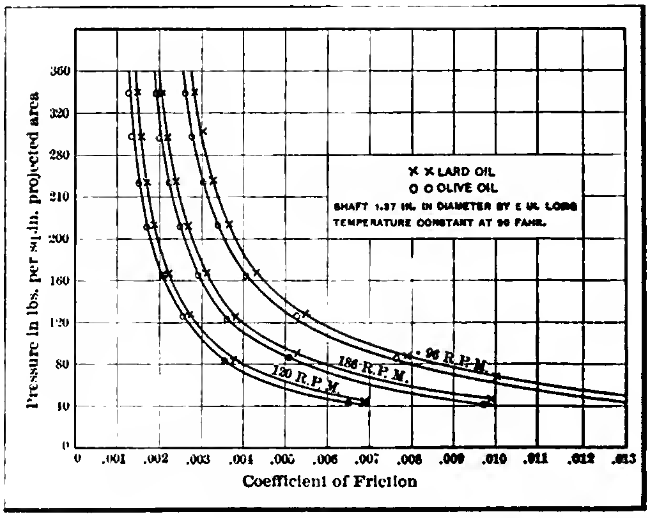


Fig. 2—Test curves showing how friction varies with pressure

$$N = p\, l\, r_1 d\theta$$

and p equals N cos θ
so that the load is:

$$\text{Load } W = \int p\, l\, r_1 \cos\theta\, d\theta$$

p varies greatly, but at intermediate points it is a constant, or enough so that it may be accurately measured. When so measured and introduced into the formula, the latter becomes:

$$W = p_1 l\, r_1 \int \cos^2\theta\, d\theta$$

which is to be integrated between the two limits of θ equal to

$$+\frac{\pi}{2} \text{ and } \theta \text{ equals } -\frac{\pi}{2}$$

In any one element of the bearing, the total force of friction is shown by the equation:

$$f\, p = \frac{.64\, W \cos\theta}{l\, r_1}$$

in which the normal variation is between the two extreme values for the angle. These values are cosine θ equals zero, in which case, the angle is 90 deg., and for an angle of zero, in which event, the value of the cosine is a maximum at 1. In this latter case, the equation simplifies to:

$$f\, p_1 = \frac{.64\, W}{l\, r_1}$$

The total pressure on the bearing is then:

$$P_1 = .64\, W \int_{\theta = -\frac{\pi}{2}}^{\theta = +\frac{\pi}{2}} \cos\theta\, d\theta$$

$$= .64\, W \left(2 \sin\frac{\pi}{2}\right)$$

$$= 1.27\, W$$

from the above, the total force of friction is

$$f\, P' = 1.27\, f\, W$$

while the work of friction is

$$U = M\, a = 1.27\, f\, W\, a\, t\, r_1$$
$$= 2.5\, f\, n\, r_1\, t\, \pi\, W$$

In this, the new quantities introduced are: a is the angular velocity, t the time taken as a unit, n the number of revolutions in this unit time. By introducing the latter in the form of seconds, and thus, the British Thermal Unit, the total power lost is found from the form:

$$\frac{U}{550\, t} = \frac{2.5\, f\, n\, r_1\, \pi\, W}{550}$$

With uniform pressure over the surface of the bearing (a condition difficult to realize) the expression for the work of friction reduces to

$$U = M\, a = 1.57\, a\, f\, t\, r_1\, W$$
$$= \pi^2 f\, n\, t\, r_1\, W$$
$$= 10\, f\, n\, t\, r_1\, W \text{ nearly}$$

That the fitting of the shaft to the bearing has a large influence upon the result is obvious, the exact difference being expressed by the difference between the values obtained from the preceding expression and the following. Before wear has widened the line of contact, and since $a = \Phi$ the angle of friction, the work of friction or energy wasted is:

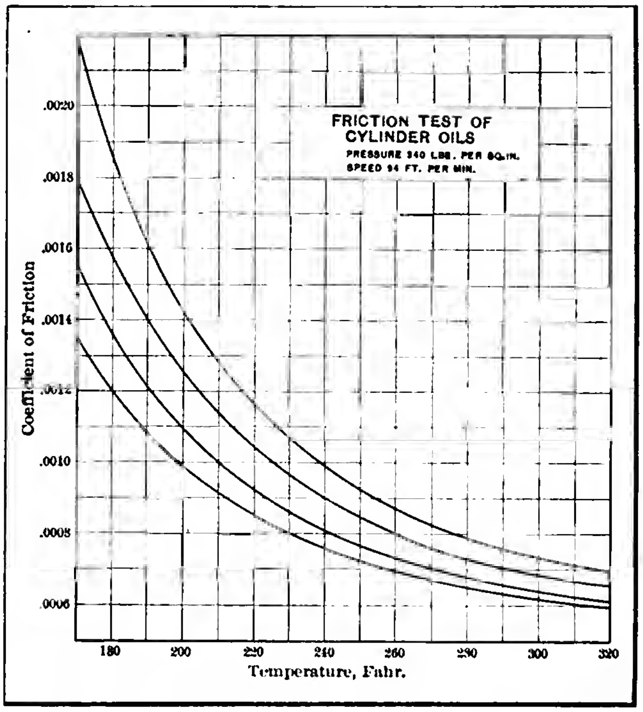


Fig. 3—Temperature variations in friction at slower speeds

$$U = W\, a\, t\, r_1 \sin\Phi$$
$$= \frac{f\, W\, a\, t\, r_1}{\sqrt{1 + f^2}}$$
$$= 2\, W\, \pi\, n\, t\, r_1 \sin\Phi$$
$$= \frac{2\, W\, f\, n\, t\, r_1^2}{\sqrt{1 + f^2}}$$

This form of shaft and bearing contact—that is, loose contact, but without wear—produces the least waste and is thus the most desirable. It is an ideal case, however, and when approached too closely, results in over-rapid wear, heating, and many other undesirable features. The ideal form, then, is not of a necessity the most practical one.

Apparent Influence of Temperature

Tests seem to show that with a decided rise in the temperature, there is an equally decided drop in the coefficient of fric-

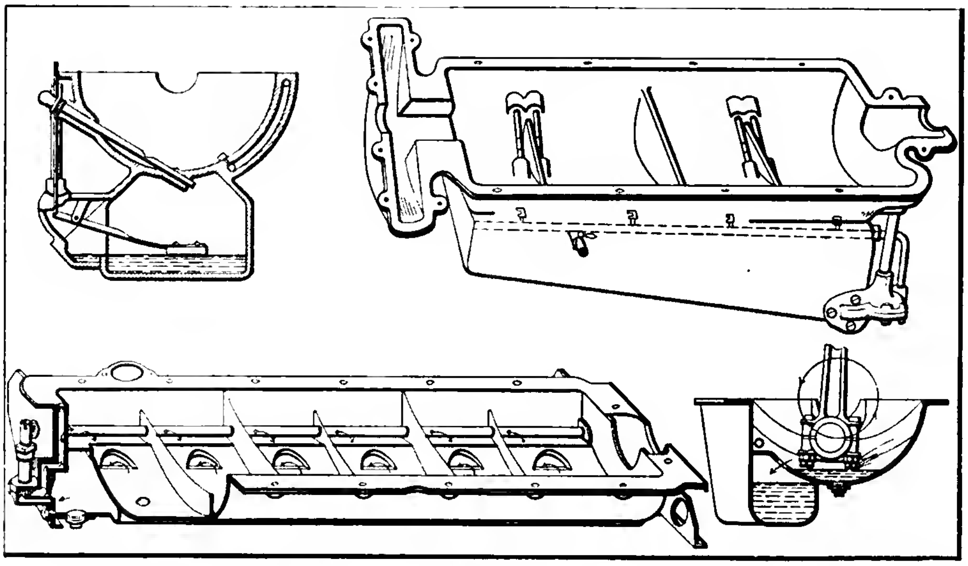


Fig. 4—Well worked out details of lubricating systems. Above, Columbia. Below, Oldsmobile

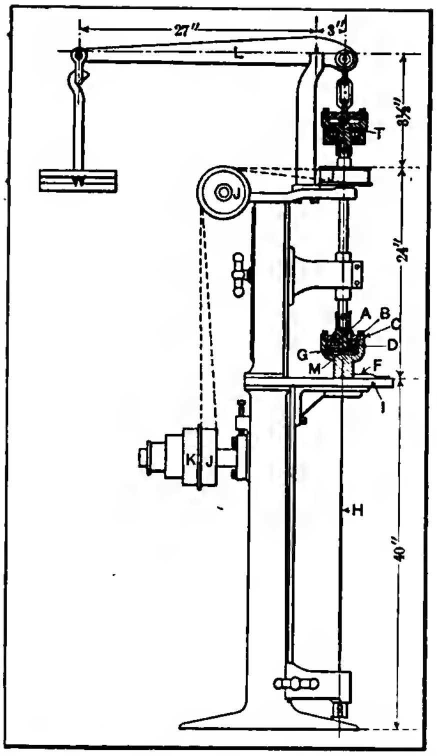


Fig. 5—Machine used in testing lubricants

tion—that is to say, from the point of view of maximum power output with minimum power input, using any one lubricant continuously, the higher the temperature the better the result.

This, however, soon reaches a critical temperature for each and every known lubricant, which critical point must be previously known, so that it may not be exceeded either purposely or by accident.

Everything said thus far has been in reference to one lubricant only, however, the results are somewhat changed when lubricants are mixed, even though of the same generic type. Thus, one test showed the following:

TEST OF SOLID LUBRICANTS FOR FRICTION AND PRESSURE

Lubricant	Speed in R.P.M.	Minimum Coeff. of Friction: Without Graphite	Minimum Coeff. of Friction: With Graphite	Maximum Allowable Press.: Without Graphite	Maximum Allowable Press.: With Graphite
Kerosene	300	.00180	.00090	290	380
"	475	.00185	.00140	290	470
"	700	.00225	.00156	290	470
Lard Oil	300	.00181	.00122	650	830
"	475	.00199	.00141	560	830
"	700	.00268	.00153	560	830
Vaseline	300	.00288	.00173	740	1100
"	475	.00280	.00210	830	920

This table shows a remarkable state of affairs. Not only is the already low coefficient of friction, in some cases so low as .00180, lowered very materially, but in some cases is actually bisected or cut in half, a reduction of 50 per cent. The last two columns of figures show items of equal importance with the friction coefficient, for the maximum allowable pressure is often of more importance than the actual saving of power. In this particular test, not only was the minimum saving as high as 30 per cent., but in several cases, it ran as high as 50 per cent. It would appear then, as if it were advisable to combine lubricants at times, this being effected with due regards for the work to be done, the necessity for a lubricant, the cost of the single components and of the compound, and the relation of the value of the lubricants, both singly and combined, to the value of the service to be rendered.

Referring again to the matter of temperature influence upon the coefficient of friction, attention is called to the high temperature work.

Thus the test made some years ago for a fire insurance company:

RESULT OF TEST SHOWING TEMPERATURE INFLUENCE
Unknown Mineral Oil, Pressure on surfaces constant at 33 lbs. per sq. in.

Temp. F.	Dynamometer Reading	Coefficient of Friction
35	8.00	.0485
40	6.12	.0371
45	5.68	.0344
50	5.36	.0325
55	5.12	.0310
60	4.95	.0300
65	4.75	.0288
70	4.54	.0275
75	4.37	.0265
80	4.29	.0260
81	4.27	.0260
82	4.25	.0260
83	4.25	.0260
84	4.28	.0260
85	4.31	.0261
90	4.90	.0297
95	6.10	.0370

Attention is called to the table above, which clearly shows that while a rising temperature is beneficial to the power saved, as exemplified by the coefficient of friction, it must also be watched with care, in order not to overtop the point of maximum saving, beyond which there is a sudden rise. Thus, while a rise of 35 deg. from 35 to 70 results in a drop in the friction from .0485 to .0275, a reduction or saving of 43.3 per cent, a further rise of but 15 deg. results in a further drop of but .0014 or less than 5 per cent. Not only that, but it brings the operation to the critical point so that a still further rise of the temperature of operation of 10 deg. results in a rise in the coefficient or loss of power of .0109, equal to 41.8 per cent, and almost overbalancing the former gain in 35 deg. rise. In short, this coefficient plotted as a curve, rises somewhat rapidly, has a rather flat top, and drops as suddenly as it rises, points at 40 deg. on the ascent and 95 deg. on the descent being practically on an equality, in fact, a consideration of these figures would seem to show that beyond the critical temperature, the drop is very rapid, much more so than the rise, rising as it does from a given point to a maximum in 42 deg. and dropping the same distance in 8 deg. Fortunately for the automobilist who must use the oils and greases, this critical temperature varies from one oil to another, very much between oils and greases, besides being different in other lubricants. Moreover, in the usual case, the range of difference is greater than in the case above selected for illustration of the point. Purely aside from the wider range, the oils and other lubricants used on automobiles have, generally speaking, a higher critical point than the one just illustrated.

(To be continued.)

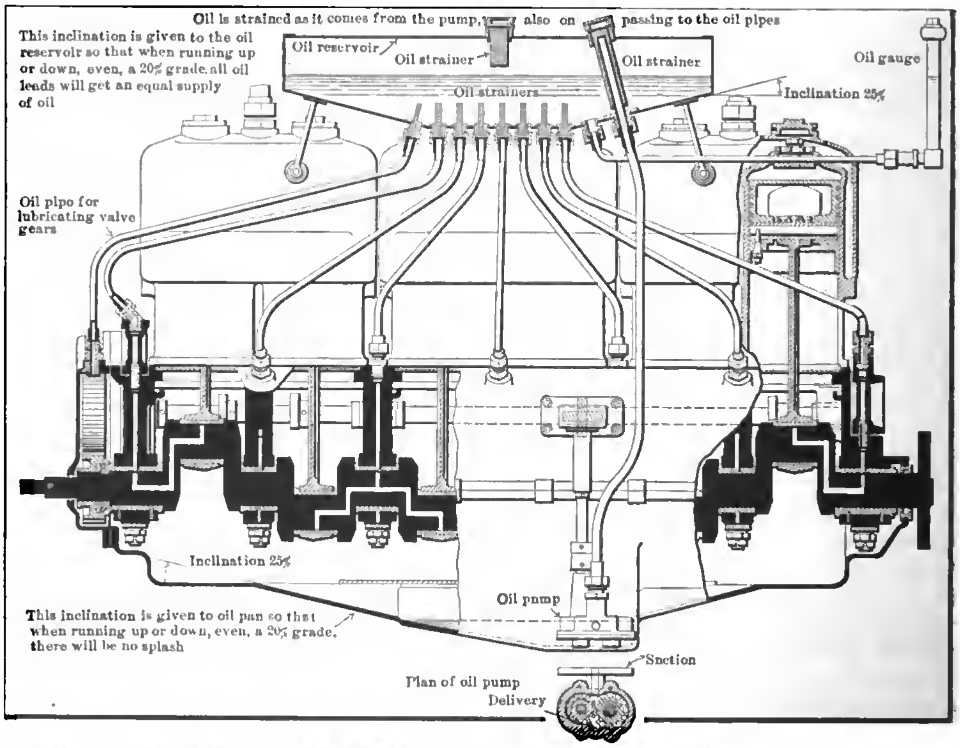


Fig. 6—Complete engine lubricating system of Pierce-Arrow cars, showing drilled crankshaft

In the Selection of a Car--Further Hints

WISDOM, if it is exercised during the process of selecting an automobile, will bear fruit in divers directions, the owner will become the possessor of a car which will reflect his needs, the service it will render might even exceed his most sanguine expectations, and the cost of maintenance will be low. If this latter condition holds, the life of the automobile will be relatively long, because a thing which does not have to be repaired at frequent intervals is bound to last the greater length of time. Wisdom is never more in evidence than it is when the automobile, as selected, is in precise accord with the service demands. It is in the process of selection that many inexperienced purchasers lay the foundation for future trouble and an increased measure of total cost. Buyers are too prone to lay undue stress upon a selling point.

STRESS USUALLY LAID ON WRONG POINT

For illustration, there is no gasoline car made which will supplant the electric in a certain field, and, as a far-fetched illustration, a banker would scarcely want to ride as freight in a five-ton truck from his office to the bank. The same idea crops out when any automobile is being selected; the right one will do the intended work, nor is a car valueless for its real work simply because it fails to satisfy a purchaser who makes the wrong selection.

It is too commonly true that intending purchasers lay stress upon the points which, while they are important, are not of the first importance. Take the location of valves: they may be (a) in the head, (b) both on one side; or, (c) as in T-cylinders, inlet on one side and exhaust on the other. Let it be taken for granted that this scheme of location is one to be weighed; certainly it is not a matter which should be compared on a basis of inferior *vice* superior material; bungling *vice* designing, or workmanship *vice* the haphazard effort of the novice.

An innovation must make good in service before it can be accepted as better than some tried device which will do the very work it is placed to do. When a purchaser places his money in hand of tried and true stability, no matter how it is clothed, it is a safe enterprise, and any other way of viewing the matter involves speculation, and the purchaser who takes this path becomes a speculator—there are good and unattractive speculations.

Speculation is legitimate within certain limits, but it is reckless when it is blind. None of the risks due to speculation are present in the mere process of selecting a motor which has the valves placed in the head, all on one side, or half on each side. Good designing will render the valves potent in either location, and, no matter where they are placed, if the materials and workmanship are inferior, the end will be disappointing.

SOME IMPORTANT CHANGES OF THE YEAR

In former times the crankcases were made of aluminum, which material was selected for lightness. The earlier efforts were attended by many a failure, due to the use of either inferior aluminum alloys or to lack of knowledge in the use of this material. The selections this year are as follows:

(a) Aluminum castings with arms of drop-forged steel.
(b) Aluminum castings with arms of the same cast integral.
(c) Cast iron upper half with aluminum for the lower half.
(d) Cast iron for upper and lower half.

Probably 50 per cent of all the crankcases made this year are of cast iron. Last year there were not more than 10 makes of motors which included cast iron in the crankcase, and, in all probability, this change in material represents the most radical departure of the year. Cast iron adds to the weight, but it is at a point of vantage, all things considered, and the total weight of the automobiles are less than ever before, due to the use of pressed steel and drop forgings instead of castings for chassis frame parts.

The engineeering side of the automobile, then, in view of several advances, makes it good practice to add weight where it will count, and subtract weight elsewhere, to compensate for such additions. It is in this class of refinements that advances have been made, and it is on this account that some critics have visited the shows and brought away the idea that the automobile designing situation is more or less at a standstill.

There is no evidence of a standstill; designing is far ahead, and it is due to the industry to point out that improvement is now being made in directions which are too subtle to intercept the eye of the critic who depends for his information upon the fact that he is not color blind; it is not now a question of the color of the finish of the body or the shape of the hood, nor can criticism be well-founded if confined to superficial matters.

MOST FOR THE MONEY IS ANOTHER POINT

It is one thing to want the most capable automobile made, and quite another matter to demand the most for the money. If an intending purchaser cannot afford to expend more than a certain sum, his first move should be in the direction of eliminating from his mind the idea that he will exact all the high-priced gewgaws that hamper automobiles, in general, and learn to limit his wants to the automobile proper, and to be careful not to go in for an "elephant." It is a moral certainty that, with a certain amount of money, but a fixed amount of good machinery can be purchased.

In a general way the cost of maintenance of an automobile is in proportion to the square of the speed it will make on the road, and in order to keep down the speed it is necessary to limit the power of the motor. This is not to say that a relatively puny motor should be loaded down by a big if not overgrown chassis. Harmony of relations of power plant to car should be maintained.

Makers are frequently confronted by demands which spell large repair accounts by purchasers who hanker after express speed when they only show a willingness to pay for a "freighter," and the only way this demand can be met is to so gear the motor that it will propel the car at a relatively high speed on a hard, level road, with disastrous results which creep in from two sources:

(a) The motor is strained when a grade is being negotiated, or, if the going is heavy as in deep sand.

(b) The high speed on a level pounds the car to junk—it is not designed for such speeds; the tire equipment is below the requirement.

According to this method of reasoning, the speed laws which are complained of as being too stringent, are in exact accord with the natural laws which place a limit on excessive cost of maintenance, and the reasons why the speed law should be respected may be summed up as follows:

(a) Depreciation will be excessive if the speed of a car is increased beyond the point as indicated by the character of the material used in the makeup of its parts, as it may be if the purchaser demands a special gear ratio in order to enable him to make greater speed on a level than is consistent with the hill-climbing ability of the car, considering the power of the motor, and when high gear is being used on the hill.

(b) If a car is thus abused it will soon reach a state of bad repair which will render it unsafe from the point of view of the public at large, and it is fair law to protect the public at large from the acts of those who have no regard for safety for themselves or others.

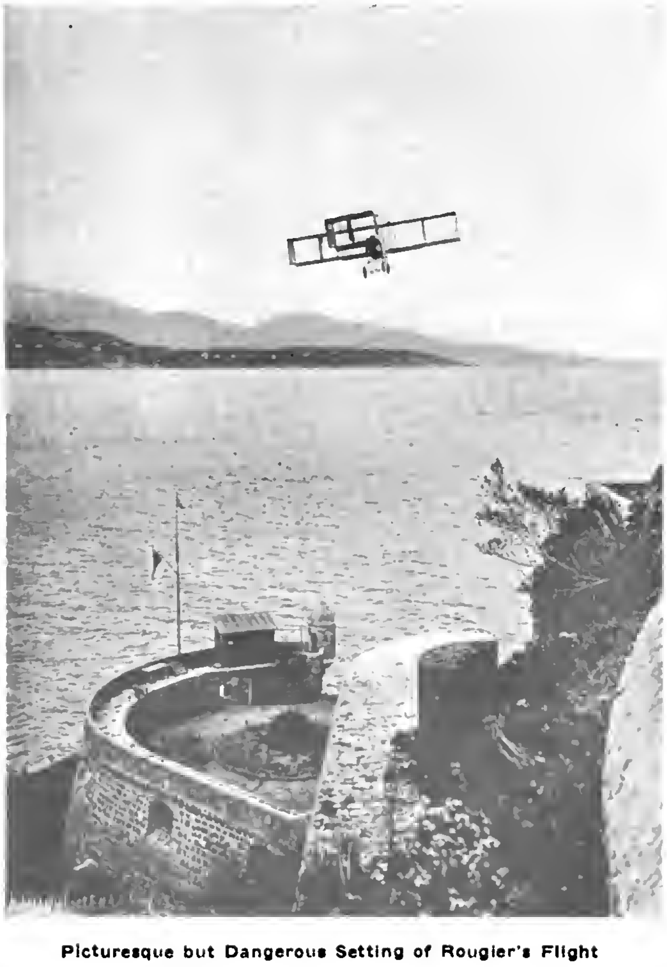
It is in these and many other ways that designers are paying attention to the problem, and it should be worth more than a little to prospective purchasers to appreciate this situation, especially when they go to select a car. Too much for the money is never to be regarded as a good purchase, and trying to beat the seller into a bargain state of mind is poor economy.

NEWS FROM BEYOND THE ATLANTIC

Rougier's Sensational Flight at Monaco

Monaco, March 14—Exactly one year ago valuable prizes were offered for flights from the port of Monaco to Cap Martin and return. The distance across the blue waters of the Mediterranean is only about three miles, but in view of the fact that there is hardly a level inch of ground on which to make a start, no aviator was found capable of winning the prize. The trip has now been made by Henri Rougier, a former automobile race driver, now a Voisin pilot, without the attraction of a big money prize. Rougier returned from the Egyptian meeting, had the big cases containing his aeroplane shipped to Monaco, occupied two days in fitting up the apparatus, then, after a dynamometer test of the motor, flew across the water.

The feature of the flight is that a start had to be made from a jetty 130 feet wide and 350 feet in length, with the harbor on the left, a perpendicular cliff on the right, and at the end a sea wall 35 feet high which must be cleared after this unusually short run. It is necessary to come back to the same place to make a landing, for this is the only level portion of this town nestled in clefts of the rock. In order to prevent aeroplanes and their pilots dashing themselves to pieces against the sea wall, the Monaco committee last year built a steeply inclined plank road from the jetty to the top of the wall, the inclination being so great that unless an aeroplane had got sufficient lift to clear the wall it would in all probability be brought to a stop without damage being done.



Picturesque but Dangerous Setting of Rougier's Flight

This track has remained in position, but was not used by Rougier, for immediately full gas was given to his motor he shot away, rose quickly, cleared the wall, and in a few seconds was hovering at a great height over the sea. Cap Martin having been rounded, the return was commenced. The aeroplane flew over the Tir aux Pigeons, now black with spectators. It appeared but a stone's throw to the harbor below, but in order to reach that narrow ledge it was necessary for Rougier to swing out to sea, then head in again parallel with the cliffs and the path. A landing was made in correct style. the machine pulling up after a run of only 100 yards. The trip had occupied a quarter of an hour.

Paris Show Settled by Club's Withdrawal

Paris, March 14—After one month's hard fighting, the Automobile Club of France has been forced to give way before the combined constructors and withdraw entirely from the show business. According to an agreement which has just been arrived at, the next Paris Salon will be held by three automobile manufacturers' associations and one cycle makers' syndicate, under the patronage of the club, and with Baron de Zuylen, president of the club, as honorary president of the joint committee. For the first time in eleven years the Automobile Club of France will have no voice in the management of the show.

The authorities now responsible for the automobile exhibition in the Grand Palais are the Syndicate of Automobile Constructors, with M. Peugeot as president; the Automobile Syndicate, an affiliate of the Automobile Club of France, with Marquis de Dion at its head; the Cycle and Automobile Syndicate, presided by M. Darracq; and the Syndicate of Cycle Manufacturers. The three automobile bodies will each take 30 per cent. of the net profits of the show, leaving 10 per cent. for the cycle makers. By reason of this agreement, the understanding between the Syndicate of Automobile Constructors and the aeroplane manufacturers for the holding of a joint show, has been withdrawn. The aeronautical men will now hold their own show in the Grand Palais during the last fortnight of October, and the united automobile salon will take place in the same hall the first fortnight in December.

The new committee will inaugurate numerous changes in the method of holding the show. Gustave Rives, the genius of the fairy-like exhibitions which came to an end in 1908, has been asked to withdraw, and his place has been taken by M. Gobron. a manager who will have to work on more economical lines. It is the intention of the manufacturers to hold an important exhibition, for the feeling is strong that an effort must be made to put Paris back into the premier position as an automobile center. At the same time there must be no unnecessary expenditure on decoration for decoration's sake. Stands will doubtless be of a uniform type throughout, provided complete, ready for receiving the exhibits, at an inclusive cost. There will be drawing of lots for positions, but not on the previous basis of first reserving the central stands for the oldest established or the most important racing firms. Everybody will now be treated alike. It is very probable, too, that the show will only remain open twelve days instead of three weeks, as formerly.

There is a strong feeling that government influence has been brought to bear on the various parties in order to lead to this settlement of the difficulty. The club protested against the aero manufacturers receiving the automobile industry into their exhibition, and the automobile firms, on the other hand, maintained that they were ready to work with the club if reasonable terms were put forth. As the government gives the use of the Grand Palais gratuitously, it was an easy matter to give a hint to the aeronautical group that the hall was not loaned for a joint show, and at the same time advise the club that it had engaged upon a useless struggle in trying to fight the automobile manufacturers. As the club, however, had an option on the Grand Palais, and the manufacturers had not, it was only possible to hold the show by giving that body a nominal share in it. This was done by asking the club to patronize the show and put its president, Baron de Zuylen, in the position of honorary president.

Paris Omnibus Company Renews Monopoly

PARIS, March 14—The only automobile firm in Paris which has reason to be satisfied with the recent floods is the company holding the monopoly for the motorbus service. During the height of the flood most of the trolley cars were stopped, the entire subway service was put out of commission, and even now, when there is not a single flooded street in Paris, only about one-tenth of the underground lines are in service. This was the opportunity of the bus company, for, as its garages were on high ground, no damage could possibly be done to the vehicles, and if streets were flooded it had only to change its routes to those that were free of water. The subway having disappeared as a competitor, it has been possible to run lines that were formerly unprofitable with very great advantage. There is, indeed, such a demand for buses that the company has been obliged to appeal to all automobile manufacturers who have previously produced experimental buses to loan them for the present occasion.

On the Hotel de Ville-Porte Maillot line a most miscellaneous collection of power buses is to be seen. The group comprises the standard four-cylinder Eugène Brillié, Darracq-Serpollet steamers, Renaults, De Dion, Diétrich, Brasier front-drive, Clément-Bayard and Darracq gasoline motors. The same additions have been made in other portions of the city formerly served by the subway, and in every case the buses are incapable of taking all the passengers presenting themselves. As the omnibus company had in stock large quantities of gasoline and benzol it has not had to pay the extra price for fuel that has struck taxicab drivers and private hiring firms so hard.

On June 1 the monopoly of the present General Omnibus Company in Paris will expire, and on the same day a new monopoly for forty years will be entered upon by the same body. The city, however, will have the right to purchase the undertaking at the end of ten years if considered desirable. The new order of things will see the introduction of an all-mechanical service for Paris, one of the conditions of the new contract being that the horses still remaining in service shall be withdrawn as quickly as possible and their place taken by gasoline or steam vehicles. Starting from June, 1910, three years are given in which to abolish all the horses, at the rate of not less than 200 reformed vehicles a year.

The present buses in service are two-deckers driven by four-cylinder Eugène Brillié motors running on benzol. It has been decided that the upper deck shall be abolished, and that the new buses shall have a capacity for not less than 34 passengers. This change has been expected for some time, it being felt that the present buses were too large and heavy for the most efficient service. Dwellers along the routes strongly protest against the noise and vibration which the vehicles occasion. The company is free to buy its buses wherever it desires, but must submit them to a municipal examining board before putting them into circulation. Up to the present the only specially-designed single-deck buses that have been used in Paris are four-cylinder Renaults, the first of which were mounted on triple rear pneumatic tires and twin pneumatics in front. Recently the same buses have been run with solid rubber tires in the rear and pneumatics in front. A number of the two-deckers have been converted to single-deckers, but as they are too narrow in the track and are unnecessarily heavy for the reduced load they have not been a success. Attempts have also been made to utilize old horse material by fitting a front drive.

Automobile manufacturers are anxious to get hold of the omnibus company's contracts, for the new regulations practically stipulating that all the present vehicles, whether horse or mechanically driven, shall be replaced within a limited period, there will be over one thousand new autobuses to furnish. Motors using alcohol or benzol will probably be favored, as the Paris tax makes gasoline too expensive for profitable working.


Rougier in Full Flight over Ships in Monaco Harbor


Santos Monoplanes Under Construction in Clement Factory


Motley Assemblage of Buses Waiting at Paris "Luna Park"

Graphite, What It Is, Where Found, and How Used

NOWADAYS the necessity for proper lubrication is being appreciated at its full worth, and in the automobile business is having its proper result, this being apparent in greater mileages per given weight or quantity of fuel, increased life of mechanisms, lessened care, lowered repair bills, and in many other ways. With this idea in view, a short mention of some of the more important lubricants will be of interest.

Graphite exists in two forms—crystalline (or flake) and amorphous. It is known to the trade by the names of black lead, plumbago and graphite. Black lead usually refers to the inferior grades of graphite, plumbago to the Ceylon product, and graphite to the American product.

A distinguishing characteristic of graphite is its unctuous quality, and all graphites have this quality, the crystalline more so than the amorphous forms for the reason that when a crystal of graphite is broken the cleavage surface is smooth, while in the case of amorphous graphite, and because it is amorphous, the line of the fracture is necessarily irregular and rough. It is only when the irregularities are worn away that such a surface becomes smooth and unctuous.

This quality (unctuousness) is usually determined by rubbing between the thumb and finger. However, this method does not give entirely satisfactory results for reasons as follows:

Crystalline graphite, either flake, needle-like or irregular, is dense and compact, and not easily reduced by crushing between the fingers, so that the individual particles maintain their size and continue to be easily felt; while, on the other hand, the amorphous kinds of graphite, both natural and artificial, continue to be reduced in size until the particles no longer are evident to the touch, and the "unctuous" sensation comes into evidence.

A true lubricant has been described by some of the promoters of the suspension of graphite in oil as "a body that will subdivide so that all movement will be within itself and not between it and the adjacent metal"; also that a perfect suspension of graphite and oil "is of a nature that permits of slipping within its own mass without any expenditure of energy that will produce high temperature."

The close connection of the definition of a perfect lubricant and the mention of graphite as possessing the qualities of a perfect lubricant are deceptive. This definition of a true lubricant is a very excellent one, and describes perfectly a liquid or semi-liquid substance where the material adheres to both friction surfaces and the globules between are in constant movement one on the other, but no stretch of our imagination can enable us to conceive such a condition when considering graphite, which is a solid substance and which requires considerable force to rend the particles asunder.

A mixture, as indicated above, of graphite suspended in oil has no particular advantage over a non-graphited oil as a lubricating material, because the particles of graphite, being in perfect suspension, cannot break through the surrounding film of oil or easily become attached to the metal surfaces. They simply move about in the oil film without at all decreasing the viscosity of the oil itself, the only way in which any reduction of friction could be brought about. In fact, a mixture of finely divided graphite and oil has a higher viscosity than that of oil alone, and so reduction of friction is not to be sought along this line.

One of the real functions of graphite as a lubricant is to keep the metallic surfaces apart. This result would be obtained by the presence of any solid material, such as sand, carborundum, or any abrasive substance, but that these have no value as lubricants is obvious. The separating substance, in addition to keeping the surfaces apart, must not in any way detract from the smooth, frictional surfaces, and, on the other hand, must make them smooth when they are rough. Graphite fulfils these requirements, provided it becomes permanently attached to the surfaces. A reasonable doubt might be entertained as to whether graphite can readily become attached to the frictional surface if it is so fine that it passes through the pores of filter paper, as is claimed (by some), which would indicate that the particles of graphite are surrounded by an unbreakable oil film. But if these particles could become attached to the frictional surface, efficient but not lasting aid to lubrication would certainly result.

As was said, amorphous graphites are extremely friable and easily worn away.

"Place a very little amorphous graphite on the palm of the hand and rub with the finger and notice that it cannot be rubbed off." The above has been cited as an evidence of the adhesiveness of amorphous graphite, but go a little farther: wash and dry the finger between repeated rubbings, and it will soon be noticed that the finger slides over the palm with difficulty, though the graphite still appears to be there. Now, what has happened? Simply that the graphite, being so friable, has all been worn off the high points, while enough remains in the depressions to give the idea that it is all there. The very fact that the rubbing finger continues to get blackened between washings shows how easily the amorphous graphite wears away.

Now place some crystalline graphite, preferably in some flake form, in the hand and repeat the experiment, and note how much less rapidly it blackens the rubbing finger.

In all friction surfaces there are irregularities both above and below the normal surfaces. It is the irregularities above the normal that cause the trouble, and it is important that whatever surfacing material is used should be able to build up the surfaces to the level of high points, rather than to simply fill up the very minute pores of the metal. It is not conceivable that any particle of graphite small enough to go through a filter paper could become impaled on one of these projecting peaks, but such a result is entirely possible when the broad flake is used. Even on smooth surfaces the flake form of graphite adheres with wonderful persistence, and its resistance to wear, due to its smooth crystalline surface and compaction, is remarkable.

Every one knows how difficult it is to sweep up a small, flat piece of paper, like confetti, from the floor, and the same reasons which cause the paper to adhere to the floor cause the flake of graphite to adhere to the surface of the bearing which it is intended to lubricate.

Standardization Talk Universal, Nowadays

SO much is being said nowadays about standardization, and its possible working out in the near or more remote future, that anything said on the subject is pertinent. In a recent issue of the *Motor Trader* (English) the following remarks were made under the caption "Standardization as a National Essential":

"A lecture by the president of the Engineering Standards' Committee—Sir J. Wolfe Barry, K.C.B., etc.—recently delivered before the Institution of Engineers and Shipbuilders of Scotland, will aptly serve to again voice the necessity for attention to standardization in the motor trade, perhaps the greater need of the day when its financial condition furnishes the uppermost problem. The fact that this subject is being so persistently presented to and discussed by the older branches of the engineering trades, those branches, too, that have subordinated the elements of design to the absolute requirements of commercial economy combined with efficiency to the user, is some indication that the ultimate trend of any branch of trade concerned with a mechanical output must make for standardization as a business necessity if not an inventor's ideal. As the author pointed out, standards exist for art and literature and as a means for assessing the every day economies of life. Without our weights and measures' standards, imperfect though they be, business could not be conducted, for it is of their essence that they control the sale and exchange of a variety of commodities. The appreciation of some such purpose of a systematized production has been rife in the mechanical industry as a whole since 1841, when Sir Jos. Whitworth introduced his standards of screw threads. It is true that for several years the ideal thus epitomized was overlaid by the prosperity of the industry which with the world for its mart had no pressing reason for producing by a system of uniformity or standards, and rather courted diversity of practice as the more evidence of a trade expansion that then seemed almost illimitable. With the altered conditions of modern trading, partly brought about by the supplanting of hand-wrought processes by machine and repetition methods of manufacture, and even more so by the greater diversity of the quarters whence they emanate, uniformity of parts' measurements and to a degree of the bare essentials of design became a necessity of commerce rather than as at the earlier period an ideal of the far-seeing organizer. The now stable position of the standardization movement is but of recent attaining. The success attending it has been great, but the efforts of the committees of organizers and of the sections of trade intimately concerned with the task of collating the evidence and suggestions of their members have been vastly greater. Reference to the reports of these sections, or at least such as have some relation to the industry, has been made in these columns periodically. It is to be feared, however, that the motor trade is as little alive to the importance of standards for the essentials of chassis as to some other factors making for the internal economy of the trade. Sir J. Wolfe Barry's paper furnishes numerous illustrations of the appreciation of the engineering trades of the efforts of himself and colleagues, but none that the motor car branch has at all risen to the demand. It is not so in France, the trade's greatest competitor. There standardization exists and with it no lack of progress in design, but the designer first lays hold of what is available cheaply by organized repetition methods and fashions his ideal so as best to comprehend as much of them as can be availed of. The experience of all modern manufacture is entirely against an unrestricted scope to the designer, or, to put it alternatively, the merit of a successful mechanical product is in the cheapness with which it can be made, maintained, or its parts replaced. There is no restriction of merit or talent in this environment, and no limitation of the trade's commercial scope of activity. The public demand for diversity in style and to a degree as regards essentials can truly be more adequately satisfied by a production based on a large output of many parts organically units, and structurally similar, than on a system that necessitates as many drawings, fixtures, and an administration that must consume most of the available profit.

Further Possibilities of Standardization

CONSIDERING standardization as a factor in reducing cost, it is strange that designers are not more alive to the possibilities of incorporating into their designs standard measurements for connecting rods, front axles, and other drop-forged parts in which the cost of the dies is important. Although the making of pressed steel frames is the monopoly of a comparatively small number of firms, and the variations in pattern are correspondingly limited, hardly any two designers seem agreed as to the shape of the front axle beam, and each requires separate dies. Such procedure should not continue in a business ostensibly commercially conducted.

Another point suggested by the recent show exhibits is the prevalence of the stereotyped in erroneous design. Such was to be noticed perhaps more in regard of the steering gear of certain chassis that are claimed to have been "specially designed." The trade has accepted the behind-the-axle position for the bar, and for reasons that certainly have more sanction from the aspect of safety in the event of a collision between the dumb ends of the frame, than for any mechanical point of superiority; yet few constructors have been able to break away from the necessarily hazardous (under vibration and wear) ball-and-socket coupling for the steering link, and a still larger number seem unagreed as to the relative efficiency of the angle, or the direction of the rake of the link member. The style of constructing the pivot or axle stub centers is also unsettled, and the wisdom of getting the road wheels as closely up to the pivot centre as is possible with a shoulder pivot arm does not apparently find agreement with all constructors.

Outside the mechanical purview has to be noted with much gratitude a wider recognition of the carburetion problem. The combination of a mechanical—as distinguished from any species of automatic-spring control—means of synchronizing the flow of the liquid fuel, and of determining mechanically its volume for a given position of throttle opening seems to have commended itself to a number of students of the question, and in combination with the now accepted practice of separating the jet and primary air intake from the extra air valve, with a (heat) jacketed vaporizing chamber or trunk pipe, promises to prove no small factor towards a more economical fuel consumption. The trade should have available for such tests a suitably equipped laboratory to further the tests in this regard, and that even more important aspect of the fuel question, the garnering of data on the merits and possibilities of alternative fuels within the capacity of the country to produce. The trade has certainly available the researches of specialists in laboratories subsidized from the public funds, but such are controlled by a management necessarily independent of trade control. Hence such research work has a pedagogic or academical rather than a practical and experimental value to the trade, and results in the forcing back on their own resources the trade's own witnesses to progress and research.

Simple Formula for Welding Cast Iron

A formula for welding cast iron, developed by Messrs. A. Beltzer and C. Delcampe and published in the *Iron and Coal Trade Review,* calls for a flux consisting of 15 per cent. lithium chloride, 20 per cent. potassium fluoride and 60 per cent. potassium chloride. The cast iron surfaces to be welded are preheated, and then covered with the flux powder and heated to the melting point. Additional material is supplied from a rod of cast iron which is also dipped in the flux and presented to the joint where it melts and flows in, filling up the space and making a sound weld. It is claimed that blow-holes in castings may be filled by the addition of cast iron in the above manner and that metal may be added to defective castings to build them up where defective. In short, this can be made a "putting on" process where required. The means for heating are not given, but probably any non-oxidizing flame capable of raising the temperature to the melting point of cast iron can be employed.

Results from Testing Napthalene

NOT so very long ago, about seven months ago to be exact, there was a very spirited discussion in these columns as to the availability and general usefulness of other fuels than gasoline to automobile work, the particular cause of the discussion being some statements made concerning napthalene. This fuel, which comes in a solid state, was discussed pro and con for several issues.

However little or any of what was said then was said with a basis of actual test results. So, it is of use to present some exact figures and comment thereon, as sent out by a foreign correspondent, writing with the consent of the Technical Commission of the Automobile Club of France, which made the tests.

The results of this exacting trial were very much in favor of napthalene and it will therefore be of interest to know a little more about this fuel. The Assistant Secretary of the Technical Commission, M. L. Ventou-Duclaux, an expert chemist, has given us the following interesting details:

The use of napthalene as fuel for internal explosion motors—suggested as it was by the cheapness of this product (about $1.00 to $1.25 per 100 lb.) as compared with the costs of gasoline (about $5.00 for the same quantity)—offers several great difficulties which are in the nature of the product, and which the motor industry is trying now to overcome.

Napthalene is a hydro-carbon, and, like benzol and other different products, is extracted from heavy oils, which, in their turn, are distilled from coal tar, a residue of the production of coke and gas. The portions of these oils, which are distillated between 200 and 220 deg. (C.), are submitted to a cooling effect which causes the crystallization of the raw napthalene.

This latter is subsequently separated from the other products of the distillation by compression between sheets of tissue, in which way the liquids are separated from the solid matter. The napthalene is then purified by a treatment, with soda, which cleanses it from the phenols, afterwards it is treated by means of sulphuric acid, which separates it from the other basic substances. The napthalene is in the gas works rather a troublesome by-product, requiring frequent removal from the pipes, which it would otherwise obstruct in no time.

Until comparatively recently napthalene has only been used for preserving clothes against moths during the Summer. The development of the automobile industry has drawn attention to this valuable by-product, which, chemically, fulfils all the requirements of a suitable fuel for motor cars.

Napthalene, like gasoline, belongs to the aromatic group of organic compounds. The chemical formula describing it is $C_{10}H_8$ and belongs to the hydro-carbon group characterized by the formula C_nH_{2n-12}, while gasoline, whose formula is C_6H_6 belongs to the category C_nH_{2n-6}. The molecular percentage of carbon is greater with napthalene (93.7 per cent.) than with petrol (92.3 per cent.); and it may be stated as a general rule, that the larger the quantity of carbon the greater is the difficulty to burn it completely. As an example the methane C_4H may be given, which burns very easily, producing thereby carbon dioxide with water and steam, while petrol burns in the open air with a dusky flame, leaving a deposit of unburnt carbon. The napthalene burns under the same conditions, but with a very sooty and more heavy flame, which is a point to be recognized in dealing with it in practice.

To burn a gramme of napthalene in the chemical sense of the word—that is to say that all the carbon is to be transformed in carbon dioxide—about the same quantity of air is needed as for the same quantity of benzine. The combustion theory is quite easily established for the two products:

C_6H_6	+	$15\,O$	=	$6\,CO_2$	+	$3\,H_2O$
78 gr.	+	240 gr.	=	264 gr.	+	54 gr.
gasoline		oxygen		carbon-dioxide		water
$C_{10}H_8$	+	$24\,O$	=	$10\,CO_2$	+	$4\,H_2O$
128 gr.	+	284 gr.	=	440 gr.	+	72 gr.
napthalene		oxygen		carbon-dioxide		water

The Economy of Napthalene as a Fuel

A simple calculation will show that to burn 1 gramme of petrol, 3 grammes of oxygen or 13.04 of air are required, while the oxygen required to burn 1 gramme of napthalene is 3.07 grammes, which equals 13.34 of air. It is, nevertheless, also true that the same quantity of air will enable us to burn less easily napthalene than petrol, and to explain this it may be assumed that the carbon of the petrol has some peculiarities which are apparently not shared by that of the napthalene. On the other hand, the napthalene is a solid product at ordinary temperatures; its melting point is at 49.2 deg., while it boils only at 218 deg. To obtain the carburation of the air it is therefore necessary to vaporize the product, or at least to mix it in a liquid state with air while it is maintained at a temperature which does not allow it to vaporize. According to the tests made by Messrs. Burlat Frères, to ensure good results this temperature must not be lower than 200 deg. C. This temperature must, therefore, be reached before the motor is ready to accept napthalene as fuel, which renders imperative the starting of the engine on another fuel.

A by-pass branched off the exhaust will readily provide the heat required for melting napthalene; but it is also necessary that the pipes leading to the napthalene tank be always heated to at least 80 deg. C. If this degree of heating is not constant the crystallization of the fuel may take place, followed by stopping of the motor. The air absorbed for carburation must also be preheated before it comes in contact with the napthalene, and the admission of the air into the carbureter must be regulated with much greater accuracy than for a petrol motor, since the slightest diminution of oxygen in the mixture will cause a bad combustion of the fuel.

These conditions make the use of napthalene a delicate business, especially if it is intended to obtain from the fuel all the power it can give. Its non-inflammability when cold, the ease of handling, together with the cheapness in price, make it on the other hand a desirable product which should give excellent results if rationally employed. Why gasoline with 11,000 calories, and napthalene with only 9,620 calories, give the same power in an internal combustion motor has not yet been explained; it would be both useful and interesting to further inquire into this point.

To feed an explosion motor with a mixture of gasoline and napthalene should allow regular working under normal conditions, while realizing a great economy, especially under the existing prices of the two combustibles. The question of adopting the two, one for another, will have to be studied seriously, because it will not be easy to accommodate the new fuel to the conditions of the others, or it will have become possible to change the nature of carbon.

Now that gasoline is getting scarce, and the price—already high—being liable to go higher, the attention of all discerning automobilists who give the future a thought, is called to the above. Not only does this represent one angle of the fuel situation, and an important one at that, but it also shows that scientists are fully aware of the closely approaching end of the supply of available gasoline for an automobile fuel.

New Oscillating Engine Valve

VALVES have aroused much interest in the past year or so, primarily through the wonderful success of the Knight engine with sliding sleeve valves. Many inventors have brought out other forms of valves, possessing points of apparent superiority over either the sleeve form or the old style poppet valve, or both. One of the newest inventions in this line is that pictured on this page in several cuts, and the invention of M. S. Keyes, an automobile engineer, formerly with the Maxwell Briscoe factory at Tarrytown, N. Y.

As Figs. 1 and 2 on this page show, this invention consists of a tubular sleeve used for a valve. This sleeve has cut into its one side a number of ports, which are presented to the open combustion chamber in succession. To operate the valves—for there are but one per cylinder—the regular camshaft is used, but instead of a sliding or lifting motion, as in the case of the poppet valve, or a rotary motion as in some valves, the motion given to these sleeves is that of partial rotation followed by similar partial rotation in the opposite direction, in short, oscillation..

As Fig. 3 shows, this is accomplished from the usual camshaft by means of an L-shaped lever placed on the side of the head—for these valves are located in the head—and operated by the upper end of the push rod, this motion being restrained, and the downward motion produced by means of a strong spring, which works against the other end of the L-shaped arm, and at right angles to the direction of the push rod.

Inflow of gases and outflow of the exhaust are through the interior of the tubular form, the inlet and exhaust pipes being bolted up to the cylinder heads on the side opposite to the operation. This gives a certain amount of end thrust on the valve, both from the inflowing carbureted air and the reaction from the fast-flowing exhaust. This is cared for, as is also wear, by means of a taper end.

To take care of unequal expansion and contraction, the side of the sleeve opposite to the ports is slotted with a fine slot, which allows the valve to adjust itself to the temperature of the surrounding chamber. This slit is made large in the drawing to bring out the point. Similarly, the opening in Fig. 1 connecting

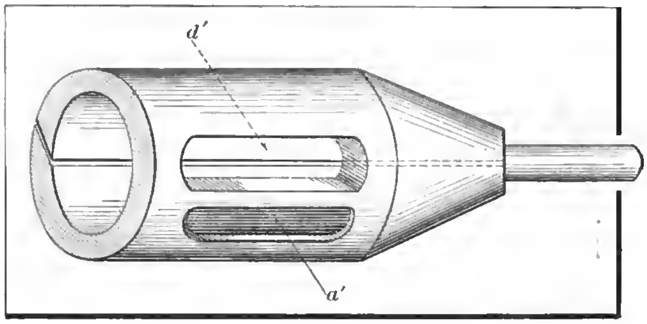


Fig. 2—Sketch of valve showing ports cut in the side

the port in the valve with the combustion chamber, is sectioned by mistake. This should show an opening, as the valve is set in the open position.

One advantage which this design has is that of calling for water jackets all around the valve, not alone below, as is common, but also above and on all sides, so as to completely surround the valve. This circular form makes this easy, without destroying the symmetrical appearance of the cylinder head. The latter is in a separate piece and bolted in position, so that removing it for an inspection of the valves, should one desire to do this, is an easy matter. To carry out the idea of a perfect combustion chamber, at least as to shape, the piston is hollowed down to a spherical shape, the part of the chamber which is in the head being similarly shaped. This form, according to scientists, gives the most nearly perfect results.

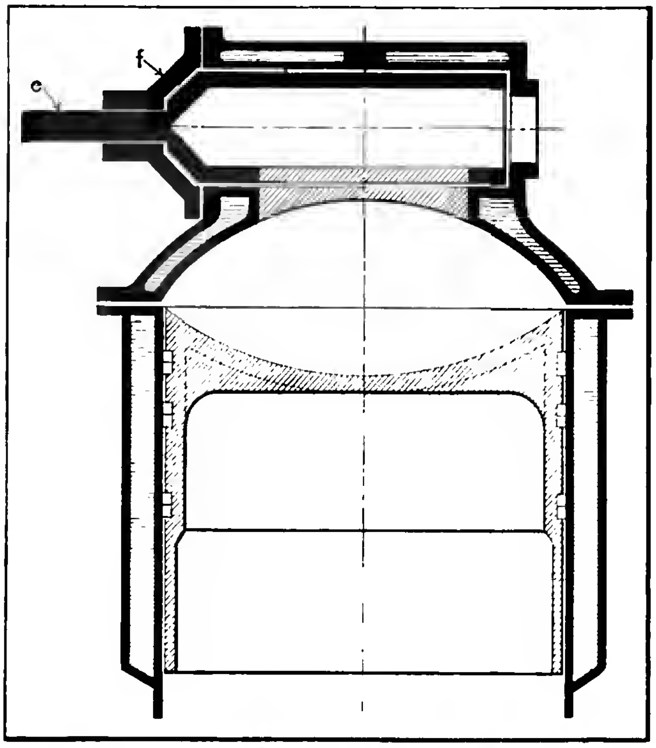


Fig. 1—Section through cylinder showing valve in place

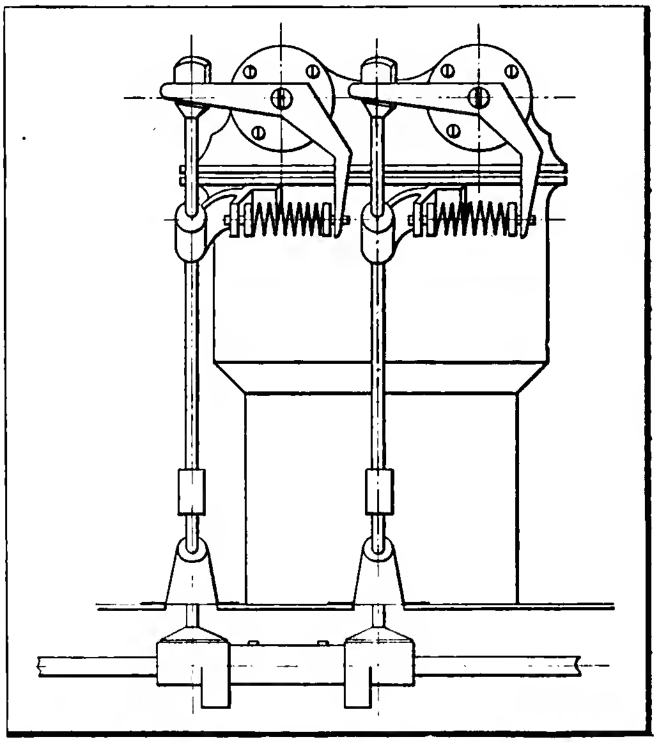


Fig. 3—Assembly of engine fitted with valve mechanism

General View of First Regiment Armory, Louisville, Showing Patriotic Scheme of Decoration, Using American Flags

Louisville Show Opens Under Auspicious Conditions

LOUISVILLE, March 22—The Automobile Show which was opened on March 17, and was run under the auspices of the Louisville Automobile Dealers' Association, closed on Saturday night under conditions of the most unusual success from both a business and social point of view. The excellent results obtained were due to the splendid co-operation of the members of the club as a whole, the close attention to detail by the committee, and the exacting and painstaking efforts of President Prince Wells, supplemented by the good work of Vice-President E. G. Reimers, and the executive ability and indefatigable energy of Herbert Levy, secretary-treasurer.

The opening took place at 1 o'oclock in the afternoon at the First Regiment Armory, which was appropriately decorated for the purpose, utilizing the flags of all nations in graceful array, and just enough of foliage to destroy monofonous tendencies. The armory is a large one, with 54,000 square feet of floor

Some of the Exhibitors. At the Left Weber Commercial, White and Stanley. Right, Buick and Welch Stands

Along one of the Outer Aisles, Where Chalmers, Reo, Haynes, Babcock, Ohio, and Broc Drew and Held the Crowd

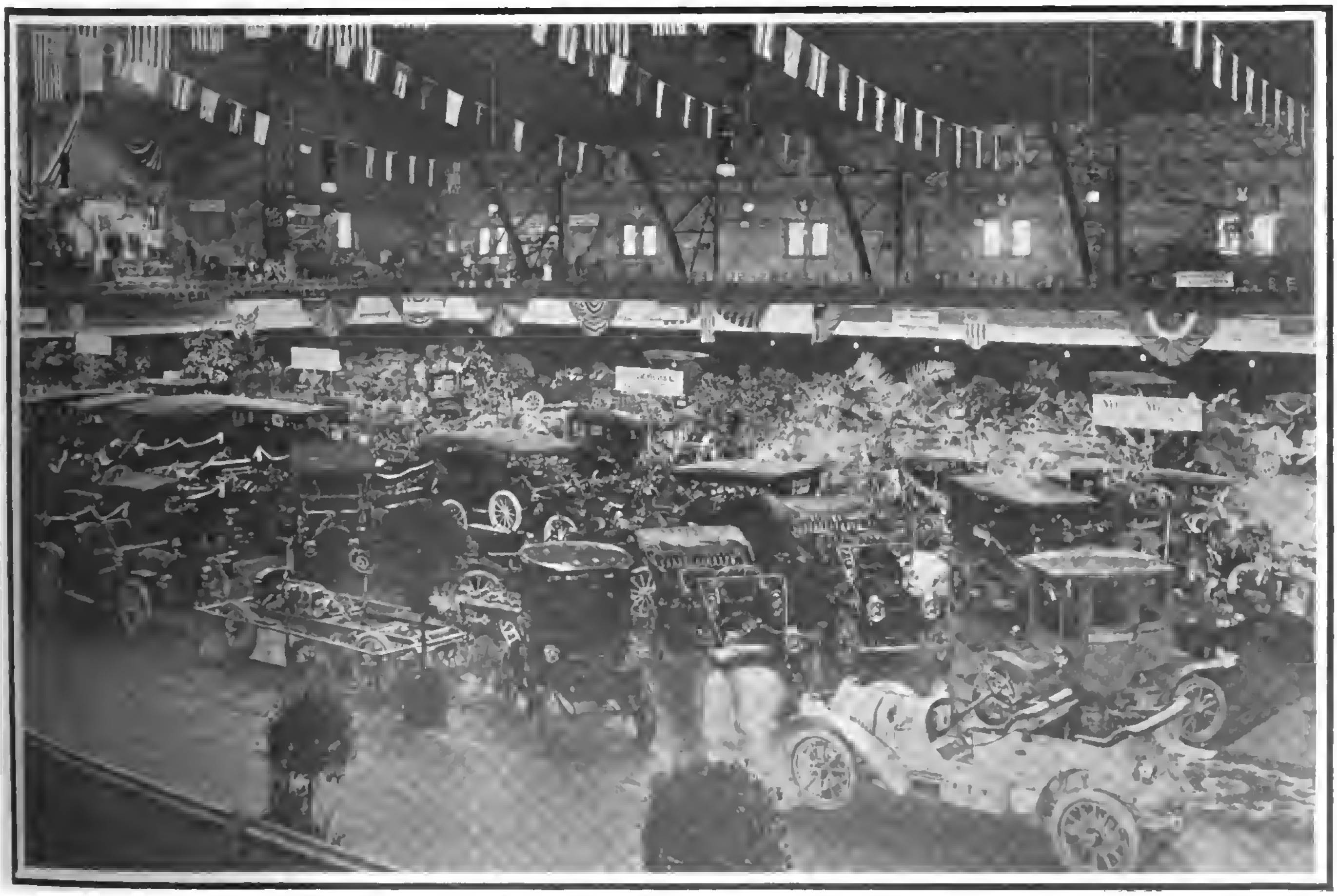
space in the main hall, which is known as the drill room, and 18,000 square feet of balcony space. Over 100 cars were skillfully arranged over the drill room floor, and the balcony space was adequately cared for by the accessory makers.

From a purely business point of view the show exhibited some decided tendencies in addition to the customary expectation from the touring car point of view. It soon became known among the exhibitors that the South is interested in the commercial automobile, and the visitors from afar, representing in the main the rural communities, were there in sufficient numbers to be distinctly noticeable, and their inquiries took on a utility tone. There was no time during the show when it could be claimed that the Exhibition Hall was sparse of spectators, but there were periods during which the patrons of the industry were uncomfortably numerous.

EXHIBITORS AT LOUISVILLE AUTOMOBILE SHOW

Atlas Machine Company, Regal "30," Marmon, Empire "20," Graboweky trucks; Banks Motorcar Company, Ford; Hite D. Bowman, Stearne, Rausch & Lang electrice; Broadway Auto Company, Stein tires and sundries; Andrew Cowan & Company, sundries; R. L. Davis, R. S. motorcycles; Dunham Auto Company, Velie "40" Buffalo trucks; Filton-Conway Company, E-M-F "30," Flanders "20"; C. W. Fisher, Thor motorcycles; Gloesbrenner Commercial

(*Concluded on page* 616.)



Diagonal View of the Main Floor at Louisville, Showing Where Olds, Oakland, Rambler, Packard, Detroit and Woods Held Forth

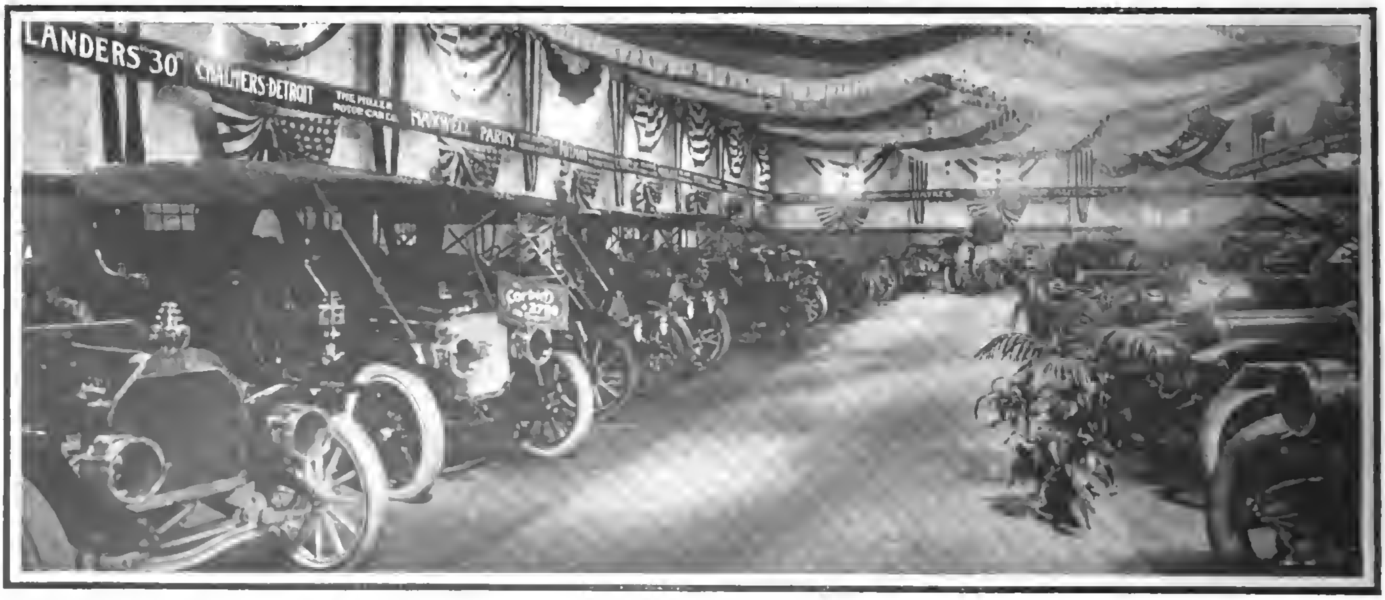
Armory Where the Exhibits Delighted the Automobiling Public of Bridgeport, the Home of Locomobile

Bridgeport Demonstrates Attraction of Shows

BRIDGEPORT, CONN., March 21—The attractions which an automobile show hold forth to the public were well demonstrated by the large attendance which has been the feature of the Automobile Show here from the opening night on. The show is held in the Armory, by the Bridgeport Automobile Dealers' Association, the officers of which feel satisfied with the results thus far.

Opening on Wednesday, March 16, the show is scheduled to continue for three days, closing on Saturday night. The opening night was marked by a crowd well in excess of 2,000 people, which is large, considering the size of the town and the hall in which the show is held.

As one enters the armory the sight is a most pleasing one. The decorative effect is excellent. As stated previously, the color scheme of the decorations is green and white. There are



Exhibits of Flanders, Chalmers, Maxwell, Parry, Pullman, Cadillac, Midland, and Speedwell Occupied One Broad Aisle

View of Spacious Main Floor, Showing in Particular the Exhibits of Regal, Paterson, Whiting and Mitchell

many American flags on the side walls, and the blending of the national colors with the white and green has made a fine combination, one which attracts much attention.

The exhibits are in the center of the hall and on both sides. The center is by no means the most attractive spot. The cars rest upon green crash, and the booths are separated by white tape. This gives a full view of the entire exhibit without the offensive break of the usual wooden railing. The elimination of the wooden railing and the use of the white tape instead is a most desirable and commendable feature of the booths. By the use of the tape the dealers have made their show much more attractive and have shown some taste.

The show was opened without much ceremony, the only thing being a speech by the Mayor, and a reply by the president of the Dealer's Association, W. D. Rantz. During the evening, music was furnished by the Wheeler & Wilson band.

Among the other attractions, Post & Lester showed a small model of a Wright biplane, which was made in France. The attendant in charge of this booth had to answer a constant fire of questions.

The way in which interest keeps up the general enthusiasm and feeling of hustle and bustle are cause for congratulation, and the auto dealers feel that they have accomplished something, as indeed they have.

Another Aisle, Along Which Were to Be Found Peerless, Marion, Mitchell, and in the Foreground, White Chassis

RECENT CLUB ACTIVITIES

NEW HEADS FOR BUCKEYE CLUB

Columbus, O., Mar. 21—The annual election of officers and banquet of the Columbus, Ohio, Automobile Club will be held March 29 at some place to be selected at a later date. A large attendance is expected, since the campaign for membership has been inaugurated. Much enthusiasm in the affairs of the club is shown.

The two tickets to be voted at the coming election have been completed by the nominating committee. The tickets follow: President, Dr. W. D. Inglis and Charles E. Firestone; first vice-president, Dr. C. S. Means and Norman O. Aeby; second vice-president, Sherman D. Brown and Charles C. Janes; board of governors, Perin B. Monypeny, Herman Foster, Dennis Kelly, Rev. J. H. Dodson, Nelson J. Ruggles, M. J. Hanley, William M. Frisbie, D. B. Neil, C. S. Krumm, Dr. George P. Stephenson, Dr. H. A. Radebaugh and H. S. Waite. Six are to be elected. The new constitution and by-laws was adopted at a recent meeting and a complete reorganization of the club has been effected. Instead of the affairs of the club being looked after by the officers everything is now in the hands of the board of governors, consisting of six members and the four officers *ex-officio*.

Every member was placed on the committee of reception for the entertainment of the delegates to the convention of the Ohio State Automobile Association, which met in Columbus March 16.

MORE ACTIVITY IN QUAKER CITY

Philadelphia, Mar. 21—The First Volunteer Motor Corps is the title of an organization of the Quaker City Motor Club, Philadelphia, Pa. It was organized two years ago with a view of quick mobilization in times of national, State or municipal danger. Several days ago, at a time when street car strike disturbance was at its highest, this force volunteered its services to the Mayor of the city and as soon as assembled they did excellent service for the Department of Public Safety. The owners and drivers have been sworn in as special police and provided with badges and arms. The president of this organization is Charles J. Swain; others connected are: P. D. Folwell, Richard Sellers, J. Fred Betz, 3rd, Edwin H. Lewis, Louis Vogel, C. Edgar Shreve, J. F. Morgan, Evans Church and Archie James.

WESTERN PENNSYLVANIA NOTES

At the annual meeting of the Automobile Club of Pittsburg, Pa., held February 21, the following officers were elected for the third year: President, Edward Kneeland; vice-presidents, Edward Kent, William N. Murray and William A. Seif; secretary, Hall C. Wolff; treasurer, William A. Heyl.

The automobile show held in Sharon, Pa., was quite pretentious. It opened March 1 and continued three days with the following as exhibitors: Buick, Rambler, Parry, Ford, Hudson, and Chalmers. An orchestra enlivened the occasion and the automobiling public, which is increasing very rapidly in the Shenango Valley, was present en masse. The show was conducted by W. C. De Forrest & Son, who made a special effort to have the decorations above the average.

SYRACUSE CLUBS EVINCE MUCH ACTIVITY

Syracuse, Mar. 21—The Automobile Club of Syracuse has made still another addition to its already large membership. At the last meeting twelve more members were elected, making a total to date of 422. This large organization has set a mark of 500, which it hopes to reach by the first of July, and it is expected by the officers that a long step toward this object will be taken at the coming automobile show in Syracuse. For the purpose of bringing this about, the club will have a booth at the show where an active campaign for membership will be carried on. The annual banquet of the club was held at the Yates on Thursday evening, March 10, the eighth recurrence of this social feature of the organization.

ANNUAL ELECTION NEXT AT CINCINNATI CLUB

Cincinnati, Mar. 21—The Automobile Club of Cincinnati having successfully carried out its first annual automobile show is now engaged in making arrangements for the annual election which will take place on March 27. Dr. C. L. Bonifield, the present head of the organization, will, it is believed, have no opposition if he again runs for the office of president. A move has been started to open a publicity bureau at the club and it is believed that with the proper person at the head of such a bureau, much good can be achieved by the Cincinnati organization.

FARTHEST SOUTH STATE CLUB ORGANIZATION.

Tampa, Fla., Mar. 21—Motor clubs of Florida have formed a State body, a permanent organization of which was effected in Tampa, Fla., on February 24. It will be known as the Florida State Automobile Association, and at present comprises clubs from eight cities. The board of directors are: E. Ed. Bryan and Capt. C. S. Washington, Tampa; G. B. Reynolds, Fort Meyers; W. W. Clark, Bartow; Judge Syd. L. Carter, Gainesville; Albert W. Fisher, St. Petersburg; T. C. Calmes, Plant City; E. L. Lesley, Kissimmee, and J. H. Spencer, Ocala.

MOTORCYCLE CLUBS VERY ACTIVE NOW

Syracuse, N. Y., Mar. 21—The Syracuse Motor Cycle Club has launched a movement with a view of securing the 1910 Federation of American Motorcyclists convention. The president of the Syracuse Club was directed to appoint a committee to invite the Board of Directors of the Federation of American Motorcyclists to designate Syracuse as the meeting place.

SHOW BREVITIES

BAD WEATHER DAMPS ENTHUSIASM AT TERRE HAUTE

Terre Haute, Ind., Mar. 19—Although an artistic success, which gave the people of the town a better idea than before of the importance of the automobile industry, the show which just closed here was a box-office failure, and its promoters are out a considerable sum. The expenses incurred by the management amount to some $500; the decorations and band cost $200, rent $100, and various incidentals not less than $200 more, making a total outlay of $1,000. On the receipts side it appears that 1,430 persons paid to see the show, their contributions amounting to $357.50. The smallness of the attendance is laid to the bad weather which prevailed during show week.

SPOKANE, WASH., SCHEDULES ITS FIRST SHOW

Spokane, Wash., Mar. 19—The first automobile show to be held in this city will open at the Princess Rink next Monday. Two hundred machines will be exhibited and a number of aeroplanes, including one of the Curtiss models from Los Angeles.

PROSPECTS GOOD FOR PASSAGE OF REGISTRATION BILL

Favorable action on the Federal Registration Automobile Bill at an early date is confidently expected by the automobilists of the country as the result of the presentation of the merits of the bill before the delegates in Washington at the recent legislative convention of the American Automobile Association. The encouraging feature in this respect is due to the keen interest shown in the bill by the members of the Committee on Interstate and Foreign Commerce, before whom the hearing was held on the last day of the convention.

As expressing the sentiment of the delegates attending the recent legislative convention, among whom were representatives of Governors from States extending from the Atlantic to the Pacific and from the Gulf of Mexico to the Great Lakes, a resolution was unanimously adopted advocating the passage of the Federal Registration Bill. The resolution follows:

"Whereas, the bill providing for, federal registration of motor vehicles, known as H. R. 5,176, introduced by William W. Cocks, of New York, and now pending before the Committee on Interstate and Foreign Commerce of the House of Representatives, meets the approval of all who have given the matter careful consideration, and the prompt enactment of such a law is necessary for the unhampered development of interstate commerce and travel by means of motor vehicles;

"And since it is only through federal legislation that the unjust and unwarranted burdens now imposed upon such interstate commerce and travel can be removed;

"Now, therefore, be it resolved, That the National Legislative Convention of the American Automobile Association, held in Washington, D. C., on February 15-17, 1910, does urge the speedy passage of this measure, and pledges itself to use every honorable effort to accomplish its enactment."

One of the strongest supporters of the Federal Registration Automobile Bill is Representative William G. Brantley, of Georgia. "The time will come, I predict," he said, "when Congress will be compelled to take hold of the interstate commerce of automobiles and regulate and protect it. Whatever appeal you make to Congress should be predicated upon the right of Congress not only to protect and regulate, but also to restrain and properly control the growing commerce of the country."

Senator Chauncey M. Depew, of New York, who delivered one of the strongest addresses at the convention, cited the fact that ten years ago there were but seven hundred cars in use in the United States, while now the number is three hundred and fifty thousand, aggregating in value $419,000,000.

ROAD BUILDING NEWS

PENNSYLVANIA HOTEL KEEPERS WANT BETTER ROADS

STROUDSBURG, PA., Mar. 21—The annual meeting of the Monroe County Mountain Resort Association, held here recently, was marked by a mass meeting held in the Court House in the interest of good roads. The session was attended by men interested in the resorts, as well as business men of New York and Philadelphia.

W. P. Colton, of New York, was the chairman of the meeting, and the principal addresses were delivered by J. H. Weeks, the head of the Delaware County Automobile Association; E. N. Clark, of the Scranton Automobile Association, and A. B. Dunning, of the same city, a civil engineer; W. C. Freeman, of New York, and Benjamin Butterworth, of Brooklyn. All the speakers impressed upon the minds of the audience the importance of good roads to the summer resort business. The annual banquet was held at the Indian Queen this evening.

The hotels of the Water Gap district, like those in many other parts of the country, are feeling the benefits of the growth of automobile touring.

THE LAW AND THE AUTOMOBILE

NATIONAL GRANGE URGES ENACTMENT OF FEDERAL BILL

One of the strongest arguments in favor of the Federal Registration Bill was made by ex-Governor N. J. Bachelder, of New Hampshire, and Master of the National Grange, with its membership of upward of a million farmers. Governor Bachelder also looks at the purposes and benefits of the bill from the broad viewpoint of the farmer, and he stated at the legislative convention that, while regarding the automobile as an important factor in bringing into the State residents of other places who desire to purchase farms and make their summer homes there, it is also necessary to consider that proper means of travel must be offered.

"The experience of the past six or seven years has shown that different laws on this subject have resulted in many complications tending to discourage even the orderly use of the automobile," he stated. "In some States the natural resentment against the dangerous rate of speed at which automobiles were being operated has resulted in the enactment of unreasonable laws, which defeated their purpose by imposing regulations so stringent that they could not be enforced. And a law that is not enforced is worse than no law at all. For instance, many residents in New York City live for four or five months of the year in the State of Maine. The pleasantest method of reaching their Summer homes is by an automobile trip through Connecticut, Massachusetts and New Hampshire. As travel of this kind is clearly interstate commerce, they can properly claim the right to go through these various States without being forced to pay taxes for the privilege of passing over the roads. I understand that the Supreme Court of the United States has decided that the imposition by a State of taxes on a traveling salesman coming from other States is unconstitutional, and it would seem that if they cannot tax citizens of other States doing business temporarily within its borders it has no right to tax them while merely passing through its territory."

IMPORTANT LICENSE DECISION IN OHIO

COLUMBUS, O., Mar. 21—Upon the request of State Registrar of Automobiles Fred H. Caley, Attorney-General U. G. Denman of Ohio has rendered several decisions of great importance to auto owners. The first question submitted was whether or not a license and set of number plates can be transferred from one owner to another upon the sale of a motor vehicle. After analyzing the law, the Attorney-General comes to the conclusion that such cannot be done legally. He quoted the laws as follows: "Every owner of a motor vehicle acquired during any year shall, immediately upon acquiring such motor vehicle, file an application with the necessary fee for registering the motor car." He says no exception is made to allow the license to be transferred with the car.

Upon the question of using the same set of number plates on different cars by one owner, the Attorney-General says that it is unlawful for a person selling a motor vehicle to transfer the tags to a new motor vehicle purchased by him.

The Attorney-General also rendered an opinion in which it is held that all motor vehicles excepting fire engines and ambulances have to be registered, notwithstanding the ownership.

Aeroplane Weight and Power

Editor THE AUTOMOBILE:

[2,197]—Please answer these questions through "Letters Interesting and Instructive":

1. What is the smallest wing surface of an aeroplane that will lift two hundred pounds?

2. Would it require a high or low powered motor to lift this weight?

3. Where is the elevating rudder located on the Blériot monoplane? LESLIE M. SANEDER.

Denison, Kan.

There is a considerable variation in the surface required, depending on the shape of the surface. A relatively flat surface will support less weight than a more curved one, but, weight for weight, requires less power. The Wright machine, the surfaces of which have a curvature of but one in 20, carries only two pounds to the square foot, but does so with one horsepower to every 41 pounds. The cross-channel type of Blériot. with a surface curvature of one in 12, carries 4.5 pounds to the square foot with one horsepower to every 29 pounds. The Wright machine can average 40 miles an hour to 36 for the Blériot (all figures relate to the Blériot fitted with the three-cylinder 25-horsepower Anzani motor). Thus you can suit yourself in both ways; you can either have a small high-powered machine, or a large, low-powered one to carry the same weight.

The Blériot monoplane has its elevating rudder in the rear, its front edge being about 8½ feet from the rear edge of the main surfaces. There are really two rudders, one on each side of a stationary surface, but acting in unison.

The 1910 model Blériot, known as type 11 *bis*, is said to carry 6½ pounds to the square foot, being both smaller and heavier than the 1909 model.

Licensed and Unlicensed Cars

Editor THE AUTOMOBILE:

[2,198]—Will you kindy tell me through the columns of your esteemed paper what A. L. A. M. means, and what its connection with the Selden patent is? Notice that there is considerable discussion on this question now, also that parties purchasing unlicensed cars are liable to suit. As I am contemplating the purchase of a car, I would like this information for personal protection.

Fond du Lac, Wis. A. W. BISSETT.

The initials A. L. A. M. are but an abbreviation or shortening of the full and very long name of the association, which comprises all of the makers authorized under the Selden patent to make and sell cars, the full name being Association of Licensed Automobile Manufacturers. This association does not actually own the patent, that being the property, either wholly or the controlling part, of the stockholders of the old Electric Vehicle Company, Hartford, Conn., but the association decides by vote which among the applicants for membership shall be given such membership, the same election being subject to the approval of the aforementioned owners.

As far as a suit is concerned, it has been laid down as the policy of the association and the patent owners, not to take such a course, at least not until the patent is definitely and finally upheld by the higher courts. This is a matter which will doubtless carry over until 1911, for certain, and possibly until 1912, in which latter year the patent expires.

Parts for Discontinued Cars

Editor THE AUTOMOBILE:

[2,199]—Can you advise me through "Letters" where I can get Queen automobile parts, knowing that the Blomstrom concern is now out of business. I need some parts for my transmission and so must find the party who has the patterns and makes the parts.

Marysville, O. L. HENDERSON.

Parts for these cars may be obtained from the Auto Parts Manufacturing Company, located at St. Antoine street and Michigan Central Railway, Detroit, Mich. This firm not only make and sell the parts for the Queen cars, so they inform us, but also for the Northern and Wayne cars, neither of which are now regularly manufactured.

LETTERS INTERESTING

Simple and Efficient Still

Editor THE AUTOMOBILE:

[2,200]—I am a subscriber to your valuable journal and have recently become deeply interested in the prevention of radiator inefficiency due to the incrustation of the various mineral salts suspended in the water used. Will you kindly give a sketch of a simple and cheap still such as may be made by the local tinsmith, since the use of distilled water seems to be the only absolute way of preventing incrustation. "An ounce of prevention is worth a pound of cure," so they say. P. L. MORGAN.

North Ridgeville, O.

This is an excellent plan, and the simplest still that can be suggested is made from an old tea kettle, rubber tubing. two long glass tubes of different diameters, one large, one small and more rubber tubing. As this apparatus is so simple that any one can buy the materials, assemble them, and then have the use of perfectly pure water, it will be described in detail.

First buy from the drug store a length of rubber tubing of rather thick walls, large enough inside to go over the spout of the tea kettle which you intend to use and long enough to lead from the tea kettle situated over the fire to a source of cold water, which, if the kitchen be utilized, will be the kitchen sink. Then buy a small diameter glass tube. which will fit one end of the rubber tube very tightly.

Next buy another and much larger glass tube, say, 1 1-2 in. inside diameter, but about an inch shorter, the first one being about 18 in. long. Finally you will need another short length of rubber tubing of the same size, not over two feet long.

Put the tea kettle on the store, attach the long rubber tube, leading it over to the source of water, then slip the larger tube over it, and manage to hold it in that place by some means so that the cold water from the faucet can run in the upper or open end of the large tube. Hang the combination of the two tubes one within the other so that both are slightly inclined. The object of the inclination is to permit the cooling water to flow around the inner tube and then out to the sink drain. This flowing cold water will condense the steam in the inner tube, which will then flow through the shorter rubber tube (attached to the other end) to some convenient receptacle.

The process will then proceed as follows: Water put into the tea kettle will be converted into a vapor, steam, leaving the impurities behind in the tea kettle. This vapor will pass through the long tube to the glass, when the cold water flowing around the outside will condense it to a liquid again, which will then flow through the shorter rubber tube to the receptacle. Using as large a tea kettle as possible, and carefully bottling the resulting pure water in bottles with ground-glass stoppers, which have previously been scalded out clean, will result in giving you a source of pure water which can be used without fear of trouble from incrustation.

A more elaborate still may, of course, be made, but at some expense. This, however, would present many features which would be worth the money expended to motorists able to spend that amount, so that a drawing of one will be presented at an early date.

A variation of this idea, to dispense with the breakable glass tubes, would be to get enough rubber tubing not only to lead to the sink but also to form several coils around the bottom of a tub or dishpan. The tubing would then be in one piece, with one end connected to the spout of the tea kettle and the other connecting with the receptacle for the distilled water.

ANSWERED AND DISCUSSED

Starting on the Spark

Editor THE AUTOMOBILE:

[2,201]—To settle an argument, will you kindly tell me if a car will not start off the switch; is it because the cylinders do not hold compression? A manufacturer here states that compression has little to do with it, as he says that he has taken out his spark plugs, looked at them, replaced them, and then started on the switch. I was under the impression that the gas would escape as soon as the spark plug was loosened, or if the valves did not shut closely. He says that only the extra quantity that is compressed will, because, as gasoline vapor is heavier than air, enough to fill the cylinder will remain there, but he states if the mixture is not proper when the gas is not compressed one cannot get the explosion, whereas if the mixture is correct one gets explosion enough to turn over the engine on the spark taking place, although there is no compression whatever. Is he correct in this? If he is, does one need a rich mixture or a poor one? AMATEUR.

Toronto.

Your information is somewhat misleading, for while a correct mixture is a necessity for starting purposes, and an explosion of such a mixture may be produced when it is not compressed, this latter occurrence is so rare as to be almost negligible. In fact, a more truthful statement would be that compression is absolutely necessary, so that the writer of the above letter is more nearly right than his informer.

Starting on the spark depends upon the retention of the compression. from the fact that the spark obtained under stationary conditions is fairly weak, and as such would not ignite a partly compressed mixture, or one not compressed at all. More than this, it is a pretty safe statement that the rich mixture is easier to ignite than the weak, and that compression leaks would result in a comparatively weaker mixture, so that from that viewpoint the mixture not compressed would also be more difficult to explode.

It is doubtful if the experiment spoken of, in which the spark plugs and other parts were removed from the cylinder, leaving them open to the atmosphere, and that then, after replacement. the engine was started on the remaining mixture, on the spark. ever happened, or could be made to happen.

Names and Makers of Carburetors

Editor THE AUTOMOBILE:

[2,202]—In the issue of January 6, 1910, I notice, under the head of "Things That Attract in the Accessory Field," and under the sub-head "Carbureters Show Encouraging Improvement," a mention of a device for mechanical atomization in one carbureter, and a needle valve construction in another for the same purpose. The names and manufacturers of the carbureters are not given. Will you please give me their names, as I desire to get their catalogs or descriptive matter. H. CASSEDY.

Brookhaven, Mass.

The device for mechanical atomization you refer to we believe is the "Homo," although this is not a carbureter, but is intended to be placed in the inlet pipe between the carbureter and the motor. It is made by the Gasoline Motor Efficiency Company, ersey City, N. J. The other carbureter referred to is doubtless the Breeze, made by the Breeze Carbureter Company, also of Jersey City, N. J.

There are a number of devices which nearly fit the descriptions given, so that an exact selection is nearly out of the question. It is hoped that the writer of the above letter will bear this in mind when reading the above letter.

Can One Vibrator Do Work of Four?

Editor THE AUTOMOBILE:

[2,203]—I have an old four-cylinder, four-cycle car with a four-unit coil and dry batteries. When the vibrators are set right the motor runs very well, but after the car has gone a few miles some of the vibrators lag, the engine fires unevenly and the vibrators have to be adjusted. I have read about the master vibrator, and the theory of it seems right, as synchronism is very important, but I cannot understand how one vibrator can do the work of four when four cause so much trouble. Are master vibrators as successful as the makers claim? I have also read of the benefits of the Atwater-Kent "Unisparker," which does away entirely wtih vibrators. Is it a fact, as they claim, that one spark fires a charge as effectively as a series of sparks, as in a vibrating coil? Do you think either of the above methods would cure my trouble? T. W. M.

Little Ferry, N. J.

The first description of your trouble sounds very much like that old bugbear, weak batteries. Are you sure that a new set would not put your engine right again, without considering any further changes.

Master vibrators are very satisfactory in service. There is no trouble about making the one vibrator work overtime, as when four are used each one is working less than one-fourth of the time. If you were employing four men who only worked two hours a day each, you wouldn't hesitate long in replacing them by one man who would work eight hours.

The theory of the Atwater-Kent device is correct, as one spark is sufficient to fire the mixture under proper conditions. With a series of sparks, if the first one does not come at the right time, or fails to ignite the mixture, the result is practically a misfire; for even if the others of the series do succeed in causing an explosion, it will not be of sufficient strength to assist in running the engine.

There is no reason why your engine should not be made to give satisfactory service with its present ignition system, but either of the two devices would save your battery consumption.

Materials for Garage Floors

Editor THE AUTOMOBILE:

[2,204]—Will you please tell me what is the objection, if any, to a garage floor being of paving brick? Isn't it (brick) less liable to absorb and show oil and other spots than a concrete floor? Also, how is it best to lay them? CLAYTON.

Oshkosh, Wis.

Not only is there no objection to the use of paving bricks for garage floors, but their use is an excellent thing. The bricks will not, as the letter above brings out, absorb moisture, oil, grease, nor anything else liable to be on the garage floor, but moreover, has the big advantage of being readily and quickly laid by anyone, while cement, although easy to lay, is dodged by the ordinary amateur workman as a dirty if not complicated job.

The best way is to lay them on edge, but this has a disadvantage, where cost is the prime consideration, of nearly doubling the initial cost of the bricks. The best way would be to lay them on a deep bed of sand, and bond with cement, although tar may be used as a bond, or the bricks may even be laid up loose, without any bond, and later on a thin grout of cement or tar or other material poured in between them.

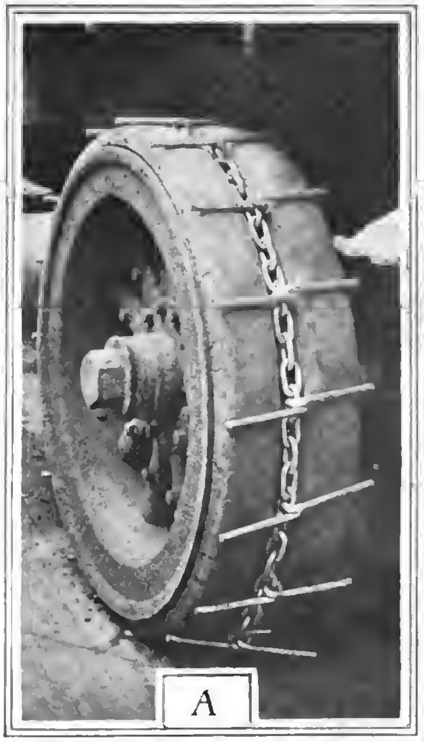
Graphite Used in Care of Tires

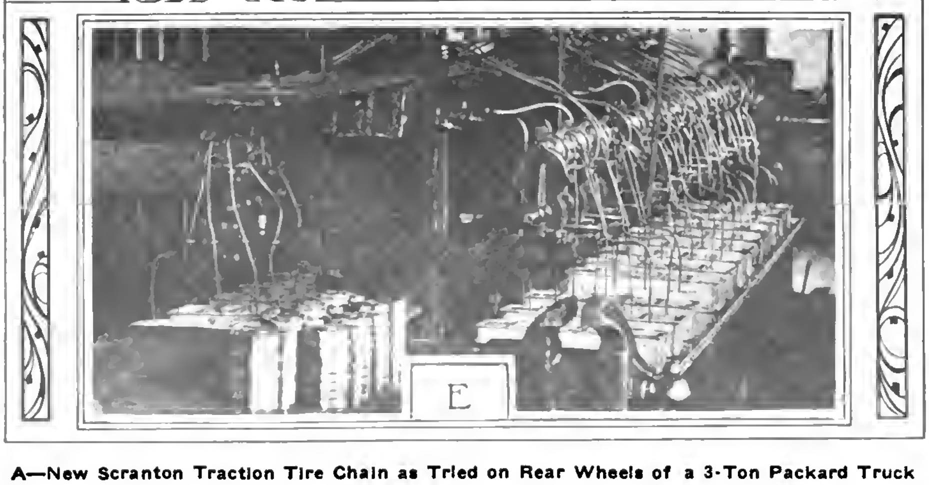
Editor THE AUTOMOBILE:

[2,205]—In your reply to No. 2,141, Letters Interesting and Instructive. you advise painting the inside of the tire shoe and the outside of the tube with graphite. Kindly state how to prepare graphite paint for this purpose. G. L. STAYMAN.

Indianapolis.

"Painting with graphite" seems to have been a misleading term. Of course none of the ordinary oils used for paint bodies would be suitable for this purpose, as they would rot the rubber. What was meant was that the graphite should be applied in its powder form, either by dusting it on or using a brush. French chalk is also used for the same purpose.





A—New Scranton Traction Tire Chain as Tried on Rear Wheels of a 3-Ton Packard Truck
B—Wilkinson Foot-Pedal Actuated Starting Device for Gasoline and Other Engines
C—Walker Non-Skid Tire Chain Which Has Many New and Excellent Features
D—Universal Demountable Rim, Showing Ease of Use, Applied With One Hand
E—Testing a Row of Maxwell-Briscoe Oilers at the Tarrytown Factory

Accessories

Traction is just as much of a problem in connection with large trucks and wide solid tires as it is when reference is had to touring cars and pneumatic tires. The tractive ability, while it varies somewhat with the nature of the tire equipment, is very largely dependent upon the weight resting upon the wheel and the character of the roadbed. The weight multiplied by the coefficient of friction represents the situation in the main, and non-skid devices are utilized to increase the friction. Fig. A, shows a scheme as it was applied to a Packard truck, which embodies the use of a substantial chain around the girth of the wheel, placed between the two tire members and substantially flush. A series of equidistant laterally disposed bars, with eyes which engage the chain links, are responsible for the good work done. This system is known as the Paragon chain, and was exhibited on Packard trucks during recent shows by F. H. Scranton, Thoroughfare Building, Broadway, New York City.

There always has been a certain amount of danger to the inexperienced autoist who disregards instructions and assumes a clumsy attitude when cranking a motor. Sometimes the back kicks which are experienced are due to a derangement in the timing system, or to the absent-mindedness of the autoist who attempts to crank on an advanced spark. Even if the spark is properly retarded, it is perfectly possible to have trouble of this sort, provided the autoist fails to vigorously spin the crank. This trouble will be the more noticeable in motors with a high compression, especially after they have been heated up, and if lazy methods of cranking are indulged in. It is on this account that inventors have undertaken to supply a means which will serve for the purpose and protect the autoist during the process. Fig. B shows just such a device, which was exhibited at Detroit by J. Franklin Wilkinson, and is designated as a mechanical motor starter. It is

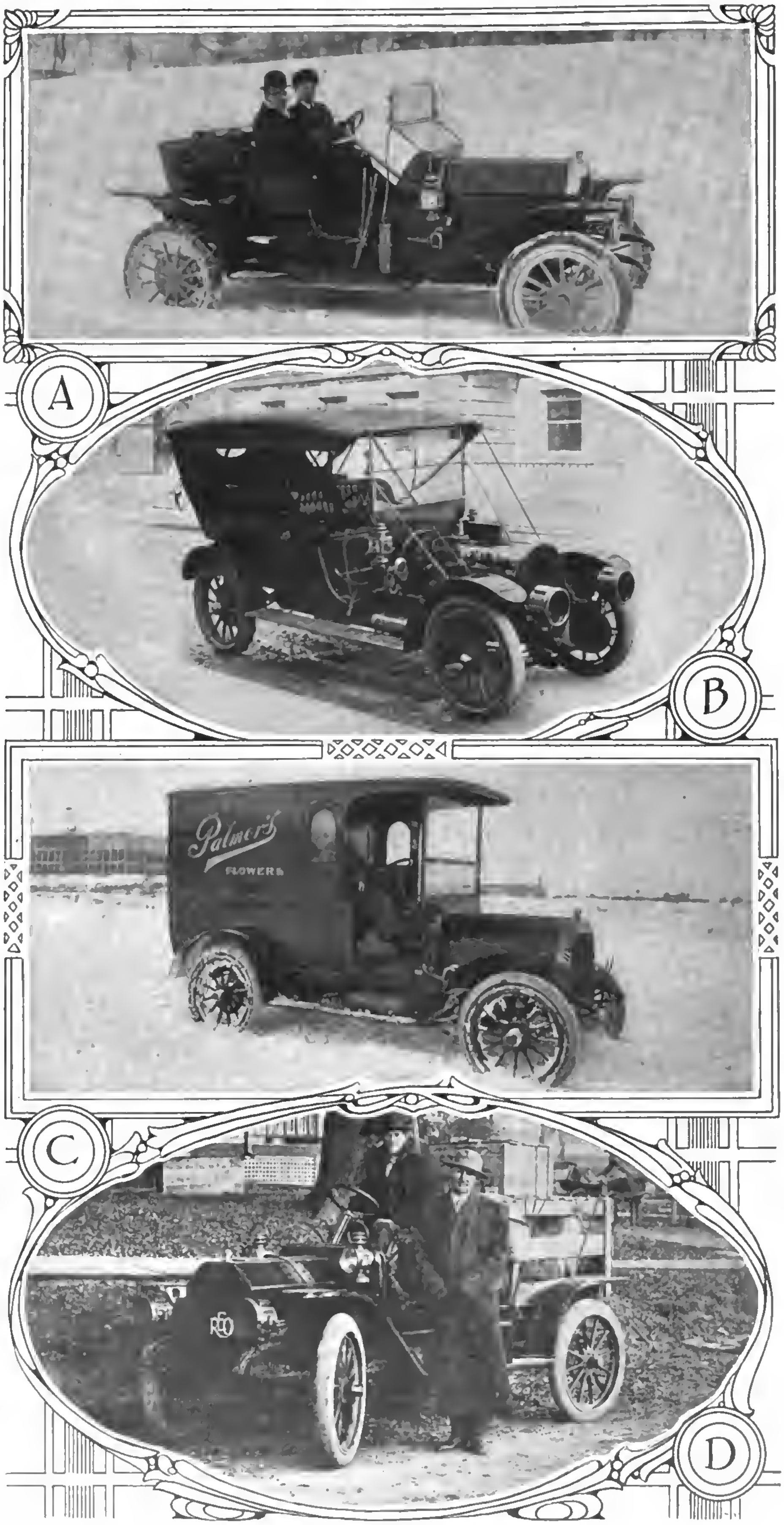
(Continued on page 616.)

Making a Demonstration

(A) Inter-State "40" touring car being tried out by C. S. Welch, sales manager of the company, with C. E. Easton, advertising manager, in the other seat. This car is shown with lamps, generator, folding glass front, and everything complete as required by an autoist for efficient work. The body represents a distinctly Inter-State innovation which is growing in popularity. The 4-cylinder water-cooled motor has cylinders with a bore of 4½ inches and 5-inch stroke, a cellular radiator aided by a centrifugal pump is responsible for cooling, and a U & H magneto, with a coil and dry cells in the auxiliary position is assurance for proper ignition work. Lubrication involves the use of a pump, and a multiple disc clutch has 63 members, thus presenting an unusually large area of surface. The transmission is a three-speed selective, to a shaft drive, and the wheelbase is 118 inches. This car weighs 2700 pounds, has 34 x 4 tires all around, and sells for $1,750. The Inter-State Automobile Company, Muncie, Ind., maker, reports an easy market for this car, and excellent progress in the process of manufacture.

(B) The latest Franklin innovation is shown in Fig. B, which represents a Franklin model fitted out with a glass bonnet, so that during demonstration by the company's representative intending purchasers are enabled to observe the workings of the new Franklin air-cooling system, which is so contrived that the cooling air is definitely measured out for each of the respective cylinders, thus eliminating all differences in cooling as between them. The idea attracts attention because of its novelty, but there is a certain underlying virtue attached to the plan, and those who are but little skilled in a mechanical way, are enabled to more clearly understand the underlying principles of the Franklin design. The H. H. Franklin Mfg. Co., with its large plant at Syracuse, N. Y., is having excellent success with both its 4 and 6-cyl-

(*Continued on page* 616.)



A—Inter-State Roadster, with Sales Manager Welch at the Wheel and Adv. Manager Easton
B—Franklin 1910 Demonstrating Car with Glass Hood to Show Workings of Engine
C—Pierce-Arrow 1906 Touring Car Converted into a Delivery by Buffalo Florist
D—Two-Cylinder Rod Serving as a Live Stock Transport in the West

WHAT THE SELDEN PATENT DECISION DECIDED

SCOPE OF THE DECISION AND ITS OPERATION

By Xenophon P. Huddy, LL.D.

IT is familiar history that Judge Hough of the United States Circuit Court for the Southern District of New York upheld what is known as the Selden Patent after a bitter legal controversy which was waged for years. Although this decision is not final and an appeal has been taken from it, still it is of the greatest interest and importance to the automobile industry and users of motor vehicles. If the appeal fails, Judge Hough's decision stands and it should be borne in mind that the burden rests upon the appellant, the defeated party, to show that the decision against him is illegal and ought not to stand. The appellant in this case has the onus and the burden of upsetting that which the lower court decided. He who asserts that a wrong or an error has been committed, has the affirmative upon his shoulders. So it may be said that the first point of advantage gained by the Electric Vehicle Company by the decision referred to was, to place the burden on the defendant to show that the Selden Patent is invalid and Judge Hough's decision sustaining it, is erroneous. This decision is officially reported and may be found under the title Electric Vehicle Co., et al. vs. C. A. Duerr & Co. et al., in volume 172 Federal Reporter at p. 923. The actual questions decided by the Court are as follows:

WHAT THE DECISION HELD

"The Selden Patent, No. 549,160, for a road locomotive, granted in 1879, claims 1, 2 and 3 are all for combinations the elements of which were all old in some form, although changed, modified, and co-ordained by the patentee to adopt them for harmonious action in such combinations, especially the "liquid hydrocarbon gas engine of the compression type," which constitutes the motive power and is the most important feature. At the time of the filing of the application, the art to which it relates, that of a self-propelled road vehicle with a considerable radius of action over ordinary highways and capable of management by a single driver, and he not necessarily a skilled engineer, had no practical existence, and the patent, which embodies all the parts of an operative vehicle of that kind, discloses invention of a primary character. As so constructed, claims 1, 2 and 3 are infringed by the Ford machine, and claim 1 and 5 by the Panhard French machine."

COMMENTS ON THE DECISION

The above is set out verbatim as it appears in the law report so that the reader may properly understand the specific points passed upon by the Court. From the many newspaper accounts of the decision written by laymen, it is quite possible that the automobile public may have received mistaken impressions. The decision and the opinion of the Court have been commented on extensively throughout the United States and Europe. The legal periodicals have also discussed the decision as appears in the editorial reprinted in this number from "Case and Comment." The author of this editorial is asserting broad propositions in apparently disagreeing with Judge Hough. Of course, almost every case has two sides before it is passed upon by a competent Court and even if a judicial decision is rendered, enough lawyers can be found who will disagree with the Court's judgment, since it is a part of the legal profession to disagree. No doubt one might be able to find a lawyer in this wide land who would disagree to any proposition of law that any court had decided against; so we should, before giving much weight to an argument against a decision, such as referred to above, examine and dissect the argument and the decision, compare the two and ascertain the truth or falsity of the premises upon which the dissenter's contentions are based.

WHAT ARE INVENTIONS

Of course, the subject matter of the patent must be *new* and *useful* and must have called for the exercise of the inventive or creative faculties of the originator. The article must be new whether the invention is an entire machine or an improvement on a machine, but the invention may consist of a combination of mechanical powers. This is the nut-shell of the Selden Patent decision. Notwithstanding the fact that old and well-known appliances were used, the Court says:

NEW USE OF BRAYTON'S ENGINE

"With Brayton's engine in mind, he [Selden] organized a new road vehicle. To be sure, he did substitute one old and well known prime mover (gas) for another (steam), but in so doing he devised and used an arrangement of Brayton's engine never before attempted, one that Brayton never suggested, made or patented, and without which the road vehicle was an impossibility. This mental concept constituted invention if capable of redrction to operation."

In conclusion it may be said that since the United States Circuit Court has found as a matter of fact and law that Selden's claims constituted an *invention*, even though admittedly composed of some old and well-known parts, and since the patent has been sustained and declared valid, it will be a difficult task for the defendants to overthrow the Court's decision by claiming to the contrary.

It will be noted that the point of this Selden Patent case is that the combination discloses invention of a primary character according to the language used by Judge Hough. It might be stated that Judge Hough is a man of learning in patent law and fully capable of handling all questions presented by the litigation, quite as much so as the writer of the editorial before referred to. Judge Hough is a lawyer of profound learning and his decisions have been uniformly upheld by the United States Appellate Courts.

SELDEN PATENT COURT DECISION ON NEW GROUNDS*

A NEW departure seems to have been taken in upholding the Selden patent on automobiles. The court says that no litigation closely resembling the case has been shown to it, and it cites no authority for its holding, so that it seems that the court itself recognizes that it is treading on new ground. The claim of the patent is for the "combination with a road locomotive provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with, and arranged to run faster than, the propelling wheel, an intermediate clutch or disconnecting device, and a suitable carriage body adapted to the conveyance of persons or goods, substantially as described." This, of course, is a mere claim for combination of several parts, all of which were old at the time, and it would seem that, if any patent for it could be

* Courtesy of "Case and Comment," published by the Lawyers Co-Operative Publishing Co., Rochester, N. Y.

sustained, then any application of power to the operation of any machine is subject to patent. In fact, although the claim is for a combination, when changed in form and reduced to its ultimate terms, it is merely a claim for the application of power in the shape of a gas engine to the running of a road vehicle. Such a claim has never been thought to be patentable. In fact, the court says, in referring to a machine manufactured by Rosenwald, that, even if it had been successful, he might, nevertheless, have found his patent invalid by American law, because each part of his vehicle was doing just what it had always done without any new "co-operative law," while his engine, in particular, was the same motor which, before it was applied to his brougham, had, perchance, driven a lathe, and might to-morrow do something else. On the face of Selden's claim, that is precisely what he did, and that would make his patent unsustainable. The court says that there is no denial that, in form, nothing but combination was claimed. But then comes the point of the decision, which seems to be in advance of the former law.

The court says that Selden's combination cannot be taken apart and each element recognized as something that had done the same thing or series of things before. It then proceeds to show that he took the old Brayton engine and made some alterations in it. He built a plurality of cylinders to minimize the necessity for a flywheel; he produced an inclosed crankcase, and used a small piston with a short stroke. By so doing, he devised and used an arrangement of Brayton's engine never before attempted —one that Brayton himself never suggested, made, or patented, and without which the road vehicle was an impossibility. So that, in 1879, when Selden applied for his patent, there was not one gas engine, which, in its then form, could be made an element in a road wagon combination. The court further says Selden solved this difficulty, and such solution gave him the right to claim broadly the thing which was the leading element in his invention when used in his combination. But he did not claim it. What he had invented was an improvement on the gas engine, but there is nowhere in his claim any mention of such improvement. What he claims is the combination, and that alone; and, so far as appears from his papers, the elements of his combination were all old and well-known. There is no suggestion that he had made an improved engine, and sought a patent on that, and the question then arises whether one can invent a part of a combination, and then, without mentioning or claiming his invention, simply make it an element of his combination, treating it as an old device, and when he secures a patent on his combination, shut others out of the use of the device which he has not claimed Such does not seem to have been understood to be the law; and, from the fact that no precedents could be found, the holding that it can be done would seem to be a new departure in patent law If the engine was in fact the old, well-known engine, the court itself, as above shown, says that the combination would be invalid. Does the fact that the engine was in fact new alter the case when Selden treats it as old, and makes no claim for it? Prima facie it would seem that, by reason of the fact that he abandoned his claim on it, so that it at once became public property, it would fall under the well-established rule which applies in any case of a mere aplication of power to the operation of machinery. From the opinion, the question of the sufficiency of the claim to cover this invention does not seem to have been considered by counsel, but they seem to have confined their attention to the question of fact whether or not Selden had a practicable working model when his application was filed, and whether or not defendant's machines infringed the patent. It is understood that the case will be appealed, and the question of the possibility of excluding the public from the use of a new device by simply claiming it as part of a combination may be presented to the consideration of the appellate court. If the device can be covered in that way, an interesting question arises as to the scope of the patent. The adaptation of the gas engine used by Selden in his automobile is practically the same as that used in motor boats, aeroplanes, and for other purposes; and, if that is Selden's invention, the question arises, Can he recover royalty for the use of it in all ways in which it is now used?

JERSEY AUTO BILLS VIGOROUSLY OPPOSED

DESPITE the fact that the Edge bill was defeated in the New Jersey Legislature, two more bills were introduced and it looks as if the autoists of the state will have to exercise their fighting ability before the end of the legislative term. The Edge bill, which suffered defeat, was to allow motorists registered in other States to tour New Jersey without further formality. The bill was expected to become a law, but it did not meet with the approval of Senator Joseph S. Frelinghuysen, President of the Senate, whose influence was sufficient to beat it.

One of the two bills which subsequently were introduced provides for an increase in the license fees of automobiles, and contains a joker which will do away with the present limited tourist privilege permitting non-resident motorists registered in their home States to tour New Jersey for eight days in any one year upon the payment of $1.

The second bill allows the State of New Jersey to pay one-half of the cost of the proposed new ocean boulevard, instead of the quarter of the expense of the construction of new roads, which the State usually bears, and also permits the funds in the State Treasury accrued from the licensing of automobiles to be applied to the maintenance of the boulevard, instead of dividing such funds pro rata among the counties.

Both bills, which are favored by Senator Frelinghuysen, are strongly opposed by the automobile interests of the State.

Resolutions attacking both measures have been passed by the leading automobile organizations of the State, the New Jersey Automobile and Motor Club of Newark, N. J., which has a membership of more than 2,000; the Associated Automobile Clubs of New Jersey, a federation of the clubs in New Jersey; the Automobile Club of Hudson County, with headquarters in Jersey City, and the North Jersey Automobile Club of Paterson, N. J.

The North Jersey Automobile Club held a special meeting recently and passed this resolution:

Whereas, Senate bill No. 215 provides for the diversion of money received for licenses of automobiles to other purposes than those named in the original bill covering licensing of automobiles as adopted in April, 1906, together with certain amendments added in 1909, and

Whereas, A Senate bill provides for increasing the license fees covering all automobiles above 15 horsepower; be it therefore

Resolved, That the North Jersey Automobile Club in special meeting assembled protest most vigorously against the passage of either or both of these bills and ask that the members and legislators for Passaic County and the State Senator representing this district not only to vote against these bills personally, but to use every honorable endeavor to influence other members of the Senate and Assembly to vote against their passage.

The members of the club also pledged themselves to work against any candidate for public office who votes for either of the two bills imposing added taxation on automobiles.

INTERESTING NEW JERSEY DECISION

An extremely interesting case on the question of the constitutionality of the New Jersey motor statute which requires a license from both cars and drivers is found in Cleary vs. Johnston, 74 Atl., New Jersey, 538. The complaint was that R. H. Johnston drove a motor car in the streets of Trenton, N. J., without having his motor car licensed and registered according to the law of New Jersey, and without having paid his registration fee.

The court held that the statute, which required registration by both resident and non-resident owners, was constitutional, and that the fine of $100 assessed must be paid.

THE AUTOMOBILE

Vol. XXII Thursday, March 24, 1910 No. 12

THE CLASS JOURNAL COMPANY
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A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

As the weather clears up and the roads become hard, a new gathering of autoists will start out; all will go in search of enjoyment, some for the sake of health, and of experience; it lies before them. Just how many inexperienced purchasers of automobiles there will be numbered in the aggregate, it is difficult to state. If statistics have any foundation, 100,000 is a low figure to fix upon. Of this number, if but one per cent. proves to be totally incompetent, the daily papers will have at their disposal subject-matter for 1,000 double head lines, and it may be that some of the columns of matter will contain nuggets.

It is a serious subject, this, and it offers wide opportunity for reflection. Those who fail to appreciate the improvements wrought in automobiles within a few short years will only remember the time when brakes were poor, steering equipment insecure, and the men at the wheel were ill-fitted to the task. They may have failed to take into account the subconscious automatism of the whole situation; brakes are now capable, steering equipment is reliable, and the whole populace has undergone a change. Men who do not profess mechanical knowledge seem to understand more about automobiles to-day than designers did yesterday.

It is fortunate that capability keeps stride with requirement; the leader barely outnecks the flock; the whole world advances in unison and yet there is the hindmost. It is the tail end of the procession which must be watched, and it matters not whether it is in an army, a fleet of battleships, or, instead, the users of automobiles.

That the tailenders are likely to come from the midst of he 100,000 who just purchased their first automobile, is a fair inference, and that they will be vigilant and prudent it is hoped. If they are unable to appreciate the extent of the hazard which attends blind and reckless driving; if it is not in their nature to allow for the safety of others, they will most likely belong to the class called selfish, and it may be possible to reason with them through their pocketbook.

The life of an automobile will be long, or short, depending merely upon the speed at which it is driven, and to a large extent quite independent of the quality of material of which it is made, or the accuracy of workmanship expended upon it. If the speed is 40 miles per hour, the depreciation will be four times as much as when the speed is 20 miles per hour. If, in turning a corner, the speed is excessive, the structural parts will then be subjected to enormous stresses relative to the work the parts will have to do at a high speed on a straightaway.

There is one other point which is a forceful argument to a pocketbook. No automobile, however well made (no matter how good the brakes may be) may be stopped within a certain distance, and this length is fixed by the speed and weight of the car, considering the adhesion of the traction (road) wheels.

An accident is a mathematical certainty if a car is driven at a speed so high that (considering the stopping distance allowed, in a given case) it fails to conform to the set conditions. An inexperienced autoist must learn what the stopping distance is for his particular automobile, and when he accomplishes this task he will then have to learn to judge of distance. When a new autoist becomes proficient in these important respects, he may then graduate into one of two classes, i. e., a prudent and respected citizen who knows it is ill-advised to exceed a reasonable and safe speed considering the surrounding conditions, and the man who, feeling his skill, takes the long chance.

The several legislative bodies throughout the country are now busying themselves with legislative matters involving the automobile. In some States there are several bills pending, each one of which differs from the other in principle and detail. The sponsors for these bills, severally, stoutly maintain for their respective efforts that they are just what should be imposed upon the users of automobiles, and since each one of the bills differs radically from the other it is a self-evident fact that nearly all of them must be wrong in principle and in detail.

All that can be done by the autoists throughout the country is to oppose these half-baked efforts and go in for conservative and proper legislation, making sure that the laws will be of a character which will put reasonable restrain upon reckless drivers, whether or not they pilot a brewery wagon drawn by horses, a big touring car with the owner at the wheel, or a chauffeur who may indulge in a ride on his own account. Traffic regulations and road laws are just as necessary to-day as they ever were, but the wild talk which is heard by citizens who lack experience, keenness of observation and fairmindedness is not a sufficient foundation upon which to rest these regulations and laws. In the long run it is believed that sound reason will prevail, and all that autoists have to do is, have patience, be vigilant and vote tight.

Indianapolis Is Now Holding Opening Week

INDIANAPOLIS, IND., March 22—Local tradesmen are enjoying their annual opening week, which will close Saturday evening with a banquet at the Denison Hotel, when covers will be laid for four hundred guests. Charles A. Bookwalter, former mayor, will be toastmaster at the banquet and other speakers will include Gov. Thomas R. Marshall and Edgar Apperson.

The affair is under the auspices of the Indianapolis Automobile Trade Association, which includes fifty-nine manufacturing and retail concerns in its membership. Monday and Tuesday will be devoted to displays in factories and salesrooms. A floral parade is set for Wednesday afternoon, various contests Thursday afternoon, a commercial car parade Friday afternoon, and the banquet Saturday night.

At the banquet a suggestion that the Indiana Automobile Club be revived and reorganized will be made and Carl G. Fisher, president of the Indianapolis Motor Speedway Co., will be mentioned as its new president. The club is affiliated with the A. A. A., but has been inactive for some time.

It is expected that Indianapolis will be much in the limelight this season by reason of the various events scheduled at the speedway. The program for the season is as follows: May 27, 28 and 30, automobile races; June 12-18, aviation meet; July 1, 2 and 4, automobile races; August 12, 13, twenty-four hour automobile race; August 12, local balloon race; September 2, 3 and 5, automobile races; September 17, national championship balloon race, and October 22-26, international aviation flyers. On May 27, the Prest-O-Lite trophy will be contested for in a 100-mile race and on the following day the Wheeler and Schebler trophy will be hung up for a 200-mile event. Last August the Wheeler and Schebler trophy was offered for a 300-mile race which was called off after Lynch, driving a Jackson, had covered 235 miles. It is said that more attention to the manufacture and sale of commercial cars will be paid this season by local manufacturers and dealers in Indianapolis. Notwithstanding the fact that there are probably more commercial cars in use in Indiana than in any other city in the country in proportion to size, it still remains that one or two agencies have practically controlled this class of business—a condition possibly due to the fact that dealers and manufacturers have had all of the pleasure car business they could well handle. With added facilities and more salesmen, however, commercial cars will be made a prominent feature by the local concerns. Ira V. Buckley, Harvey T. Huff and Edmund B. Walker are the directors of the Commercial Car Company organized in Indiana with an authorized capitalization of $100,000. It is said that this company will build a factory for commercial cars exclusively, and that provision will be made to go in on an extensive basis.

Indianapolis dealers, in preparation for the annual show to be held during the week beginning March 28, are adding new agencies, while new companies are being organized. Among them may be mentioned the Co Auto Motor Company, handling the Jackson, Fuller, Stearns and Westcott; the Weber Automobile Company, a new concern, will represent the Apperson; the Fisher Automobile Company has taken on the Courier, while the Conduitt Automobile Company has added the Velie.

Coming Events in the Automobiling World

Mar. 21-26........Spokane, Wash., First Annual Automobile Show, at Princess Rink.

Mar. 21-30........Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 21-28........Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.

Mar. 26-Apr. 2...Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Mar. 26-Apr. 2...Montreal Automobile and Motor Boat Show, Official Motor and Sportsmen's Show Committee of the Automobile and Aero Club of Canada, in the Coliseum. E. M. Wilcox, Manager, 123 Bay St., Toronto.

Apr. 6-9..........Watertown, N. Y., Automobile Show, Watertown Automobile Dealers' and Manufacturers' Association, in the State Armory.

Apr. 9-16..........Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.

Apr. 11-16........Harrisburg, Pa., Kelker Bldg., Automobile and Sportsman's Show, Harrisburg Automobile Dealers' Association, B. R. Johnson, Manager.

Apr. 11-16.........Erie, Pa., Meyer Block, Automobile and Motorcycle Show.

Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Feb. 18-25, 1911..Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Mar. 23-24........Daytona, Fla., Speed Carnival, Florida East Coast Automobile Association.

Mar. 26...........Atlanta, Ga., Hill Climb, Atlanta Journal and Fulton County Automobile Club.

Mar. 28-29........Savannah, Ga., Endurance Run to Jacksonville, Fla., Savannah Automobile Club.

Apr. 8-10 & 13-17.Los Angeles, Cal., Inaugural Meet, Motordrome.

Apr. 30-May 2...Philadelphia, Roadability Run to Atlantic City, Quaker City Motor Club.

May 2............Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.

May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.

June 11..........Wilkesbarre, Pa., Annual Hill Climb Up Giants' Despair, Wilkesbarre Automobile Club.

Foreign Shows and Races

Mar. 19-Apr. 3...Berlin Automobile Show.
Mar. 22..........Elegance Competition at Monte Carlo.
Mar. 27-Apr. 4...Prague, Austria-Hungary, Automobile Show.
Mar. 28..........Brooklands, England, Easter Meeting.
Mar. 31-Apr. 3...French Spring Wheel Competition.
Apr. 2-24.........Turin, Italy, Automobile Show.
Apr. 27-28........Brooklands, England, Two-Day Meeting.
May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.
June 2-8.........Prince Henry (German) Touring Competition.
June 13-18........Scotland, Scottish Reliability Trials
June 20...........French Voiturette Race.
June 21...........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27...........Speed Trials at Kiev, Russia.
July 12-18........Ostend, Belgium, Automobile Week.
July 20-25........Boulogne, France, Automobile Week.
Aug. 1-15.........Ardennes, France, Meeting.
Aug. 15-Sept. 15..French Industrial Vehicle Trials.
Aug. 21...........Salon, France, One and Five Kilometer Trials.
Aug. 28...........Mont Ventoux, France, Hill Climb.
Sept. 3-6.........Liedekerke, Ostend and Voiturette Cups, at Ostend.

AUTOS PERMITTED IN OBERAMMERGAU

Passion Play committee is building a garage to accommodate 200 automobiles during the Passion Play and as a special concession to Americans automobiles will be permitted in Oberammergau during the season of the Passion Play, which is from May to October, according to advices received to-day by the North German Lloyd Company, the official representatives of the Passion Play committee in the United States.

Many persons who contemplate visiting the Passion Play during this year were much worried because of the ordinance of Oberammergau forbidding the use of power cars in the village territory. Repreesntations were made to the Passion Play committee on behalf of the Americans who wanted to take their automobiles with them and as a result the ordinance has been rescinded during May, June, July, August and September of this year.

In order properly to care for the automobilists who visit Oberammergau, the Passion Play committee has built a fireproof garage with accommodations for 200 cars and their attendants.

Contracts have been made with a leading firm to keep the roads free from dust by the use of oil or some other binding material.

Visitors will have a variety of choices in which to reach the Passion Play. Already arrangements have been made for a dirigible balloon to make daily trips between Munich and Oberammergau, while those who do not care for the balloon route may go by automobile, train and trolley, train and stage coach or may drive there from Munich, a distance of 43 miles.

BILLINGS & SPENCER GOING TO MIGRATE

Hartford, Conn., March 22—The drop-forging plant of the Billings & Spencer Company of this city will be removed to Dividend in the town of Rocky Hill as soon as the transfer can possibly be made. New buildings will be erected at the new site just as fast as the work can be done. This action was taken at a special meeting of the board of directors. The cause of the removal of the drop forging department to the down-river town is unique. That is to say the present plant is located in a neighborhood thick with dwelling houses and it was feared that the residents would not tolerate the operation of the drop shop 24 hours a day, which is necessary under the present busy conditions. The residents of Rocky Hill in which the town of Dividend is located are quite anxious to get the drop shop in that town and it was voted by the town that if the plant was located there a new highway will be constructed down to the site of the factory and further agreed that if possible the annual tax on the plant is not to exceed $500. The new shop of the Billings & Spencer Company is to be 150 x 70 feet. A dock will be constructed along the Connecticut River and there are also other facilities for shipment of the company's product by rail. This move does not affect any other department of the Billings & Spencer Company, in this city.

EXCESSIVE LUBRICATION SEAT OF EVILS

The smoke nuisance, dripping of oil on the pavement, and attending evils, is a subject which may lead to drastic legislation unless users of cars can be brought to a full realization of the necessity of maintaining a proper adjustment of the lubricating system and carburetor. President George J. Dunham, of the Royal Tourist Car Company, points out that carelessness is at the bottom of these evils in the main, although faulty motor construction can be regarded as having to do with the situation. Excessive lubrication, in the event that piston rings are poorly fitted, is a prolific cause of smoke, and the old-fashioned method of splash oiling accentuates the condition. In the old system of oiling, no provision was made to fix the oil level, and a careless chauffeur was thereby provided with every facility for producing the undesired smoke.

PROMISING CONDITIONS FOR ELMIRA SHOW

Arrangements are completed for the holding of the first annual automobile show in the State armory in Elmira by the Elmira Chamber of Commerce. The show will be held in the State Armory, opening at 8 o'clock Saturday evening, April 9th, and closing the night of April 16th.

The show is to be run by the Elmira Chamber of Commerce and the following committee will be in charge: John M. Connelly, president Chamber of Commerce, chairman; Clay W. Holmes, president, and Fred H. Rees, secretary, of the Elmira Automobile Club; Ralph W. Webster, of the Eclipse Manufacturing Company; E. deN. Sands, general superintendent of the American LaFrance Fire Engine Company; Hamlin Bryan, Southern Tier Motor Car Company; Ward LaFrance, LaFrance Motor Car Company; Benjamin Record, White Motor Car Company; Gordan Roberts, Rambler Motor Car Company; Major John T. Sadler, Second Battalian, 3d Reg. N. G. N. Y.; Captain W. A. Turnbull, 30 separate companies, N. G. N. Y.; Edwin Morrow, Morrow Manufacturing Co.; Roy S. Smith, secretary, Elmira Chamber of Commerce. The latter is secretary and treasurer of the show.

MONTREAL EXHIBITION AT COLISEUM

Montreal, March 21—The 1910 Automobile, Motor Boat, Accessories, and Sportsmen's Exhibition will open at the Coliseum, corner of Guy and Dorchester streets, on March 26 and run until April 2 inclusive. It will be held under the auspices of the Automobile Club of Canada, the Board of Directors of which are as follows: President, Clarence F. Smith; vice-president, U. H. Dandurand; directors, F. H. Anson, William Caruthers, D. McDonald, Eugent Tarte, A. J. Dawes, W. A. Edwards, F. H. Markey, L. C. Rivard, Geo. A. McNamee, secretary-treasurer.

The Coliseum is one of the largest buildings of this kind in Montreal, and is particularly well adapted to exhibitions of this character. An effort is being made to contrive decorations which will far exceed anything heretofore undertaken, and flying machines will be utilized to enhance the effect. A representative of the club went to France especially to purchase two of the best types for exhibition purposes.

CHAUFFEUR BILL AGITATES CANADA

A bill is before the House of Commons, Ottawa, to amend the Criminal Code, making it a criminal offence for chauffeurs to take out their employers' cars without their consent. The purpose of this act is to put an end to "joy-riding" by irresponsible parties, and is undoubtedly greatly in the interests not only of motorists, but of the general public.

The secretary has reecived a letter from Mr. Lloyd Harris, M.P., who has introduced the bill, requesting that each member of the club be urged to use his influence with his Member in Parliament to see that this bill, No. 75, is passed.

The section of this bill is as follows:

(a) "Everyone commits theft who takes or causes to be taken from a garage, stable, stand, or other building or place, any automobile or motor vehicle, with intent to operate, or drive, or use, or cause or permit the same to be operated or driven, or used, without the consent of the owner."

MAKER OF STERLING CAR RECAPITALIZES

Elkhart, Ind., March 21—The Elkhart Motor Car Company, this city, which makes the Sterling car, has increased its capital stock from $200,000 to $1,000,000, and plans are being made for the doubling of the present plant. For several weeks past various Michigan men have been trying to persuade the company to move to Detroit, but the company has consistently refused to entertain any such proposals. An additional frontage of 1,000 feet has been secured adjacent to the present plant. In the future the company expects to build all its own parts, and will begin making engines within two months.

HEWITT MOTOR COMPANY ABSORBED

When the Metzger Motor Car Company took over the Hewitt Motor Company of New York, it was done with the idea of acquiring membership in the A. L. A. M., and the question of the truck business remained open with a view to further discussion. It is now decided to complete the capitalization of the Metzger Motor Car Company on a basis of $1,000,000, and to build a $100,000 plant which is to be devoted exclusively to commercial automobile building. The ground for this new undertaking will be in Detroit, at some distance from the present plant of the Metzger Motor Car Company, and the first structure to be placed thereon will have a frontage of 100 feet, a depth of 300 feet, with three stories above grade.

This is another indication of the trend in the direction of commercial automobiles, and, considering the foundation which Edward R. Hewitt laid for commercial cars, it is anticipated that the new Metzger move will develop rapidly and assume huge proportions.

It was several years ago that Edward R. Hewitt, who is one of the pioneers in automobile work, came out with the Hewitt truck, which was after he had designed and constructed a line of gasoline pleasure cars, following his first experiment in steam work. The Hewitt business developed in New York along conservative lines, the idea being to limit the truck building to definite products, for which there is a strong demand, but which requires trucks of the very best possible design.

The new plan takes into account the experimental work which was conducted by Mr. Hewitt, and will make it possible to take advantage of his efforts in this field.

ROCHESTER AUTOMOBILE CLUB WILL DINE

Rochester, Mar. 23—The annual election of officers of the Automobile Club of Rochester will take place on Monday, March 28, and the annual banquet will follow. Complying with the usual custom, many stunts will be witnessed. An unusual menu card will be a burlesque fac simile of the club publication. Each guest will be presented with a souvenir. The following slate of officers is nominated to be elected: President, H. G. Strong; first vice-president, W. C. Barry, Jr.; second vice-president. W. W. Hibbard; treasurer, W. W. Dake, and secretary, Bert Van Tuyl. Directors for three years, W. C. Likly, C. J. Brown, Robert C. Shumway and W. R. Potter.

U. S. MOTOR COMPANY CRYSTALLIZING

With the new general offices of the United States Motor Company in process of completion at 505 Fifth avenue, New York, the details of the organization are being completed, and a general purchasing department, under the management of A. R. Cormully, is now established there. One of the advantages of a big merger such as this lies in the better command of the market from the point of view of the quality of material which may be had, and the more consistent prices.

DATE OF A.A.A. RELIABILITY NOT FIXED

Contrary to the general report the A.A.A. Reliability Run for the Glidden Trophy has not as yet been fixed, although it is the general impression that the matter will be taken up by the proper committee on Wednesday, March 29, and it is the expecation that the run will be started in the middle of June. Weather and other conditions will influence this date.

RAPID COMPANY LOSES ITS MANAGER

Pontiac, Mich., Mar. 19—Harry Hamilton, the general manager of the Rapid Motor Company, died here after a week's illness of acute nephritis. He is survived by a widow and two children. Mr. Hamilton was one of the company's most valued officers, and his loss will be keenly felt.

NEW 2-CYCLE MOTOR EXHIBITED AT A. C. A.

New York, Mar. 23—Last night a two-cycle fuel injection type of motor of the Newcomb design, was placed on exhibition under running conditions, at the Automobile Club of America, and by means of lantern slides, a very interesting talk was illuminated, resulting in the disclosure of many points of unusual interest embodied in this motor. An examination of the motor discloses the two-cycle principle of the conventional design, and the particular improvements which were enlarged upon involves the use of a fuel injection pump so arranged that the quantity of fuel and the timing of the injection are variable at will by the operator, through the medium of a plunger "stop" in conjunction with a means for the angular displacement of the pump cam. The fuel is injected directly into the cylinder after the air enters, and the power of the motor is varied by changing the quantity of fuel, considering a constant volume of air. It was claimed that the thermal efficiency of this motor proved on test to be about equal to that of the Deisel motor. Any such performance, if it can be borne out in practice, will represent a great advance. One other claim for this motor is that its thermal efficiency does not decrease rapidly when the load is reduced.

DETROIT CONCERNS MULTIPLY CAPITAL

Detroit, Mar. 19—The Regal Motor Car Company has increased its capital stock from $100,000 to $1,000,000. The former figure has for some time been merely nominal, as the business of the company had long outgrown it. The new figure represents a truer valuation, with a considerable surplus of new capital which can be devoted to extensions and improvements in the plant and equipment of the company.

Almost coincident with the Regal announcement comes the news that the Hupp Motor Car Company, also of this city, which makes the Hupmobile, has seen fit to multiply its capital by five, raising the figure from $50,000 to $250,000.

200-H.P. BENZ GIVEN CERTIFICATE

Chairman Butler, of the Contest Board of the A. A. A., has issued a certificate to Barney Oldfield, who drove the 200-horsepower Benz car at Daytona Beach, March 16, the records being as follows:

(a) One mile flying start, 27:23.

(b) One mile standing start, 40:53.

The certificate states "the above are world's records and are unequaled by any other performance made up to the present time."

A.L.A.M. WILL DINE AT HOTEL ASTOR

With 80 members on the list, the A. L. A. M. will hold a dinner at the Hotel Astor on April 7. The committee in charge comprises H. B. Joy, chairman; H. A. Lozier, Albert L. Pope, Benjamin Briscoe and R. E. Olds. It is anticipated that the members and guests, in order to be properly cared for, will fully tax the capabilities of the Hotel Astor.

TWO MORE COMPANIES JOIN A.L.A.M.

The latest advices from the A. L. A. M. are to the effect that the Chadwick Engineering Works of Pottstown, Pa., maker of the Chadwick car, and the Atlas Motor Car Company, of Springfield, Mass., maker of the Atlas car, were admitted to the association.

CHANGES IN PACKARD PERSONNEL

S. D. Waldon has moved up in the Packard organization and is now vice-president. His place as general manager has been assumed by Alvin Macauley.

SUMMARY OF 1910 RELIABILITY CONTEST RULES

THE most important amendment to the reliability contest rules for 1910 over those of last year will be found in the adoption of the fixed penalty schedule, which is applied at the final examination of the cars at the completion of a contest. In this schedule each of the essential parts of a car are given a definite number of points penalty for defective condition, greater or less, according to their relative importance to the whole make-up of the car and the condition in which such part is found at the finish of the contest.

SUMMARY OF PENALTIES.

One point per minute, or fraction thereof, late in arrival at any control or checking station.

One point per man per minute, or fraction thereof, for labor by driver or passengers.

Two points per man per minute, or fraction therof, for labor by workmen other than driver or passengers.

Two points per man per minute, or fraction thereof, for replacement of damaged parts by driver or passengers.

Four points per man per minute, or fraction thereof, for replacement by workmen other than driver or passengers.

Three points per occurrence for replenishing gasoline, oil or water, outside of fuel controls.

One point per minute, or fraction thereof, for motor stop when no work is done. No penalty for motor stop during period when work is being done on car, for which work or replacement a penalty is imposed.

FINAL OUT-DOOR OPERATIVE TESTS

Brake Penalties—50 feet perfect; for each foot, or fraction thereof, over this distance, 1 point.

Clutch—5 points for failure to climb curbs, spin rear wheels or stall motor.

Gear Set—25 points for failure to drive on any forward speed or reverse.

Motor Test—5 points for each cylinder not firing.

Front and Rear Axles—No penalty for one-fourth inch spread between wheels; 5 points for each additional one-eighth inch, or fraction thereof.

Springs—No penalty for sag of one inch; 5 points for each additional one-half inch, or fraction thereof.

FINAL EXAMINATION PENALTY

At the close of the contest, each competing car, after being properly washed, shall be delivered to the Technical Committee, who shall record all adjustments, replacements or repairs necessary to place each car in a safe and satisfactory condition, and penalties therefore shall be imposed in accordance with the following Fixed Penalty Schedule:

LUBRICATION

Broken oil feed	3
Inoperative oil feed	3
Leaky oil connection	1
Loose oiler	3
Disabled oiler	20
Lost grease cup	2
Loose grease cup	1

CARBURETION

Broken gasoline line	2
Leaky gasoline line	1
Leaky gasoline tank	1
Leaky gasoline petcock	1
Disabled throttle control	15
Broken or loose manifold	15

BRAKES

Broken operating devices	100
Broken brake	100
Loose operating devices	25

RUNNING GEAR

Broken spring leaves, each	5
Broken spring clips, each	15
Broken spring seating	15
Loose spring clip	1
Loose spring horn	15
Broken frame side member	500
Broken frame cross member	150
Bent frame pieces	75
Broken strut rods	25
Broken torsion rod	25
Lost muffler	5
Broken muffler	3
Loose muffler	2
Broken wheel	100
Loose wheel spoke	5
Broken wheel spoke	10
Broken running board	6
Broken fender iron	6
Broken fender	5
Loose fender	2
Lost mud apron	8
Broken mud apron	5
Broken rear axle	300

COOLING

Leaky water connection	1
Leaky radiator	20
Loose radiator	4
Disabled water pump	15
Inoperative fan	2
Leaky water jacket	50
Fan belt off	1

IGNITION

Loose terminal	1
Broken terminal	2
Dead battery	2
Lost commutator cover	2
Disabled commutator	20
Inoperative ignition control	5
Disabled magneto	20
Loose magneto	4

STEERING

Broken tie rod or drag link	200
Bent tie rod or drag link	25
Broken steering rod	200
Bent steering rod	25
Faulty steering gear	200
Loose steering connections	15
Broken steering knuckle	150
Bent steering knuckle	15
Broken front axle	300

MACHINERY PARTS

Broken valve	5
Broken or impaired valve spring	2
Broken cam	500
Broken camshaft	200
Broken crankshaft	500
Bent crankshaft	250
Broken valve rocker arm	10
Broken push or valve lift arm	10
Broken transmission shaft	100
Broken cardan shaft	100
Broken driving chain	30
Broken gear or pinion	25
Broken bearings	10
Broken body or chassis bolts	2
Loose body or chassis bolts	1
Lost body or chassis bolts	2
Broken clutch	250
Broken or impaired universal joint	50
Broken or lost bonnet fastener	2
Loose bonnet fasteners	1
Broken or impaired sprags	5
Broken shock absorbers	5
Loose shock absorbers	2

STEAM

Leaky condenser	20
Leaky generator	50
Faulty thermostat	20
Faulty pilot light	20
Faulty flow motor	20
Faulty gauge	5
Steam leak in line	1
Water leak in line	1

(In cases of leaky radiator or water jackets, recognition must be taken of the degree of leakage and the amount of fixed penalty modified accordingly.)

GRADES OF CONTEST

Reliability contests are graded as follows:

Grade I—A contest not exceeding six (6) days in duration, with penalties for time, road work, final operative test and final technical examination.

Grade II—A contest of more than six (6) days' duration, with penalties for time, road work, final operative test and final technical examination except that carburetor and brake adjustments may be made without penalty and spark plugs may be changed.

Grade III—A contest of any duration in which penalties are imposed for time and road work only, but in which the final operative test and final technical examination are omitted.

Grade IV—A contest of any duration in which penalties are imposed for time only.

NON-STOP RUN

For the "perfect road score" of the old rules there has been substituted a "non-stop run" defined as follows:

A run without an involuntary stop of the car outside of controls, except for tire trouble or on account of traffic congestion, shall be known as a non-stop run.

The motor must be kept running continuously while outside of controls.

The car may be brought to a standstill at any time, no work being done, and the motor kept running.

Stops for tire repairs or replacements with the motor kept running, are permissible.

Non-stop certificates may be issued to contesting cars in Grades 1 and 2 who conform to the requirements of the "Non-Stop" definition in a contest exceeding 1,000 miles in length.

CAR EQUIPMENT

Just what equipment a stock car may or may not carry in reliability contests is very clearly laid down. It may carry special mud aprons in front of radiator or bonnet screens between the side members of the frame; rubber bumpers for springs, and rebound straps; tire inflating tanks. It may not have special springs or spring windings; shock absorbers may not be added unless part of regular equipment and covers over coil boxes, magnetoes or any other part of mechanism, or screens around carburetor, are not permitted unless part of regular equipment.

TOOLS

Tools are carried in a special bag and sealed, the observers only having access to same.

PARTS

Parts carried are inventoried, officially checked and sealed.

Tire Repairs—There shall be no penalty for tire repairs, provided the engine be kept running while the repairs are being made and no other work is done. The time consumed in making the repairs, while the engine is running, shall be added to the day's running time.

Oil, Gasoline, Water and Batteries—At noon or night controls, tanks for lubrication oil, gasoline and water may be filled without penalty.

For replenishments of oil, gasoline or water at any other places the penalty is 3 points for each occurrence.

Oil or grease may be added to or may be drawn off the various cases when necessary without penalty during the half hour allowed for oiling at the end of each day's run.

Recharging of batteries will be allowed at any time, but all work in connection therewith must be done in the presence of the observer.

SEALS

To enable an observer to keep a more accurate record of work done on a car, metal and wire seals will be affixed to the bonnet, coil box, transmission case, differential case, mud pan or apron and parts of ignition system not protected by bonnet seals and any other parts, as may be necessary. There will be no penalty for breaking a seal, which will be replaced at the official garage at the end of a day's run, but the observer will note the seal broken and must report how many times thereafter access was had to the part or parts protected by such seal.

LUBRICATION

A half hour is allowed at the end of each day's run for proper lubrication of the car in the official garage, seals being broken for this purpose and replaced.

OBSERVERS

The rules concerning observers have been broadened and strengthened and the duties of observers enumerated in greater detail than heretofore, the following rule among others having been added:

Observers must not interpret rules for entrants or drivers and cannot say what work may or may not be done without danger of penalization, their duties being solely to record what is done and the exact length of time consumed in doing it.

To induce entrants, who appoint observers, to use the greatest care in their selection, the following penalty is imposed on an entrant for the act of an observer he has appointed:

If an official observer shall desert a disabled car without first obtaining the driver's signature to a statement that he has withdrawn from the contest the entrant who appointed such observer shall be disqualified and must either withdraw from the contest altogether or continue as a non-contestant. By desertion is meant leaving the car without taking with him the driver and passengers. This rule will disqualify but one of the cars of an entrant in case of multiplicity of entries.

OPTIONAL PROVISIONS

The following provisions, the adoption of which in any contest is optional with the promoter, and none of which count against a car or are factors in determining the car's road score, have been added:

Rules for tire penalizations.

Rules for penalization of accessories.

The keeping of a record of lubricating oil and of gasoline consumption.

CLASSES FOR DAILY RUNNING TIME

Reliability contests shall be held under Class "A" (price classification) only and run in the seven divisions of such class, as follows:

Division 1A.............	$ 800 and under
Division 2A.............	801 to $1,200
Division 3A.............	1,201 to 1,600
Division 4A.............	1,601 to 2,000
Division 5A.............	2,001 to 3,000
Division 6A.............	3,001 to 4,000
Division 7A.............	4,001 and over

on which the daily time of the cars is based.

The following average speeds shall be maintained by the cars in the respective divisions:

Divisions 4A, 5A, 6A and 7A..20 miles per hr.
Divisions 2A and 3A...........18 miles per hr.
Division 1A..................16 miles per hr.

BODY EQUIPMENT CLASSIFICATION

Stock cars only are eligible, and for the purpose of trophy awards shall be divided into two classes according to body equipment: (1) touring car class; (2) runabout class, including runabouts, miniature tonneaus, surreys and double or single rumbles.

(Official) Contest Board
American Automobile Association.
March 19, 1910. S. M. BUTLER, Chairman.

EXCITING SECOND DAY OF DAYTONA RACING MEET

DAYTONA, FLA., Mar. 22—The opening of the three-day tournament, which is being held under the auspices of the Florida East Coast Association on Daytona Beach, promises to be very interesting, despite tidal interferences during the racing hours on Tuesday. The one mishap for the first day was to the automatic timing apparatus, which was traced to a short-circuit caused by salt water, following an unusually high tide. In the absence of suitable timing equipment, the one-mile speed trial, and the five-mile free-for-all championship were put off until Wednesday. These events were what the spectators wanted to see, because they include the Benz car and the Christie front wheel drive. The Benz having recently broken two world's records against time, is naturally looked upon as a most interesting performer.

As it turned out for the first day, Oldfield drove his Knox car in two of the races. He was first in the twenty-mile race against Gus Grosjean in a Pope-Hartford, but the difference was only by inches. A Chalmers "40," driven by Harry Olmsted, led in this event to the tenth mile turn, but was beaten out through stalling his motor at the turn.

The ten-mile free-for-all attracted some notice, and proved to be very exciting for a time. In this event Ormsdorf, in a Chalmers "30" crossed the line first, and 100 yards before Aultman in a Hudson "20." Hildebrand in a Chalmers "30" was third. Allen Whiting of the Automobile Club of America, representing the Contest and Technical Board of the A. A. A., presented a cup to the winner of the ten-mile handicap free-for-all.

DAYTONA, FLA., Mar. 23—To-day the conditions proved to be ripe for record-breaking time, and the annoying incidents of the first day's work were entirely eliminated.

Referring to Oldfield's new world record of 17.4 seconds for a kilometer with a flying start, it is pointed out that the previous world's record was 17.76 seconds, made by Hemery on Brooklands Track, England, in the same car. It is also to be observed that Oldfield's time for the two mile world's record of 55.87 seconds is considerably faster than the previous record of 58 4-5 seconds, which was made by Demogeot at Daytona in 1906.

Summary of First Day's Contest

Ten-mile Southern Championship—Won by Gus Grosjean, Pope-Hartford; R. M. Bond, Stearns, second; W. E. Davis, Chalmers, third; E. Hildebrand, Mitchell, fourth. Time 9 27-100.

Twenty-Mile Open Stock Car, free-for-all—Won by Barney Oldfield, Knox; Gus Grosjean, Pope-Hartford, second; Harry Ormsdorf, Chalmers, third. Time 18 60-100.

Ten-Mile Handicap, free-for-all, for the Allen H. Whiting Trophy—Won by Harry Ormsdorf, Chalmers (2:30); M. B. Aultman, Hudson (6:30), second; E. Hildebrand, Chalmers (5:25), third. Time 9:09 20-100. Other cars finished as follows: Barney Oldfield, Knox (1:30), R. M. Bond, Stearns (2:30), W. E. Davis, Mitchell (6:00), David Bruce Brown, Benz (scratch). Mile exhibitions by Oldfield in Benz and Walter Christie in Christie car. No time taken.

Summary of Second Day's Contest

One Mile Championship trial against time, won by Oldfield in Benz car; time 28 2-5 seconds. George Robertson in Christie front wheel drive car, second; time 30.39 seconds.

Stock Car record for one mile with flying start, Oldfield in Knox; time 40:35 seconds.

Florida Ten Mile Championship Race, won by Hotchkiss in Pope-Hartford; time 9.41 seconds. Bond in Stearns car, second; time not given.

Flying Kilometer Record, Oldfield in Benz; time 17.4 seconds.

Two Mile World's Championship, from a flying start, Oldfield in Benz; time 55.87 seconds.

Ten Mile Free-For-All Stock Chassis Race, Oldfield in Knox car; time 8 min. 41 sec. Ormsdorf in Chalmers 40, second; time not given.

Ten Mile Handicap, David in Chalmers 40; time 12:13. Hotchkiss with Pope-Hartford, second; time not given.

200-horsepower Benz racing automobile driven by Barney Oldfield on Florida Beach on March 23, making world's record of 17.4 seconds for flying kilometer, against previous record of 17.76 seconds made by Hemery, at Brooklands track, in the same automobile.

AMONG THE GARAGES

Salesroom and garage of Collins & Dulaney, at Paris, Tex., a structure of pressed brick, with concrete floor and metal ceiling, 50 by 100 feet on the ground plan

E. J. Moon, sales manager of the Moon Motor Car Company

Work has been started on the garage of the Reimers Motor Car Company, of Louisville, Ky., and will be rushed to completion. The plans call for a two-story structure of concrete and brick, 52 by 125 feet. The entire lower floor will be used as a garage, and will have space to accommodate about eighty cars. The second floor will be used as a repair shop, with modern equipment. The building is located in the rear of the present quarters of the Reimers Company, and will be used as an addition. The present building will be remodeled into show rooms and offices.

The fireproof garage of the White Automobile Company, at 949 Main street, East Orange, N. J., has been acquired by J. J. Meyer, of Orange. The building has a capacity of 75 machines, besides a repair shop. Mr. Mayer will make alterations, and will in addition to the garage business handle the Auburn.

William Olson and E. A. Ludvall have leased the Mount Vernon Automobile Station, at Third and Prospect avenues. Mount Vernon, N. Y., and will continue the business formerly conducted there by Chester A. Stephenson.

Athens, Ga., automobilists have a new accommodation since the recent opening of the Bishop Motor Car Company's garage on Washington street. The building is 62 by 110 feet, two stories high, and has a capacity of fifty cars. The Bishop Motor Car Company has the local agency for the Peerless, Stoddard-Dayton, Courier, Maxwell, Overland and Johnson.

The Jeannette Machine Company, of Jeannette, Pa., which has the agency for the E-M-F and Flanders, is constructing a two-story garage at 10 South Second street. The building will be of buff brick, 40 by 100 feet. The first floor will be used as a garage and salesroom, and the second as a machine and repair shop.

S. N. Taylor will build a $40,000 garage at 5207 Delmar boulevard, St. Louis. The building will be of brick, 124 by 150 feet. The floor space will be divided into two parts, one to be occupied by the Park Automobile Company, and the other by C. F. & J. R. Brown, automobile agents.

The Johnson Auto Company, of Boone, Ia., will open a garage in the Grove Building, on Lynn street, Nevada, Ia. Work on remodeling the building has already been begun. The new company will be under the management of J. R. Davidson and will handle the Cole "30."

The Burdell Auto Sales Company, which has the Columbus, O., agency for the E-M-F and Flanders, is now located in its new salesroom at 153 North Fourth street, that city. The salesroom is 40 by 110 feet. F. G. Burdell is president and general manager.

The Electric Auto. Station, of Hartford, Conn., at present located at 19 Hoadley place, contemplates building a garage on Church street, below High, a more prominent location, and is having plans drawn up to that effect.

The Park Car Company, of Henderson, Ky., has taken the agency for the Moon and Regal and will open a garage on First street, near Greene, under the management of James B. Morgan.

Another garage will be added to the row on North Broad street, Philadelphia, by Irwin & Leighton. The new building will be at No. 326-328, and will be one story in height, to cost $9,500.

Thomas Hawkins, of Philadelphia, has accepted plans for a garage on the corner of Airdrie and Watts streets. The building will be two stories in height, 17 by 27 feet, to cost $4,000.

Brief Personal Mention

Julian A. Halford, managing director, Commercial cars. Limited, Luton, with headquarter offices at Cambridge Circus, London, W. C., is favoring America with his presence, partially with the expectations of making arrangements with some first-class establishment which will be able to exploit the commercial automobiles made by this company. THE AUTOMOBILE enjoyed a brief visit from Mr. Halford, and his mail address will be 164 West Eighty-first street, New York City, during the term of his visit.

It was erroneously stated in last week's THE AUTOMOBILE that M. S. Keyes, formerly with Maxwell, had taken the agency for Regal cars in the territory surrounding New York City. This was not the case, for Mr. Keyes has taken a position with the Regal Motor Car Company, as district manager for that district.

A. J. Rousseau, formerly manager of the Chicago Buick branch, has been appointed district manager of the Willys-Overland Company for Illinois, Iowa, Eastern Nebraska, Southern South Dakota, Minnesota, Northern Indiana and Western Michigan.

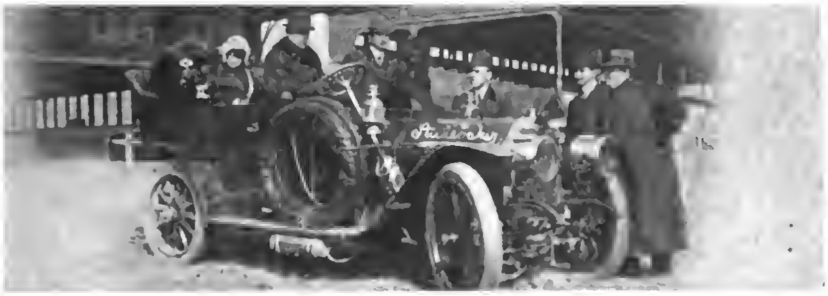
C. T. Brewster, formerly manager of the Cleveland branch of the United Manufacturers, is now connected with the Olds-Oakland Company in the capacity of State and city salesman.

R. B. Tracy, for several years Cleveland branch manager of the Michelin Tire Company, has been transferred to Chicago. As yet no one has been appointed to succeed him.

J. M. Clarke, formerly sales manager of the National Motor Vehicle Company, Indianapolis, Ind., has resigned from that position to take the agency for the National car in Denver, Col.

F. R. Bump, formerly with the Franklin Manufacturing Company, Des Moines, Iowa, has become sales manager of the Owen Motor Car Company, of Detroit, Mich.

WITH THE AGENCIES



Mme. Paulhan, the wife of the French aviator, and her friend Mme. de Pennendreff, at Jamaica Park, L. I., waiting for Paulhan to make a flight in his Farman biplane

Will Christy, vice-president of the Firestone Tire Company

COLUMBUS, O., March 19—With the passing of the season of changes in automobile agencies in Columbus, O., the announcement is made of the agencies which will have charge of the sales of cars during the season of 1910. Since the closing of the motor show given under the auspices of the Columbus Automobile Club, the agents have been busy and sales are numerous. The inclement weather has caused a delay in deliveries but the weather has not affected the sale of cars materially. Deliveries will be made during March and April, allowing time for the factories to catch up on orders.

A complete list of Columbus sales agents follows: F. E. Avery, 1199 Franklin avenue, Packard and Waverly Electric; The Burdell Auto Sales Company, 153-155 North Fourth street, E-M-F and Flanders "20"; The Robert F. Boda Automobile Company, 30 West Main street, Mitchell and National; the Columbus Buggy Company, Fourth and Gay streets, Firestone-Columbus and Columbus Electric; The Curtin-Williams Company, 122 South Parsons avenue, Cadillac, Winton. Peerless and Baker Electric; Broad-Oak Auto Company, 621 East Broad street, The Chalmers, Hudson and Pierce-Arrow; The Franklin Motor Car Company, Fourth and Spring streets, Franklin and Reo; The Charles Schiear Motor Car Company, Fourth and Spring streets, Hupmobile and Velie; The American Auto Company, Fourth and Spring streets, American; The Speedwell Company, Fourth and Spring streets, Speedwell; Howald and Wilkinson, Fourth and Spring streets, Buick and Welch-Detroit; Eclipse Auto Company, 955 South High street, K-R-I-T; The Central Ohio Motor Car Company, 61 East Spring street, Olds and Oakland; O. G. Roberts and Co., 933 East Gay street; Lexington, Marion, Overland, Jackson, Stearns and Stoddard-Dayton; The Francisco Automobile Company, 856 North High street, Ohio; The Ohio Motor Car Company, West Russell street, Ford; the Studebaker Company, Fourth and Chestnut streets, Studebaker; United States Carriage Company, 309 South Fourth street, Apperson, Great Eagle and Rauch Lang; Maxwell-Briscoe Columbus Company, 58 to 62 East Spring street, Maxwell; Iroquois Auto Company, 17 West Mound street, Empire and Grabowsky truck; Williams and Schlereth, East Long street, Pope-Hartford; The Love Garage Company, High street and Sixth avenue. White and Cole "30"; The Franklin Cycle and Supply Company, East Gay street, Demot; The Early Automobile Company, High and Town streets, Rambler, Babcock Electric, Whiting, Paterson and Warren-Detroit; R. C. Westcott, 958 North High street, Regal; Reliance Truck and Transfer Company, Third and Lynn streets, Reliance trucks; Miller Machine Company, 705 Ann street, Premier.

The Otto Gas Engine Company, of Philadelphia, which attracted much attention at the Palace show with its new Otto car, has established a New York agency at 144 W. Thirty-ninth street.

C. W. Matheson, president of the Matheson Automobile Company, entertained his friends of the fraternity at a luncheon which was given on March 22 at 12.30 P. M. The guest of honor on this occasion was the "Silent Six Matheson."

N. Lazarnick, commercial photographer, has opened a branch in Detroit, Mich., at 870 Woodward avenue, under the management of Milton B. Kolb. This arrangement puts Lazarnick in a position to do prompt work in the photographic line.

Latest advices from the Jeffery-Dewitt Company, spark plug manufacturers, 217-219 High street, Newark, N. J., is to the effect that this well-known product will hereafter be manufactured in a well-equipped plant at Detroit, Mich.

The Whiting sales agency has opened headquarters at 111-115 South Beatty street, Pittsburg, and will have the exclusive agency for the Whiting "20" and the Whiting "40" cars made by the Flint Wagon Works Company of Flint, Mich.

R. H. Ohr, Mercer, Pa., has bought the Oldsmobile agency of Alpha M. Brown, in New Castle, Pa., and will also have the Oakland agency in that city. He has for years handled the Oldsmobile cars in Mercer, Pa.

The Automobile Manufacturers' Clearinghouse is the latest second-hand agency to be established in Pittsburg. Its manager is W. H. LaFontaine, and it will have headquarters in Euclid Avenue, East End.

Warner speedometers will henceforth be sold in Pittsburg through a direct branch office. The branch is located at 5940 Kirkwood street, with C. J. Clapp in charge as manager.

The Grout Automobile Company, of Orange, Mass., has opened a Boston branch at 218 Elliott street. E. P. Forbes will act as manager to conduct the sales of the "Powerful Grout."

The Francisco Motor Car Company, of Columbus, Ohio, agent for the Ohio, has located a salesroom and offices at 856 North High Street. It was formerly located on the viaduct.

Thomas W. Meiklejohn and P. B. Haber, of Fond du Lac, Wis., have the agency for the Ford in that city and surrounding territory.

F. A. Emerson, Angola, Ind., has secured the agency for the Clark cars for northeastern Indiana.

FARMERS OPPOSE MUNICIPAL AUTOMOBILES

WILMINGTON, DEL., March 19—The Grangers are almost unitedly opposed to the proposition of the Levy Court, the governing body of New Castle county, providing itself with two automobiles, for the purpose of supervising the county roads and bridges, nearly every Grange in the county having adopted resolutions of protest. The court is to reach a decision at its next meeting, when the bids are to be opened.

REALM OF THE MAKERS

Out for a spin in an Inter-State car on one of the good highways of northern Indiana. On such a road the Inter-State can be counted on for close to a mile a minute

F. H. Wheeler, of Wheeler & Schebler, Indianapolis

Among the interesting features in tire construction at the Boston Automobile Show, the Bragg stitched tire seemed to attract a large percentage of the interest. Thorough tests have been made with the tire for the past three years and it was first put upon the market at the New York automobile show last January. The manufacturers of this tire claim that they have eliminated the separation of fabric by the stitching process and they guarantee to make satisfactory adjustments on a 5,000-mile basis. J. V. Alden, the president of the Seamless Rubber Company of New York and general sales manager of the tire, together with his associate, Mr. Williams, gave their personal attention to their exhibit at the show. They report that their success has far surpassed their most sanguine expectations and that the prospects for their business in New England are very pleasing.

The J. I. Case Threshing Machine Co., of Racine, Wis., largest concern of its kind in the world, has placed an order for twenty-five Model 38 Overlands with the American Motor Car Sales Co. at Toledo. In place of the rumble seat, a special body, consisting of a receptable like a box, is provided, these being furnished by the Racine Manufacturing Co. Three case "transfers," or emblems are to be placed on each car, one on each side of the hood and one on the box. A smaller eagle transfer will appear on each side of the seat. It is not announced what use will be made of these cars, but it is expected that the Case company's representatives in the larger cities of the country will be provided with them, the box compartments being used for catalogues, tools, small repair parts and literature of all kinds.

Tires should always be kept inflated so hard that they stand up round and full under the load, say tire men. The Diamond Rubber Company puts this rule ahead of all others, even that of pressure gauges, because the latter does not provide for the overloaded tire. Ample inflation is urged as the most important thing for the automobilist to consider in getting maximum mileage from whatever make of tire he uses. Extensive service tests have proved this fact. Ample inflation checks the movement within the tire and reduces the element of friction and heating, produced to a great extent when tires are run partially flat. These facts put it up to the automobile owner to get the best service out of his tire equipment. The tire manufacturers are responsible for the casings and tubes but obviously the tire user must furnish the air.

Cross & Brown Company sold for Aline D. Elliott and J. S. Dickerson to Louis C. Jandorf, president of the Broadway Automobile Exchange, the northeast corner of Eleventh avenue and Fifty-eighth street, New York, a two-story and basement factory building, on a plot 100 by 100. After extensive improvements the purchasers will occupy the premises for the manufacturing end of their automobile business.

The Federal Rubber Company of Illinois has established quarters in Chicago at 1312 Michigan avenue. They will handle the Federal tire. C. C. Harbridge, J. C. Zimmerman, William Seward and Hugh Jackson are interested in the company. They were all formerly with the Chicago Michelin branch. Mr. Harbridge's successor as manager of the Michelin branch is Richard Tracy, of Cleveland.

A new booklet containing valuable suggestions to motorists on the correct air pressure for their tires is being distributed by the Firestone Tire and Rubber Company, Akron, O. It also contains recommendations on the most economical sizes to use for various loads, together with other useful data on tires and quick detachable demountable rims.

The Willard-Harlow Manufacturing Co. of Janesville, Wis., has been granted a charter in Wisconsin. The company is capitalized at $25,000. The purposes of the concern are to manufacture and deal in motor car specialties and steam heating appliances. J. C. Harlow, A. E. Bigham and P. H. Korst are the incorporators.

The Chalmers Company has selected Morgan & Wright "nobby tread" tires as equipment on the Glidden tour pathfinding car. These tires made a great record on the E-M-F pathfinding car last year and Morgan & Wright feel much elated that they have been again chosen for this, the hardest pathfinding job of the season.

The Mt. Clemens Motor Car Company, capitalized at $200,000, with $75,000 paid in, has filed articles of association at Lansing, Mich. The company will manufacture automobiles and parts and conduct a general foundry and machine shop at Mt. Clemens, a suburb of Detroit. The chief output will be a delivery wagon.

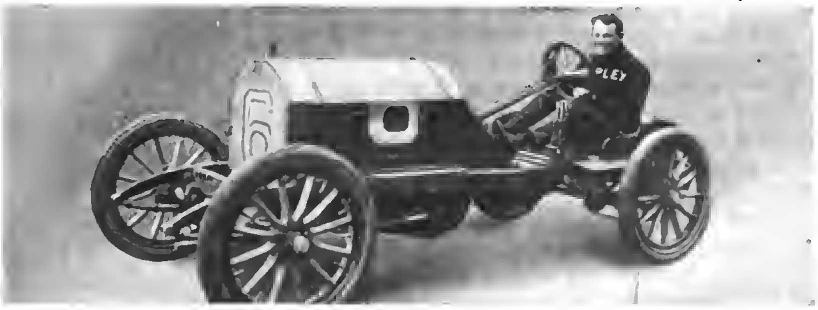
The Racine Sattley Company has contracted for the Halladay line for Central and Northern Iowa. E. A. Kiser, formerly with Cruzan & Company, Des Moines, has accepted a position with these people as manager of their automobile department, and will devote his entire time and efforts to this line.

Among the shipments last week of Premier cars from the factory of the Premier Motor Manufacturing Company was a four-cylinder touring car for Thos. W. Lawson of "frenzied finance" fame. This is Mr. Lawson's latest addition to a garage well stocked with some fine American and foreign cars.

The Mitchell-Lewis Motor Company, of Racine, Wis., issued its first limousine body type last week. This body is used on the regular Model S, six-cylinder, 50-horsepower chassis. The car was built for William T. Lewis, one of the founders of the Racine concern.

In Cleveland, the White Line Auto Express Company has been incorporated with a capital stock of $300,000 by L. B. Smith and others.

NEWS IN GENERAL



George Robertson in the 90-horsepower Simplex racer which he will drive at the Los Angeles races. The Vanderbilt winner uses Continental tires as his standard equipment

E. Le Roy Pelletier, advertising manager of the E-M-F Company

There is a sharp contest on this year between the railroads entering Pittsburg for the automobile freight business. Hitherto, the P. R. R. and the Pennsylvania company have practically controlled this business. This year, however, the Pittsburg & Lake Erie Railroad Company made a very strong bid to automobile shippers all along the New York Central lines, and as a result has been bringing in train load after train load of new cars for local agency.

One of the most interesting features of the fourth annual Pittsburg automobile show which opens March 26, will be the distribution of handsome souvenirs. The show committee has arranged for a mammoth collection of cut flowers that will be distributed every night to the lady visitors. The pennant will be in the show colors, yellow, canary and green, and will bear an immense painted design of "the girl at the wheel."

Tbe Keim Supply Company, of 1227 Market street, Philadelphia, Pa., has purchased the business of the Auto Light & Motor Supply Company, 506 North Broad street. They will retain the latter establishment for branch and storage purposes. E. C. Leeds is president of the company; H. C. Holinger, vice-president; Joseph A. Janney, Jr., treasurer; Joseph A. Steinmetz, secretary, and J. H. Rosen, manager.

The John Obenberger Company, of Milwaukee, Wis., has been reorganized and incorporated as the Obenberger Drop Forge Company and will make a specialty of automobile parts, continuing to produce steel hammered forgings. The capital stock is $30,000. The officers of the new concern are: President, John Obenberger; vice-president, Henry C. Fuldner; secretary and treasurer, H. W. Ladish.

H. W. McMaster, one of the receivers of the Wabash-Pittsburg Terminal Railroad Company, Peter K. Soffel, real estate manager of same company, and Frederick James, of Pittsburg, have formed the Reliance Motor Truck Company of Pittsburg which is applying for a Pennsylvania charter. They will have the Western Pennsylvania agency for the Reliance truck, manufactured at Oswego, Mich.

A company has been organized in Port Jefferson, L. I., to run electric automobile 'busses this Summer between Patchogue and Port Jefferson. It is called the Suffolk Transportation Company. The 'busses will connect at Port Jefferson with the steamers of the Bridgeport-Port Jefferson Company, the service to start about the first of July.

The third class in automobile operation, under the charge of the association institute of the Columbus (Ohio) Y. M. C. A., was organized February 28 with 42 pupils. This makes 135 pupils who are taking the course. The classwork consists of lectures and practical demonstrations in a workshop equipped with several automobiles.

The Willis-Holcomb Company is showing a line of Packard commercial cars, while the Percy-Willis Company, the Conduitt Automobile Company, the Cost and Orlopp and the Van Camp Automobile Company, all prominent Indianapolis dealers, are now selling commercial cars, this being "opening week."

Madison Automobile Company, Madison, Wis., has installed a complete tire, repair and vulcanizing plant, tbe largest in Wisconsin outside of Milwaukee. William A. Jackson, formerly in the Michelin Tire Works, of Milltown, N. J., is manager of this department. L. F. Schoelkopf is president.

It is said that efforts are being made by the International Association of Machinists to organize a Wisconsin district of employees of automobile and allied plants. Racine, Columbus, Corliss, Janesville and other cities will be included if the organization is effected.

J. C. Murdock, of Broadhead, Wis., has a patented automobile spring which, it is said, will be adopted by the Thomas B. Jeffery Company, of Kenosha, Wis., and the White Company, of Cleveland, is also said to be figuring on using it extensively.

The National Motor Supply Company, of Cleveland, Ohio, manufacturer of portable steam vulcanizers and gasoline tank gauges, has opened a branch at 1777 Broadway, New York. The Cleveland company was organized less than a year ago.

A. B. MacGowan, a well-known salesman of the Maxwell-Briscoe Pittsburg Company, has gone into business with N. H. Wishart. The firm will continue to handle the Flentje shock preventor and the Hoffecker speedometer in Pittsburg.

A movement has been started by capitalists at Jefferson, Wis., to use part of the big Vaughn Manufacturing Co.'s implement plant for the manufacture of a light farm motor wagon. The project is not yet in definite shape.

The Rowe Automobile Company, of Waynesburg, Pa., one of the most thrifty concerns in western Pennsylvania, will build a plant at Martinsburg, W. Va., at once to manufacture automobiles and gas engines.

The New Kensington Motor Company of New Kensington, Pa., has been formed by J. W. Vernam, New Kensington, Pa., J. S. McKee, Ambridge, Pa., and J. G. Silvens, Homestead, Pa.

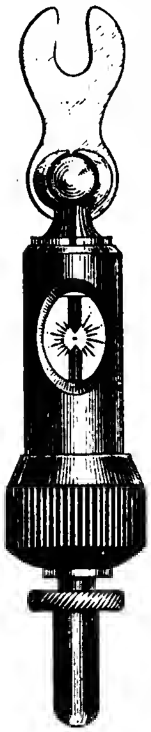
The Standard Automobile Company of Pittsburg is making rapid progress on its new building at Grant boulevard and Bellefield avenue, and will have its formal opening about May 14.

G. W. Laurie, salesman for Morgan & Wright in Boston and vicinity, will shortly assume a traveling position for the same firm, calling on the trade in the New England States.

The Mutual Manufacturing Company has been formed in Pittsburg by George Ferrer, A. J. Kraber and E. R. Cramer and will manufacture wind shields.

PROMINENT ACCESSORIES

REVIVING the old idea of the spark-gap, the New England Sales Company, of Boston, has brought out, under the name of the Phelps "Trouble Finder," a device to be inserted in the wiring between the coil or magneto and the spark plug to show whether the spark is jumping regularly. The "trouble finder" is designed to take the place of the usual high-tension terminal attachment to the spark plug. It consists of two points, separated slightly to form a gap across which the current must pass on its way to the plug. The points are properly insulated, and are inclosed in a brass tube, with a glass window through which one may watch the spark jumping across the gap. One of the points is adjustable by turning a milled nut on the outside of the tube, so that the length of the gap may be regulated.



"Trouble Finder"

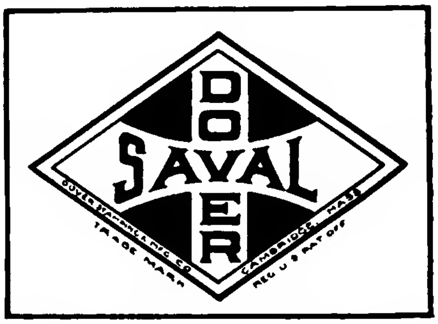
For ordinary service the points are adjusted quite close together, so as to introduce as little resistance as possible. In case one cylinder should be missing, it can easily be located by looking at the row of "trouble finders"; for if there is no spark in the cylinder, there will be none across the gap of the "trouble finder." Many other claims are made for the device, such as keeping the plugs free of carbon deposits, increasing the power of the motor, making it possible to throttle down to a lower speed, and making it possible to run on nearly exhausted batteries.

In connection with the description of accessory makers' factories in and around Boston, which appeared in a recent issue, a photograph was given of the plant of the Hood Rubber Company, at Watertown, Mass., part of which is occupied by the Shawmut Tire Company, and is the home of Shawmut tires. Owing to the limitations of the photographic art but a small part of the factory could be shown, although that was perhaps sufficient to suggest its actual size. To make the situation quite clear, however, the bird's-eye view which appears below may be of assistance.

To meet the demand for a non-skid tread the Shawmut Tire Company has brought out its "X-tra Tread," in which a raised design is molded into the tread layer of rubber. The design consists of circumferential rows of projections of a six-pointed star shape. The rows are so arranged that the stars in one row alternate with those of the rows on each side. This tread offers to the road surface a great number of sharp points, giving the maximum resistance to skidding, but at the same time the points do not bear the weight of the car, and so do not easily wear off.

Another New England product is the "Eagle" exhaust whistle, made by the Eagle Whistle Company, of Somerville, Mass. It is one of the types designed to be attached at the rear end of the muffler, having an opening through which the exhaust normally passes freely. By means of a pedal on the footboard this opening may be closed, diverting the stream of exhaust gases through the whistle proper. The outfit is simple in construction, having no hidden bolts or screws, and no internal parts which could clog up with carbon or mud. The "Eagle" is made in three sizes, suitable for any size of car, and sells at a moderate price, with the foot pedal and connections included. As a simple and effective, though inexpensive, signaling device it can be highly recommended.

On November 4, the Dover Stamping & Mfg. Co., of Cambridge, Mass., advertised for a name for a new gasoline funnel. The company considered that the funnel was too thoroughly good to have to do with an ordinary make, and it was decided to open up competition and to pay $50 to anyone who would suggest a suitable name for the funnel. The award has finally been made to C. E. Van Bibber, 256 Aspinwall avenue, Brookline, Mass., for the name "Saval." A total of 1,250 letters came from all parts of the country, but none of the other names suggested offered any of the attractions which will be noted as self-evident as the one finally decided upon.



Name Plate of the New Dover Funnel

The funnel in question has a ball check-valve which is normally closed, but opens when the funnel is resting in the filling hole of the tank. When the tank is full, simply lifting the funnel out will close the valve, and the excess gasoline which may be in the funnel will be saved, instead of running over the seat and floor. Thus the description in its name is appropriate.

Shawmut Non-skid Tire

Factory at Watertown, Mass., Where Shawmut Tires Are Made, Together with Hood Rubber Products

CONCRETE CONSTRUCTION ADVANCING IN USEFULNESS

PORTABLE structures were used up to recent times in a temporary way by contractors, sportsmen, and for camping out parties with excellent success, due to the weather-proof qualities of the houses so made, and to the further fact that they were relatively inexpensive, which desirable condition was the direct result of building in quantity. This portable idea has been extended somewhat, and from time to time improvements were made in the quality of the buildings, until today it is proper to say of them that they are portable in so far as they are made in quantity by companies of standing, and in such a way that they may be shipped to distant points, erected into place, and assume all the proportions of permanence.

The earlier types of buildings of this character were a combination of wood framing and corrugated steel, sides, ends, and roofing. They were rather unpretentious looking affairs, and the corrugated steel, despite its galvanized coating, and red paint, rusted out so persistently that three years was looked upon as a fairly good lasting time for the material. More substantial types of portable houses were made of wood throughout, and in them architectural beauty frequently played an important part. These wooden houses added marvelously to the portable idea, and when the automobile became a factor in every-day life, owners of cars utilized portable houses adjacent to their residences to an increasing extent.

The fire risk, especially in cities, is sufficiently great to demand that private garages be given more than ordinary consideration especially when they are placed within 40 feet of residence properties, many of which being wooden structures. It is on this account, perhaps, that the reinforced concrete private garage becomes the subject of great importance, and the manufacturers of portable houses, understanding perfectly the advantage to be derived, are busying themselves in the production of reinforced concrete buildings of the character which can be shipped from the maker's plant to the place of erection.

The illustration here offered is of just such a building, and it attracted considerable attention at the late Boston Show, where it was exhibited by the David Craig Company, 68 and 70 Broad street, Boston, a brief description of which is as follows:

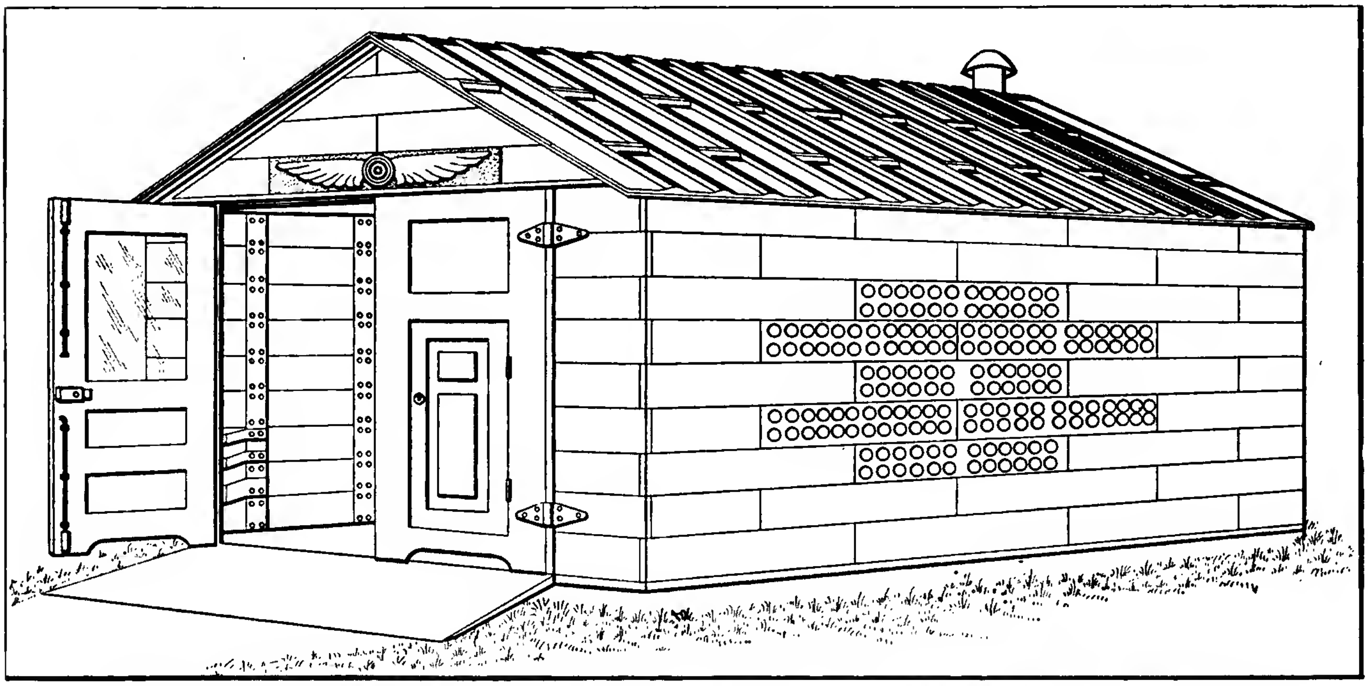
The walls are made of reinforced concrete slabs in sizes of 5 ft. by 1 ft. and 2 ft. 6 in. by 1 ft. and 1 1-2 in. in thickness. The frames are made of steel. The concrete slabs are bolted to the frame with lag screws. The only tool required to erect this garage is a monkey wrench, as they are all manufactured at the company's plant and shipped out ready for erecting.

The company claim a great improvement over the ordinary concrete block construction, as their slabs can be made with a much larger face size, and still not weigh too much for one man to handle, while the size of face gives the appearance of solid freestone. The roof frame is also of steel and covered with either copper, asbestos or corrugated galvanized iron.

Among the advantages which are represented in this structure is the method of inserting glass covered port holes in the side walls for purposes of illumination, and in this way, the disadvantages of windows are eliminated, the building becomes substantially burglar proof, and the light is distributed much more efficaciously than would be possible with a limited number of windows, while at the same time, the fire-proof idea is more definitely incorporated.

The autoist who has struggled with the small garage idea will fully understand how difficult it is to throw light onto the floor, especially under and around the car, if the car itself stands within 30 to 40 inches of the side walls. The series of ports shown in the illustration may be placed quite low down, and there may be as many of them as the autoist might elect to have, so that if the garage is barely large enough to comfortably hold a car, the floor can be adequately lighted by the simple expedient of placing an increased number of these glass bull's-eyes sufficiently low down to throw light upon the concrete floor.

In the erection of a structure as here illustrated, the most desirable results will follow if a substantial concrete foundation and floor are put down, having in mind the fact that good drainage is important, and considering the location and piping from the gasoline storage tank, which, of course, will have to be buried beneath the surface outside the building. The concrete floor would scarcely have to be more than 5 inches thick, and a bed of cinder will properly serve, if the thickness is somewhat over 5 inches. The surface of the floor should terminate in a finish of substantially neat cement.



Concrete Construction Portable Garage Which Was Exhibited at the Boston Show and Attracted Considerable Notice

R.A.C. MAKES PERFORMANCE TEST OF AUTOMOBILES

THE Royal Automobile Club of Great Britain seems to serve its members in certain particulars to a very satisfactory degree, and as an illustration of one of the club undertakings, a certificate of performance, which 'is numbered 184, is here given. This certificate was awarded to a 38.7 horsepower (R. A. C. rating) Napier car, after a test which was conducted under date of February 9, 1910. The motor of this car has six cylinders, with a bore and stroke of 4 and .5 inches respectively. The total weight of the car is 3,574 pounds, distributed as follows: front axle 1,714 pounds, and rear axle 1,860 pounds. The live load was found to be 489 pounds, so that the total running weight as certified to was 4,063 pounds.

The wind resistance area was 13.3 square feet, with a side entrance touring body. The road trial was over a route which is described to include Elwell, Reigate, Westorham, Crawley, Horsham and Brooklands. There were no involuntary stops recorded during this run, and the gasoline consumption was 5.28 Imperial gallons, making the fuel consumption 19.93 miles per gallon, or 36.15 ton miles per gallon.

The track test was for a distance of 13.8 miles, and the highest speed recorded was 61.12 miles with an average speed of 60.14 miles. The fuel economy under these conditions was 12.10 miles per gallon, or 21.95 ton miles per gallon.

ACCELERATION TEST ON LEVEL

Speed attained	Time in which speed is attained from rest	Distance in which speed is attained from rest
10 miles per hr	1.5 seconds	4.8 yards
15 " " "	2.8 "	13.2 "
20 " " "	4.4 "	27.0 "
25 " " "	6.5 "	49.6 "
30 " " "	8.75 "	80.0 "
35 " " "	11.75 "	129.5 "

Average acceleration for 151.56 yards, 5.38 ft. per sec.

A subsequent hill-climbing test, with a measured grade of 1 in 5.027, and a running weight as before stated, showed a speed on this grade of 14.822 miles per hour. The length of the hill was 117 yards, 1 foot, 3 inches, and the grade variations within this length were 105 feet, with a grade of 1 in. 8; 91 feet with a grade of 1 in 5, and 150 feet with a grade of 1 in 4. The test was conducted and declared official under the directions of the R. A. C. Committee, of which J. B. Orde is secretary; Francis W. Teck, chairman; Mervyn O'Gorman, chairman of Technical Committee.

It will be observed that this is test No. 184 which permits one to infer that the R. A. C. considers this class of undertaking as regular and of importance. It should be extremely valuable to makers of automobiles to be able to have models tested out by experienced men under official and open condition.

AMONG THE LATEST ACCESSORIES

(*Continued from page* 600.)

operated by a foot pedal, and the effort of the motorist is accumulated in a spring, and utilized through the ability of a flywheel involving a suitable mechanism as shown.

Non-skid devices for use with pneumatic tires have been found by experience to be thoroughly capable in every way, and, contrary to the predictions of the inexperienced, the chains do not destroy the tread of the tire, but they do prevent skidding and the tire depreciation and other dangers which are imminent when skidding occurs. Fig. C shows the Walker anti-skidding chain which was exhibited at the Albany show, and attracted much favorable comment from the visiting audience. The ring bolts which serve as tie points for the diagonal chain members, are claimed to be particularly efficacious, hence, serve a double purpose, i. e. (a) as a capable mechanical fastening for the diagonal chain members, (b) as non-skid elements.

The Universal Demountable Rim, as depicted in Fig. D, is shown in the position of dissembling, in which a diagonally parted clincher rim is taken advantage of. This rim is of the class which may be expanded in order that it will slip into place over the auxiliary rim of the felloe, and in demounting the rim may be expanded so that it will readily part from the auxiliary rim and come away without having to be jolted with a hammer. A single tool is employed in the locking process, and a latch, which is U shaped, snaps into place across centers.

Lubrication continues to be one of the most important subjects in connection with the operation of an automobile, and taking the problem as a whole, it is more important to have a positive and sufficient means mechanically, than it is to worry about the incidental differences in the respective qualities of the lubricants available for use. This should not be taken as an inference to the effect that the quality of the lubricating oil may be disregarded, but it does lay stress upon the desirability of providing a definite controllable means of lubrication. Fig. E shows a series of Maxwell-Briscoe mechanical oilers being tried out at the works of the company, and it is claimed by the maker, that they have solved the problems of oiling to such an extent that lubricant is fed to the respective journals sufficiently to assure the good which comes from profuse lubrication, so that smoking and other ills are obviated.

MAKING A DEMONSTRATION

(*Continued from page* 601)

inder models of automobiles, and from the best information at hand, it seems that the new sloping bonnet idea, as presented at shows this year, makes a most favorable impression.

(C) Shows how a 1906 Peerless model, after it served in touring work for a considerable time, was converted into a delivery wagon, and is now used in commercial work for rapid, rather than heavy service. The body, which is of the enclosed delivery type, was especially designed for a florist, and reports which emanate from the user of the car are to the effect that it is a distinctly advantageous proposition.

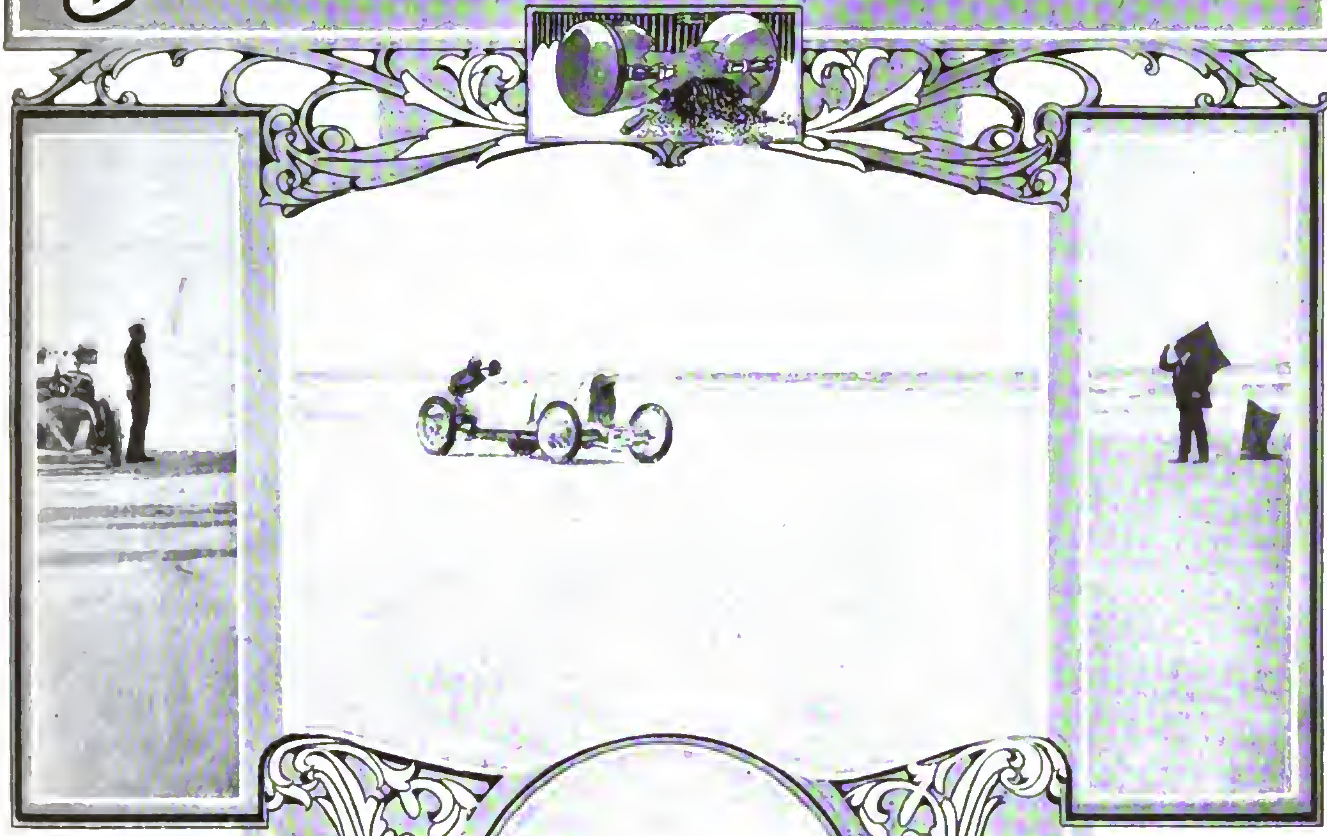
(D) Presents a Reo car which was converted into a livestock express by Theodore Buchneau of Brooklyn, Iowa, and, as shown, it made 28 miles to market with two hogs and 17 shotes, the total weight being 700 pounds. This is the Reo "20," which is a 2-cylinder touring car with a detachable tonneau, which makes it convenient to substitute crates or merchandise.

LOUISVILLE SHOW OPENS AUSPICIOUSLY

(*Continued from page* 593.)

Car Company, Rapid trucks; Kentucky Automobile Company, Cadillac; thomas King, American Traveler; Klein Brothers, Harley-Davidson motorcycles; Killgore & Stilz, Frayer-Miller trucks; Hubert Levy Auto Company, Buick, Baker electrics; Longest Brothers, Stoddard-Dayton, Overland, Waverley electrics; Louisville Auto Company, National; Louisville Brass & Brazing Company, sundries; George Looms, Locomobile; Marshall-Clark Motorcar Company, Maxlell; Miles Auto Company, Packard, Woods, Detroit electries; Olds Motor Works, Oldsmobile, Oakland; Reimers Motorcar Company, Reo, Haynes; R. O. Rubel, Jr., Curtiss Motorcycles; Southern Auto Company, Ohio, Broc electrics; Straeffer-Arterburn Auto Company, Parry, K-R-I-T; John Mason Strauss, Chalmers; Studebaker Auto Company, Studebaker gasoline and electrics; Thomas Auto Company, Winton "Six"; L. W. Thompson Company, Yale motorcycles, Fisk tires; United Auto Company, Premier; Roy E. Warner Company, Firestone tires; E. C. Walker Company, White and Stanley steamers, White gasoline; Weber Motor Vehicle Mfg. Company, Weber Motor trucks; Prince Wells Company, Rambler; Yager Motorcar Company, Peerless.

THE AUTOMOBILE



PUTTING a theory into practice is the process which is being employed in the building of automobiles, and the simplicity of the theory, considering surface indications, is at the bottom of many ill-advised attempts. It seems a simple process to apply a motor to a vehicle, and experience seems to indicate that success will attend the effort to whatever extent simplicity serves as the guide. Failure seems to be the product of a series of complex relations, and it is because innovations are too numerous, as a rule, that the results fall far below the usually sanguine expectations.

The best illustration of the good which is derived from the most simple method, will be found in racing automobiles, taking them as a whole. When a contest is to be entered into, the makers of the contesting cars exercise all their ingenuity in the direction of absolute simplicity, and they eliminate every possible construction element in the makeup of their respective products, for no other purpose than to induce stability, engender speed and pare chances down to the lowest possible level.

Were it an easy matter to reduce a theory to practice, racing automobiles would be limited to their performance for the gratification of sports, whereas the sporting phase of the true racing situation is a mere incident. The benefits derived are manifold when a car performs under speed conditions, if the designers watch the performance closely, and take advantage of the knowledge gained.

With the opening of the racing season at Daytona, Florida, on March 23, the attention of the autoing public was again called to this phase of the industry, and those who had occasion to note performances will have observed that new speed records were made, and for the purpose of showing that speed has steadily increased from year to year, tabulations were made and are offered, which will tell at a glance the growth of the automobile industry as it is reflected by increases in the attainable speed of the cars made for that specific purpose.

It is very likely true that the growth of the industry is directly reflected by these very increases in speed, just as the hands on a clock, when they point to the figures of time, offer evidences of the quality of the machinery which controls them. Road performance, under speed conditions, will be good or ill, depending upon the character of the design of the performing automobile, and engineers in attempting to solve commercial problems are enabled to place proper limits upon the design of the component units and parts of the cars they make, with far greater certainty when endurance tests are made.

In the abstract, the diameter of road wheels should be relatively large, so it is said, and in certain classes of vehicles, notably those which travel slowly and bear heavy burdens, the proof seems to be at hand, and the wheels are made relatively

ROAD RACING

GORDON-BENNETT CUP RACE

Year.	Winner.	Miles.	Time.	M.P.H.
1900.	Charron, Panhard (Fr.)	351	9:09:00	38.1
1901.	Girardot, Panhard (Fr.)	327	8:54:59	36.6
1902.	Edge, Napier (Eng.)	383	11:02:54	35.4
1903.	Jenatzy, Mercedes (Ger.)	386	6:39:00	58.4
1904.	Thery, Brasier (Fr.)	352	5:50:03	60.3
1905.	Thery, Brazier (Fr.)	340	7:02:42	47.5

VANDERBILT CUP RACE

1904.	Heath, Panhard (Fr.)	284.4	5:26:45	52.2
1905.	Hemery, Darracq (Fr.)	283	4:38:08	61.4
1906.	Wagner, Darracq (Fr.)	297.1	4:50:10	60.8
1908.	Robertson, Locomobile (Am.)	258.6	4:00:48	64.3
1909.	Grant, Alco (Am.)	278.1	4:25:42	62.8
	Harroun, Marmon (Am.)	189.6	3:10:22	59.7
	Matson, Chalmers (Am.)	126.4	2:09:52	58.5

ITALIAN FLORIO CUP RACE

1905.	Raggio, Itala (It.)	313	4:46:47	65.5
1907.	Minoia, Isotta (It.)	304	4:39:54	65.3
1908.	Nazzaro, Fiat (It.)	328.2	4:25:21	74.3

FRENCH GRAND PRIX RACE

1906.	Szisz, Renault (Fr.) (two days)	774	12:14:05	63.4
1907.	Nazzaro, Fiat (It.)	478.3	6:45:33	70.6
1908.	Lautenschlager, Mercedes (Ger.)	478	6:55:44	69.5

SAVANNAH GRAND PRIZE RACE

1908.	Wagner, Fiat (It.)	402	6:10:31	65.1

CIRCUIT DES ARDENNES

1902.	Jarrott, Panhard (Fr.)	372.8	6:54:00	53.9
1903.	De Crawhez, Panhard (Fr.)	372.8	6:52:50	54.2
1904.	Heath, Panhard (Fr.)	372.8	6:30:49	56.8
1905.	Hemery, Darracq (Fr.)	372.8	5:58:32	61.8
1906.	Duray, De Dietrich (Fr.)	372.8	5:38:39	66.2
1907.	Moore-Brabazon, Minerva (Belg.)	372.8	6:12:11	60.1

LOWELL, MASS., TROPHIES

1908.	Strang, Isotta (It.)	254.2	4:42:34	54.0
1909.	Robertson, Simplex (Am.)	318	5:52:01	54.2
	Burman, Buick (Am.)	212	3:49:08	55.5
	Knipper, Chalmers (Am.)	127.2	2:28:43	51.3

FAIRMOUNT, PHILADELPHIA, TROPHY

1908.	Robertson, Locomobile (Am.)	195	4:02:30	48.2
1909.	Robertson, Simplex (Am.)	200	3:38:58	55.4

CROWN POINT, IND., TROPHIES

1909.	Chevrolet, Buick (Am.)	395.6	8:01:39	49.9
	Matson, Chalmers (Am.)	232.7	4:31:21	51.4

large. Racing cars, on the other hand, if their performance is to be taken advantage of, would seem to indicate that there is a limit to be placed upon the diameters of road wheels. The centrifugal force, which induces fiber strains in the tires and elsewhere in the rotating mass, is increased enormously, and a limit must be placed thereon accordingly.

Racing conditions developed the weakness of these inferior designs, and the weight of motors decreased from the enormous figure of 50 pounds per horsepower, down to approximately 8 pounds per horsepower in the highly developed racing types of motors, and to substantially 17 pounds per horsepower in the type of motors as used in average pleasure types of automobiles. It has not yet been decided as to whether or not the motors used in every-day work should be much lighter than they are, but engineers are somewhat divided in their opinions, some of whom claim that the lighter the weight of the moving mass, especially if it belongs to the reciprocating members, the better will be the result commercially; other engineers call attention to the lack of rigidity of the parts which are reduced, as in racing practice, and prefer to take a medium course.

Conservatism is an excellent virtue, but this same attribute, were it the sole guide, would have defeated the automobile. Motors would weigh at least 50 pounds per horsepower, in the absence of racing and equivalent experience, and conservatism cries out against racing. It may be too conservative to say that the limit has been reached, from the point of view of available power per pound of metal used, but this question will never be answered excepting by trial under severe conditions, and certainly there is no better way to subject an automobile to an abuse test than to enter it into a speed contest.

The life of a machine which has to serve under kinetic conditions will be long or short, depending upon speed more than upon anything else, and, as experience seems to show, there is no way by which quality can be increased in the same ratio that ability is demanded with increasing speed. If the speed of an automobile is doubled, the stresses which will be set up in the component parts will be quadrupled, and an axle, for illustration, which might be quite satisfactory at 30 miles per hour, would have to work 4 times as hard at 60 miles per hour, and 16 times as hard at 120 miles per hour. Fig. 1 shows the front axle of the 200 horsepower Benz car, and attention is called to the enormous mass of metal which was used. The average

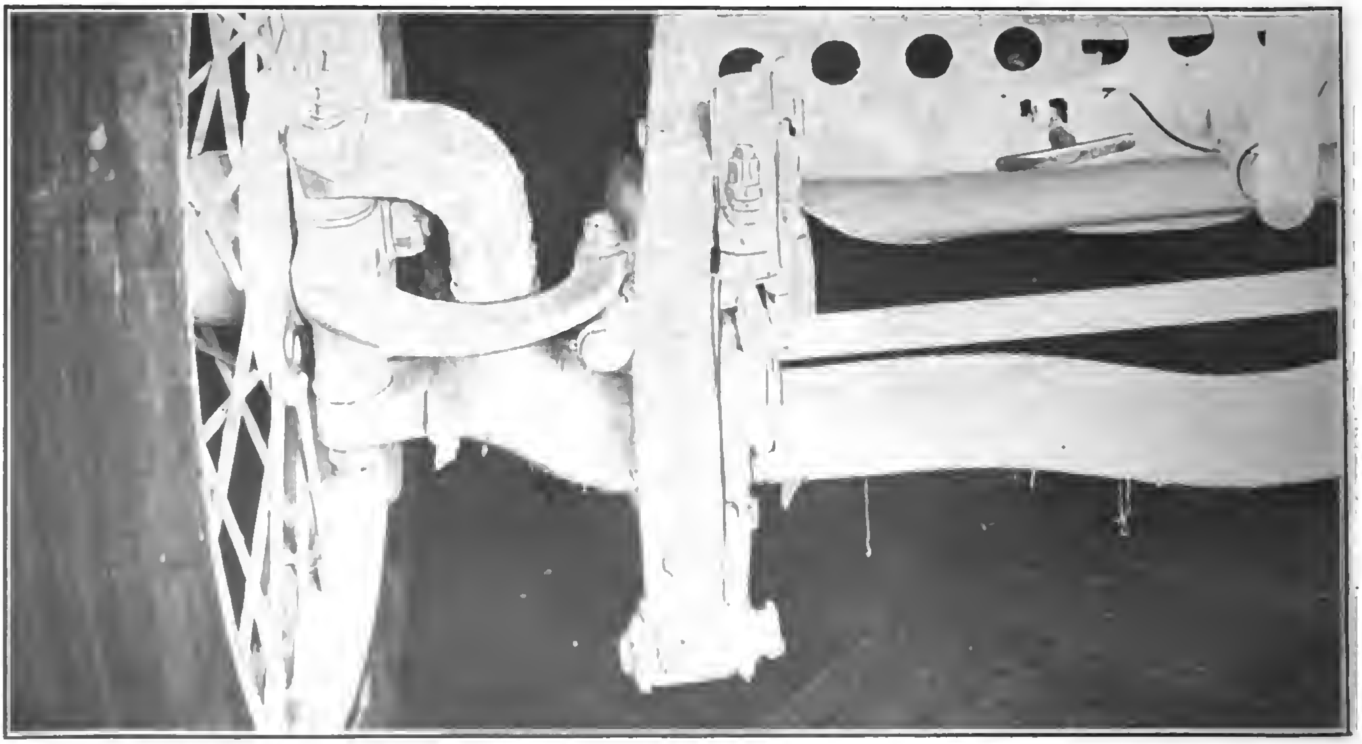


Fig. 1—Front axle construction of the huge Benz racer, which made such a success of racing on the sands at Daytona

automobile enthusiast would naturally expect that the axles and other parts of racing cars should be light, whereas this axle, if it is properly designed, proves to the contrary. That the axle is a nearer approach to correct design than relatively light axles, is proved by the large number of axles which have failed under racing conditions, and some of them were relatively heavy. The simple statement of the law, as above set down, together with the trend in matters of design, goes to show that the reverse to what most people believe is true, and it is in racing work that fallacies are uncovered and facts laid bare. Fig. 2 of the same car shows the rear axle, and attention is called to its perfect symmetry of design, and the secure manner in which it is attached to the side bars, through the springs and the perches.

No form of testing equipment has ever been devised which will determine as to the competence of a motor, under road conditions, from tests made on the "block." There are divers almost insurmountable difficulties attending a block test, which defeat the aim. A motor, to deliver its maximum power, must be tested under conditions which will not harness it down to a series of variable quantities, as when the motor is placed to propel an automobile on the road.

It is the road test which finally settles as to the capability of a motor, and which enables the designer to interject a measure of harmony into the relations. It will not be possible to arrive at the same result by theoretical deduction, nor is the approximation of a theory a reasonable approach to the realization in fact. Motors may be capable of delivering all the power required to drive an automobile at some predetermined and desired speed, but they may not be capable of doing so under the conditions which will govern them under practical working conditions.

Whether or not the new basis for future profit, due to racing, will come this year, it is difficult to predict, but this is no reason why racing should be abandoned, nor will it be proper to justify future activity on the ground that sport demands it. It is not believed that sports will support the automobile industry, and they are one of the effects rather than the pressure on the lever. In the meantime the makers of automobiles will probably continue their effective work, and subject their new models to the strenuous effort which is involved under extreme racing conditions, rather with the hope, perhaps, that something out of the ordinary will come out of it, but with the assurance, in any event, that the weak point will be developed, and a cure effected.

Year.	Winner.	Miles.	Time.	M.P.H.
	RIVERHEAD, L. I., TROPHIES			
1909.	De Palma, Fiat (It.)	227.5	3:38:36	62.4
	Sharp, Sharp Arrow (Am)	136.5	2:09:02	63.6
	Chevrolet, Buick (Am.)	113.7	1:37:36	69.6
	SAN FRANCISCO PORTOLA TROPHIES			
1909.	Fleming, Pope-Hartford (Am.)	254.2	3:59:18	63.7
	Hanshue, Apperson (Am.)	211.1	3:22:56	62.4
	Fleming, Pope-Hartford (Am.)	148.3	2:15:23	65.7
	LOS ANGELES, CAL., TROPHIES			
1909.	Hanshue, Apperson (Am.)	202	3:08:03	64.5
	Dingley, Chalmers (Am.)	202	3:38:35	55.2
	PORTLAND, ORE., TROPHIES			
1909.	Dingley, Chalmers (Am.)	102.2	1:44:18	58.8
	Arnold, Pope-Hartford (Am.)	43.8	45:53	57.2

TRACK AND BEACH RACING

TWENTY-FOUR HOUR RECORDS

	Brooklands, England, Against Time			
1,581.74 miles	24 hours	Edge, Napier (Eng.)	65.9	1907
	Brighton Beach, N. Y., in Competition			
1,196 miles	24 hours	Mulford and Patschke, Lozier (Am.)	45.7	1909

AMERICAN SPEEDWAY RECORDS

1 kilo	0:26.2*	Oldfield, Benz (Ger.)	84.6	1909
1 mile	0:37.71	Strang, Fiat (It.)	95.4	1909
2 miles	1:21.51	Strang, Fiat (It.)	88.3	1909
5 miles	4:11.3*	Oldfield, Benz (Ger.)	71.7	1909
10 miles	7:01.94	Strang, Fiat (It.)	85.5	1909
20 miles	15:31.80	Robertson, Fiat (It.)	77.3	1909
50 miles	40:14.03	Robertson, Fiat (It.)	74.5	1909
100 miles	1:22:35.35	Robertson, Fiat (It.)	72.4	1909
150 miles	2:05:00.63	Robertson, Fiat (It.)	72.0	1909
200 miles	2:46:48.47	Chevrolet, Buick (Am.)	72.2	1909
250 miles	4:38:57.40	Burman, Buick (Am.)	53.7	1909

*Made at Indianapolis; all others at Atlanta.

WORLD'S RECORDS MADE ON ORMOND BEACH

1 kilo	0:17.04	Oldfield, Benz (Ger.)	132.04	1910
1 mile	0:27.33	Oldfield, Benz (Ger.)	131.72	1910
1 mile*	0:29.57	Oldfield, Benz (Ger.)	....	1910
1 mile†	0:40.53	Oldfield, Benz (Ger.)	....	1910
2 miles	0:55.87	Oldfield, Benz (Ger.)	128.88	1910
5 miles	2:34	Hemery, Darracq (Fr.)	116.8	1906
10 miles	5:14 2-5	Brown, Benz (Ger.)	113.2	1909
50 miles	38:51	Fletcher, De Dietrich (Fr.)	77.2	1905
100 miles	1:12:56 1-5	Bernin, Renault (Fr)	82.3	1908
250 miles	3:16:48 2-5	Cedrino, Fiat (It.)	76.3	1908

*with passenger. †Standing start.

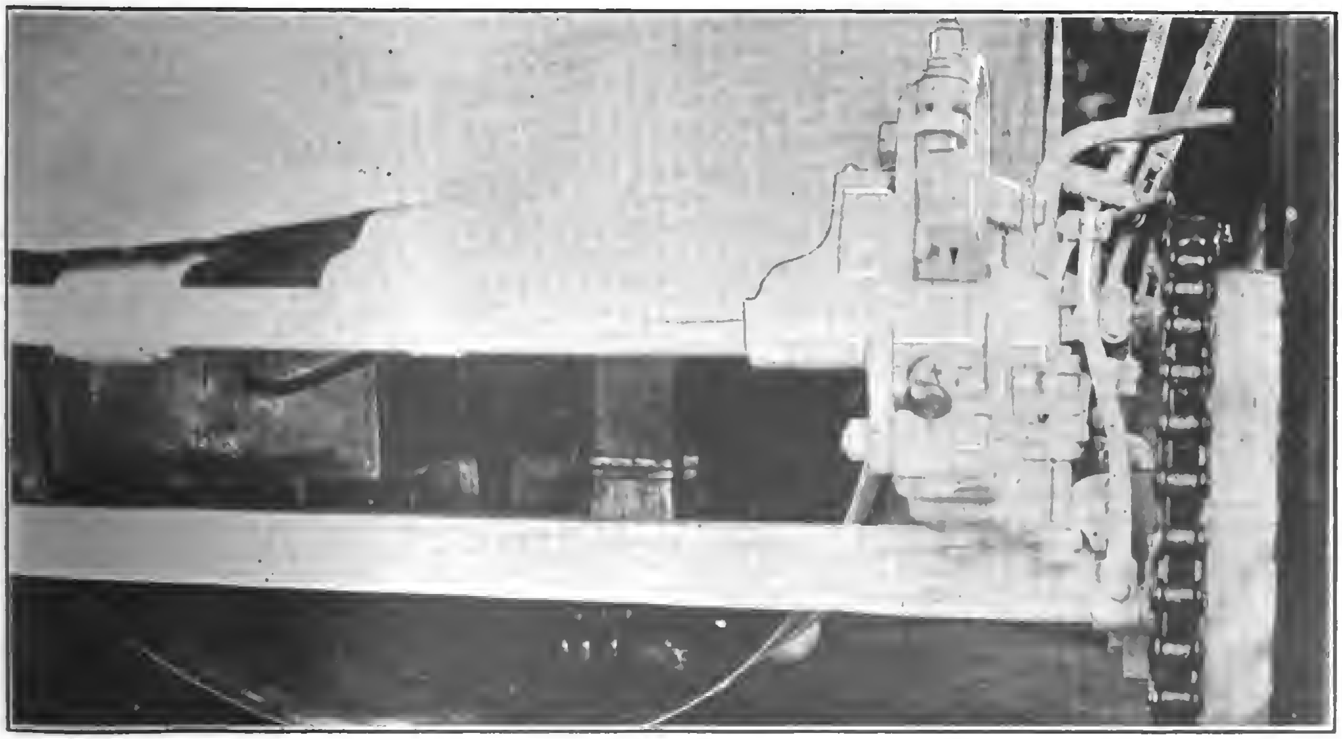


Fig. 2—Rear axle of the same car, showing I-section forging, shock absorber, spring suspension, and chain drive

Matheson Automobile Company, 1888 Broadway, New York City

Factory, Wilkesbarre, Pa.

Motor, six-cylinder, 4 1-2 by 5 inches; cylinders cast in pairs, with all valves in the head on longitudinal axis, interchangeable.

Cylinders are offset 3-4 inch.

Firing order, 1-4-2-6-3-5.

Pistons are 5 3-4 inches long, 0.010 inch small above first ring, 0.005 inch small below; piston pin 1 1-4 inch diameter, with 5-8-inch hole; connecting rods, 10 inches center to center.

Crankshaft drop-forged of 40-carbon steel, heat-treated, with four nickel-babbitt bearings; crank pins 1 7-8 inch diameter, main journals 2 inches diameter.

Flywheel 18 inches diameter by 5 inches face.

Ignition double; Bosch high-tension magneto and storage battery, with six-unit Connecticut coil, completely independent.

Carbureter, Stromberg. Gasoline tank in rear, pressure feed.

Constant level splash lubrication with gear pump and tell-tale on dash.

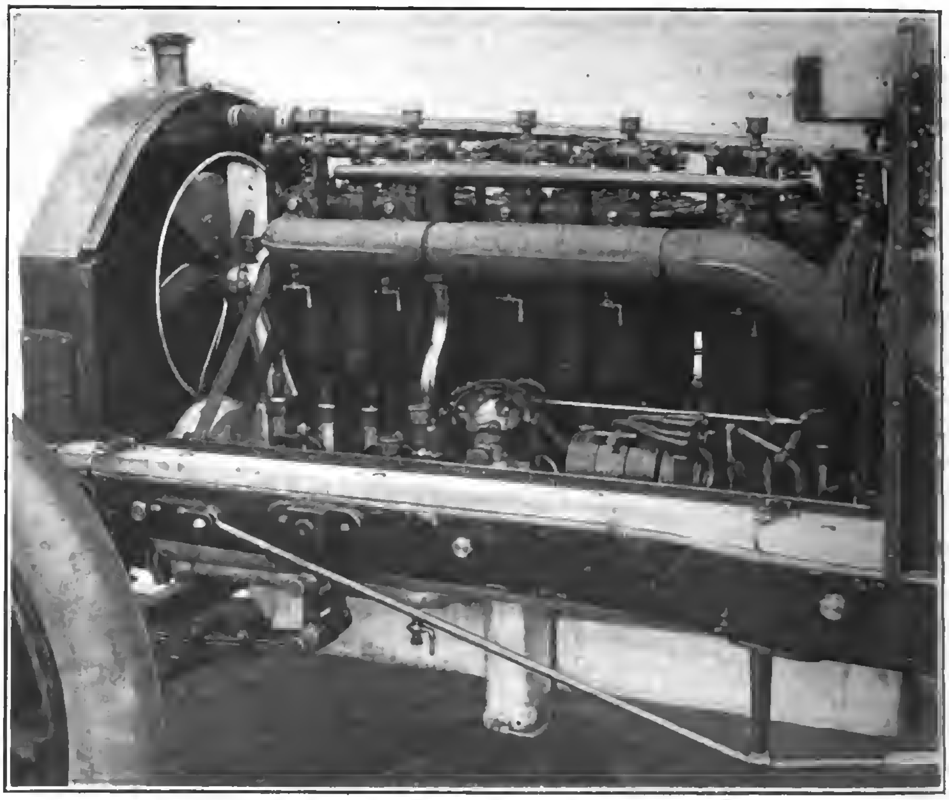
Cooling by honeycomb radiator with 16-inch belt-driven fan and centrifugal pump.

Multiple-disc clutch; 51 steel discs, 10 inches outside, 9 inches inside diameter; 180-pound spring.

Drive by shaft enclosed in torsion tube, with a single joint.

Change-gear on rear axle, selective type, three speeds forward and reverse; gears 6-8 d. p., 7-8-inch face, of nickel steel; Hess-Bright annular bearings.

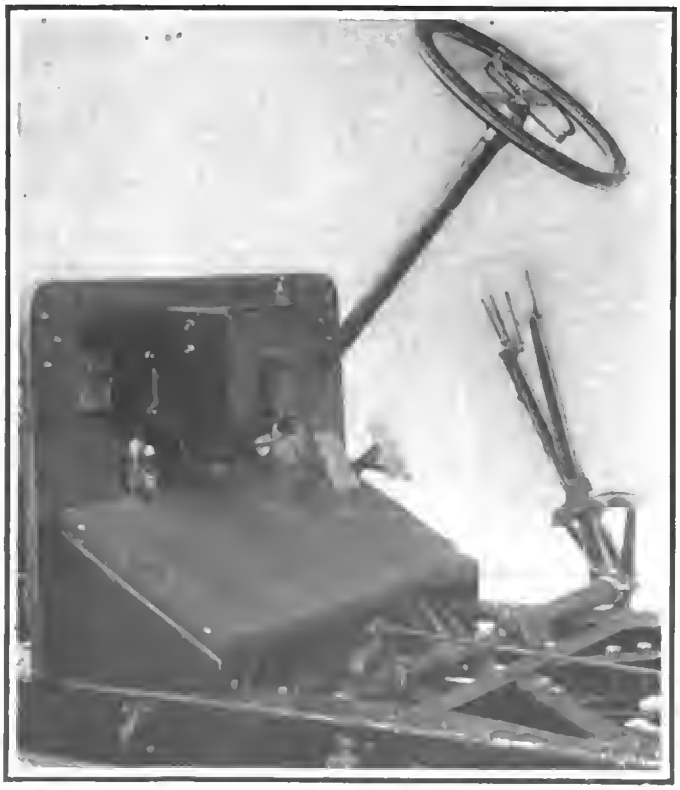
Rear axle of full-floating type; bevel gears 4 d. p., 1 1-2-inch face, 16 teeth into 44, of nickel steel, oil-tempered; live shafts of hammered vanadium-nickel steel, 1 3-8 inch diameter; Hess-Bright and New Departure bearings; bevel pinion thrust transferred to con-



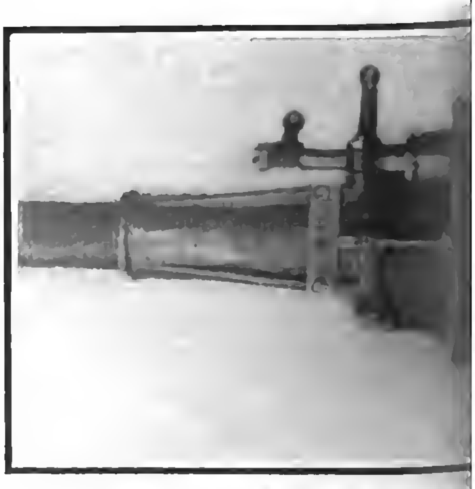
Exhaust Side of the Matheson Motor, with Water and Oil Pumps, Timer and Magneto.

Latest Matheson Six Mechanically Considered

MODEL Eighteen Matheson is the new six-cylinder automobile which is offered by the Matheson Automobile Company, New York City, to 1910 buyers. The touring car is designed to seat five passengers, and the road performance is brought to a high state of perfection, due to the length of the wheel base, which is 125 1-2 inches, and the competence of the tire equipment, which includes 36 by 4-inch tires on the front wheels, and 36 by 4 1-2-inch tires on the rear wheels and other proportions here tabulated. The six-cylinder motor may be described in general as a 4-cycle, water-cooled type, with 4 1-2 by 5-inch bore and stroke of cylinders, respectively, with a company rating of 50 horsepower. The control is effective, and made so by a multiple disc clutch involving the use of 51 discs, and a selective sliding transmission gear, with three speeds forward and reverse, all under suitable control. The weight of the car complete is given as 2,900 pounds, and it is designated by the company as the "Silent Six."

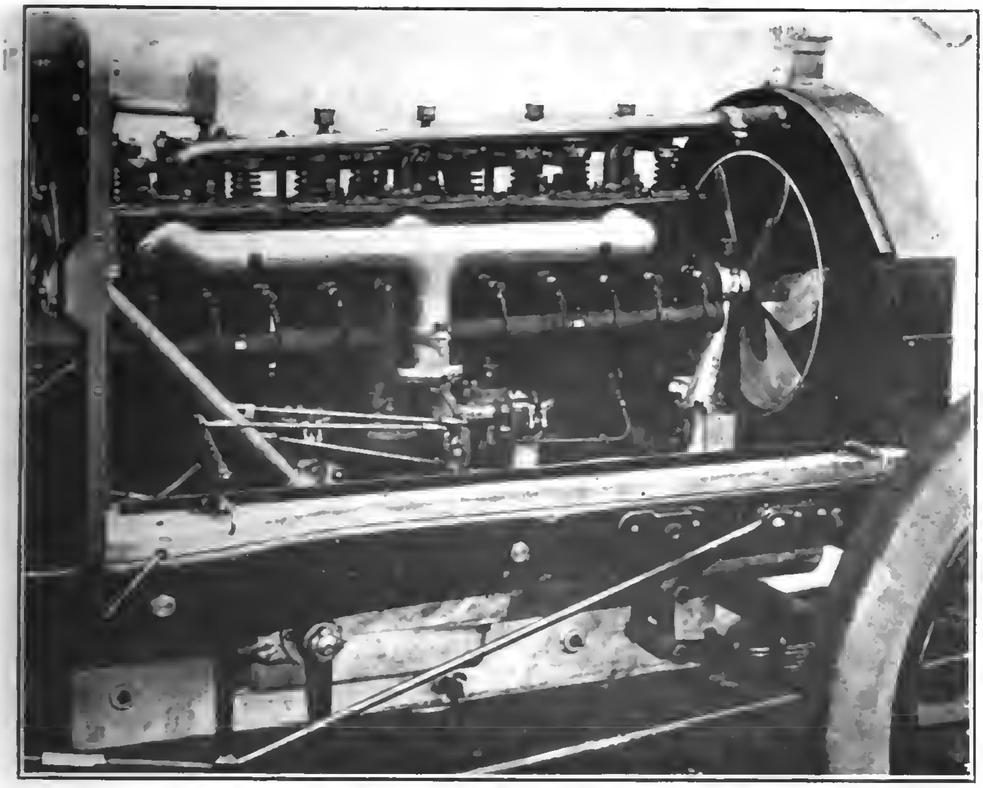


The Dash Carries the Six-Unit Coil and the Oiler Tell-Tale



Neatly Designed Three-Speed Selective Cha[illegible]

Conventional lines of design are closely followed in the motor, the six cylinders being cast in pairs; valves are all in the cylinder heads in a row, actuated by push-rods and rockers from a camshaft enclosed in the crankcase. The actuating parts are made very close to size, with only the minimum clearance, so that they are noiseless in operation without being enclosed or fitted with fiber pads. The cylindrical shape of the combustion chamber allows it to be ground internally, thus assuring uniformity of the explosion impulses of the different cylinders. The



On the Inlet Side Appear the Carbureter and the Conduit for High-Tension Cables

stant-mesh pinion bearing by a single 7-8-inch ball seated axially between ends of shafts.

Brake drums 14 inches diameter, 2 3-4 inch face; internal foot brake and external hand brake; bands and shoes faced with Thermoid.

Front axle made by Timken; weldless drop forging, I-section, 2 1-2 by 1 11-16 inch.

Worm and sector steering gear, ball bearing.

Wheels 36 inches diameter, 10 spokes front, 12 spokes rear. tires 36 by 4 front, 36 by 4 1-2 rear.

Front springs semi-elliptic, 36 by 2 inches, 7 leaves; rear springs full-elliptic, double scroll, 44 by 2 inches, 6 leaves.

Pressed-steel frame, 30 inches wide in front, 34 inches in rear; channel section 5-32-inch gauge, greatest depth 4 1-2 inches, 2 to 4-inch flange; four cross members.

Wheelbase 125 1-2 inches; weight about 2,900 pounds; price with touring body $3,500, including 5 lamps and gas tank.

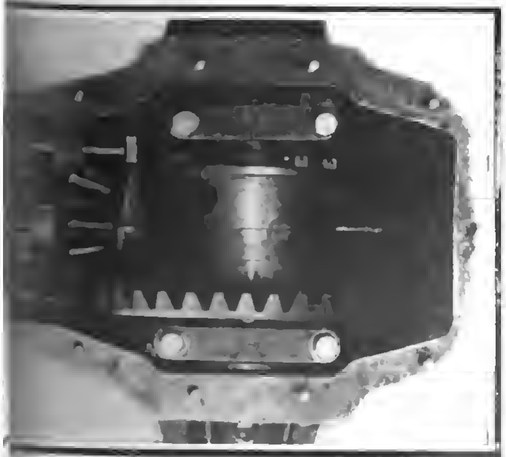
Gasoline tank, capacity 25 gallons, is hung from the rear of the frame, with the front side hollowed out to give clearance to the bevel-gear housing, supported by two steel bands, 1-8 by 1 1-2 inch; tank carries 2 pounds pressure, taken from exhaust, with a pressure gauge and hand pump on dash.

Control: Steering by large hand wheel; spark and throttle levers ratchet-retained on the same sector on top of steering wheel, pulling back to open throttle and advance spark; change-gear by inner side lever, working on H-shaped quadrant; emergency brake by outer hand lever, pulled back to apply brakes; left-hand pedal controls clutch and right-hand pedal the service brake; accelerator pedal to right of brake pedal; cut-out button convenient to left heel.

valves are 2 3-8 inches in diameter, 2 inches in the clear, seated in sleeves ground to shoulders in the cylinder heads.

The base of the motor is an aluminum casting, flanged out to the side members of the frame in such a manner that no under-pan is needed. The lower half is an oil-retainer, and extends back under the flywheel. The crankshaft is carried on four bearings of nickel babbitt; this represents a change from 1909 practice, in which the front bearing was an annular ball type. The photograph shows the completeness of the enclosure. The three-feed mechanical oiler used in 1909 has been replaced by a single gear pump, which maintains a constant level in the crank pits. Oil passes through a tell-tale, allowing the driver to verify the action.

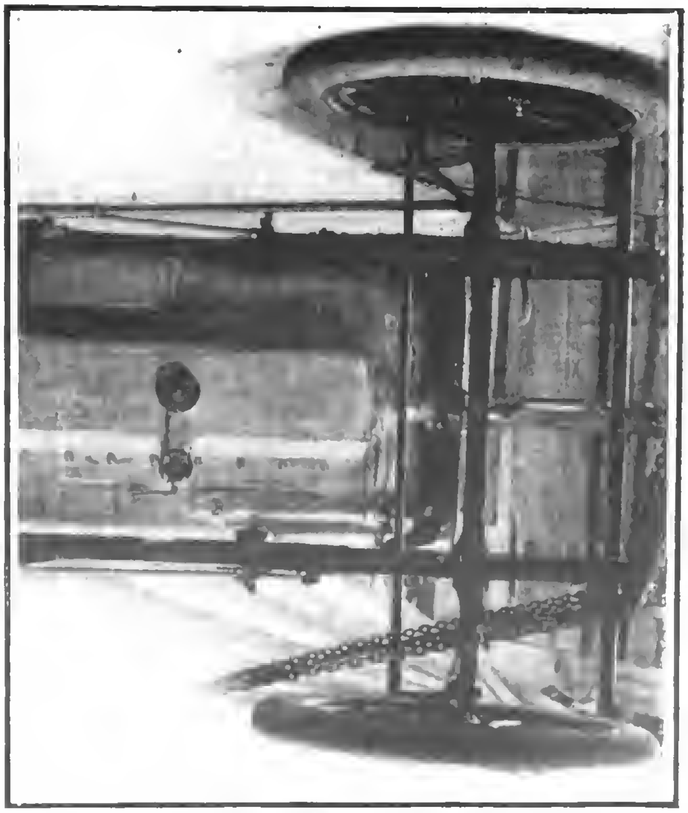
Two independent ignition systems are furnished, including a Bosch magneto, which is located on the left side of the motor, on the pump shaft, and connected by a jaw clutch to allow easy removal. The storage battery auxiliary system works through a six-unit Connecticut coil of a new type in which the units are arranged in two rows of three each, making a very compact box. The systems are entirely separate, each with its own plugs; the high-tension cables are carried through a neat conduit on the right-hand side of the motor.



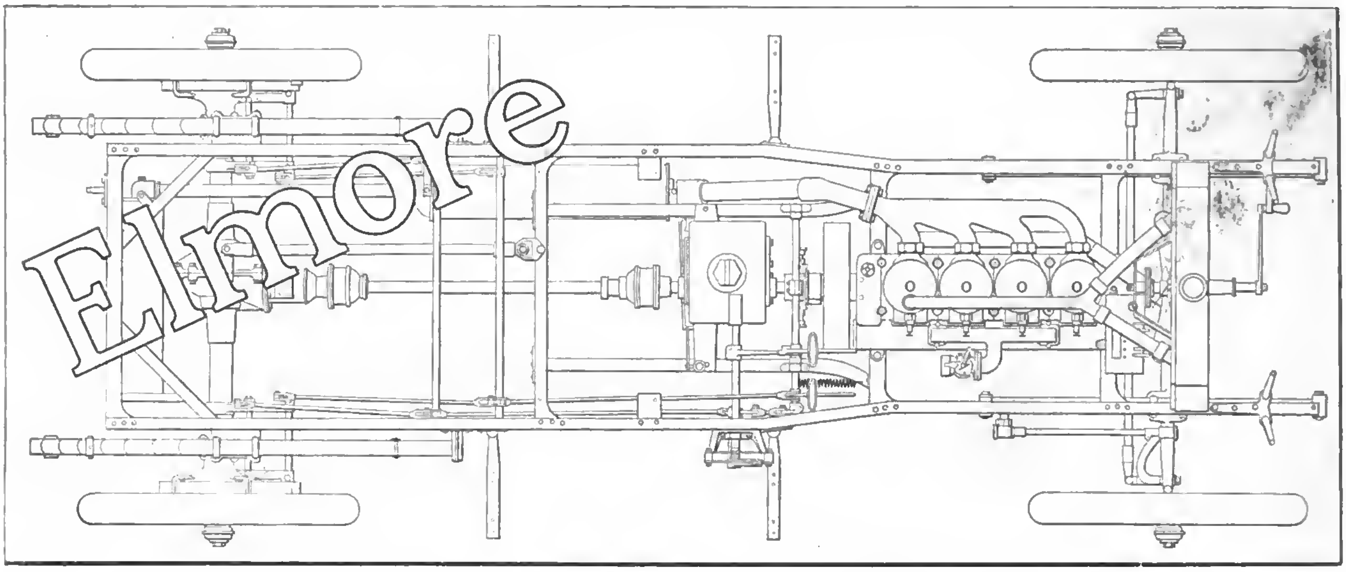
...ked on the Rear Axle, Mounted on Ball Bearings

In performance this Model 18 motor leaves little to be desired. It will run idle at 120 r.p.m. with perfect regularity, the speed being so low that it can be verified by timing the valve-lifts with a stop-watch. The muffler cut-out reveals a regular exhaust. The car runs at 3 miles an hour on the high gear without slipping the clutch, still without vibration, and the only sound audible from the front seat is a faint hum from the transmission mechanism.

Matheson Model 18 in general appearance is striking, with a long and distinctively six-cylinder hood. The mud-guards extend into the frame, with a sheet-metal boot between the frame and the running-board. The touring car and the toy tonneau, seating four, both sell at $3,500. For $4,000, this chassis may be had fitted with a new style torpedo body, while at $4,700, a limousine or landaulet type of enclosed body is available.



Motor Protected Against Dust and Mud Without Separate Pan



View from Above of Chassis of Elmore Model 46, Showing Location of Motor, Transmission and Other Parts

Price, Model 46, touring, $2,500
Weight, equipped, 2,800 pounds
Speed, 4-60 miles per hour
Engine, two cycle, three-port
Bore, 4 1-2 and 6 1-2 in.
Stroke, 4 in.
Horsepower, 46

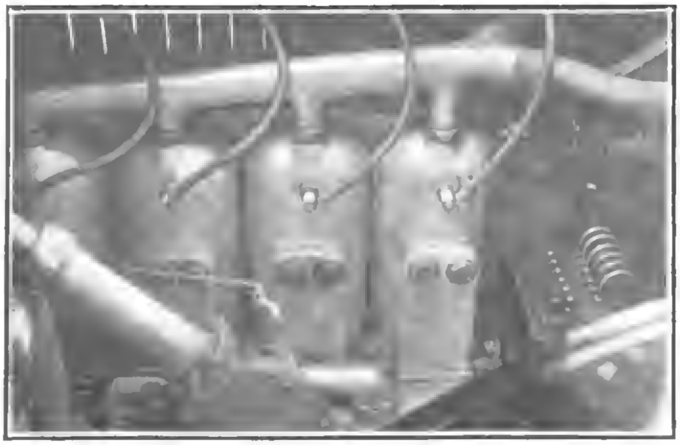
Transmission, horizontal, selective
Speeds, three forward
Drive, shaft with two universal joints
Wheelbase, 120 in.
Tread, 56 in.
Tires, front, 36 by 4 in.
Tires, rear, 36 by 4 in.

Frame, 27-30 carbon pressed steel
Front Axle, I-section, drop-forged high carbon
Rear Axle, semi-floating
Rear Axle Bearings, double ball type
Wheels, artillery type, second growth hickory
Rims, standard universal

CONSIDERING the latest tendencies in automobile circles, no one is more noticeable, widespread, and popular than the double tendency towards simplification and economy, as usually induced by such simplicity. Bearing this prominently in mind, it is not strange that the public has, of late, shown a decided tendency to give the once despised two-cycle motor a chance.

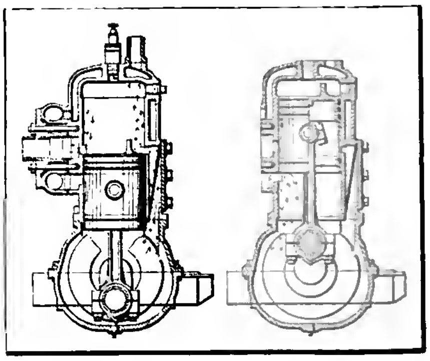
This is resulting in a number of new designs of this type of motor, and others closely allied with it, to say nothing of new and different types, which are, to say the least, getting a fair chance to "make good." Among these may be noted a revival of interest in fuel injection, as first brought out by Diesel, in the differential piston engine, in the use of rotary crankcase inlet valves, of valves within the piston, in the piston head, to be exact, and in many other forms. Some of these differ widely from both the accepted two-cycle and the usual form of four-cycle engine, while some others, in a desire to excel the older types in fuel economy, have turned to a combination in part of the two forms, utilizing some valves, and valve-operating mechanism, while retaining the inherent simplicity of construction and operation of the two-cycle form.

Nor have the older and well-established makers been content to relinquish their advantage, gained by several years' experience, without attempting something slightly out of the ordinary run. To stand aside and allow newcomers to usurp their chosen field would have been a suicidal policy, because each and every one of the newer inventions might have one single feature which would be of such compelling worth as to give the engine prestige and incidentally business, at a bound, so to speak, regardless of the crudities impossible to avoid in the new and untried product of a maker without previous experience



Inlet Side of Elmore High-Duty Engine, Showing Bypass Covers

Among the tried and proven makers in this field of endeavor, no one is better and more widely known than the Elmore Manufacturing Company, of Clyde, O., founded and maintained by the Becker Brothers, up to the recent acquisition of the plant and good will by the General Motors Company. This latter change, it is said, will not result in any radical change in policy, the idea being rather to continue along chosen lines, and expand rapidly on the proven product. Thus, the factory facilities will be increased to such an extent that the output for 1909 of 800 cars will be "boosted" to 2500 for 1910



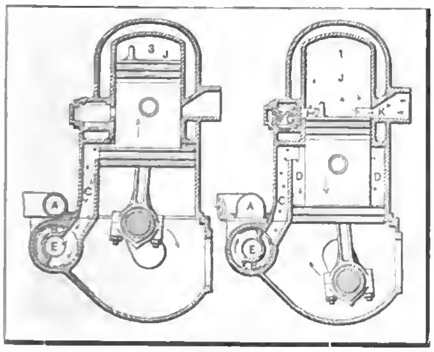
Sections Through Model 36 Engine

This product has been brought right up to date by a slight change in the design of the engine, without, however, changing the bore and stroke, although there are other changes in the construction of the engine. The old engine is also made and used in the lower-priced model, now called Model 36, while the newer engine is only used in the higher-priced car, which is called Model 46, the two names being indicative of the amount of power developed by the two motors.

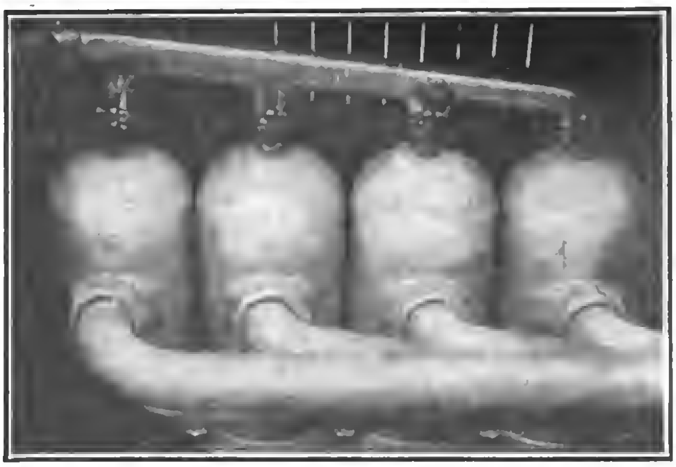
Both are of the four-cylinder, two-cycle, three-port type, but on the higher-powered unit, the differential piston is used. For the benefit of those to whom this nomenclature is strange, it might be stated that this consists of a second and larger diameter for the lower part of the piston, which enlarged diameter works in a cylinder bore of similarly enlarged diameter This latter part of the cylinder bore has a head or top partition of its own, similar to that of the ordinary piston. This enlarged portion is connected to the inlet pipe, which is set low along the right side of the engine, through the medium of a long compartment or by-pass, the lower end of which is opened and closed at the proper time by means of a rotating valve set within the inlet pipe.

This rotating sleeve, for it is more of a sleeve than a valve, is driven off of the crankshaft by means of reduction gearing. In operation, the annular ring, or differential piston, supplies compressed gas to other cylinders, numbers 3 and 4, for instance, compressing gas which flows through into cylinder one's combustion chamber, while the enlarged pistons of 2 and 1 are drawing in and compressing a fresh charge, the shape of the internal part of the distributor sleeve being such as to allow of this. The firing order is 1, 3, 2, and 4, in order from front to rear. Then, considering the operation just described, the next order, after firing cylinder 1, and exhausting from the same, would be cylinders 1 and 2 compressing fresh gas, which would flow through the distributor into the cylinder next in firing order, namely 3. At the same time, the differential pistons of cylinders 3 and 4 are draining in fresh gas.

Getting down to the specific action in any one cylinder, as illustrated by the adjoining small drawing, which shows a section through two cylinders, set side by side, and which are lettered in order to make the operation clear, the incoming gas is drawn into the annular chamber "D" during the entire downward stroke of the piston. The gas passes from the carbureter through the manifold "A" into the distributor "E", then through the distributor port "B" and pump by-pass "C", entirely filling the annular chamber above referred to (Fig. 1). At the same time the gases in chamber "D" (Fig. 3) have been compressed (the crank of this cylinder being on the opposite cycle from Fig. 1), forcing the new gas through by-pass of Fig. 3 into the distributor, which has now changed its position to admit the new gas, and on through port by-pass "F" and ports "H" into the combustion chamber, where, upon being compressed, the gases are ignited and escape through port "K" at the conclusion of the downward stroke of the piston.



Sections of Model 46 Motor

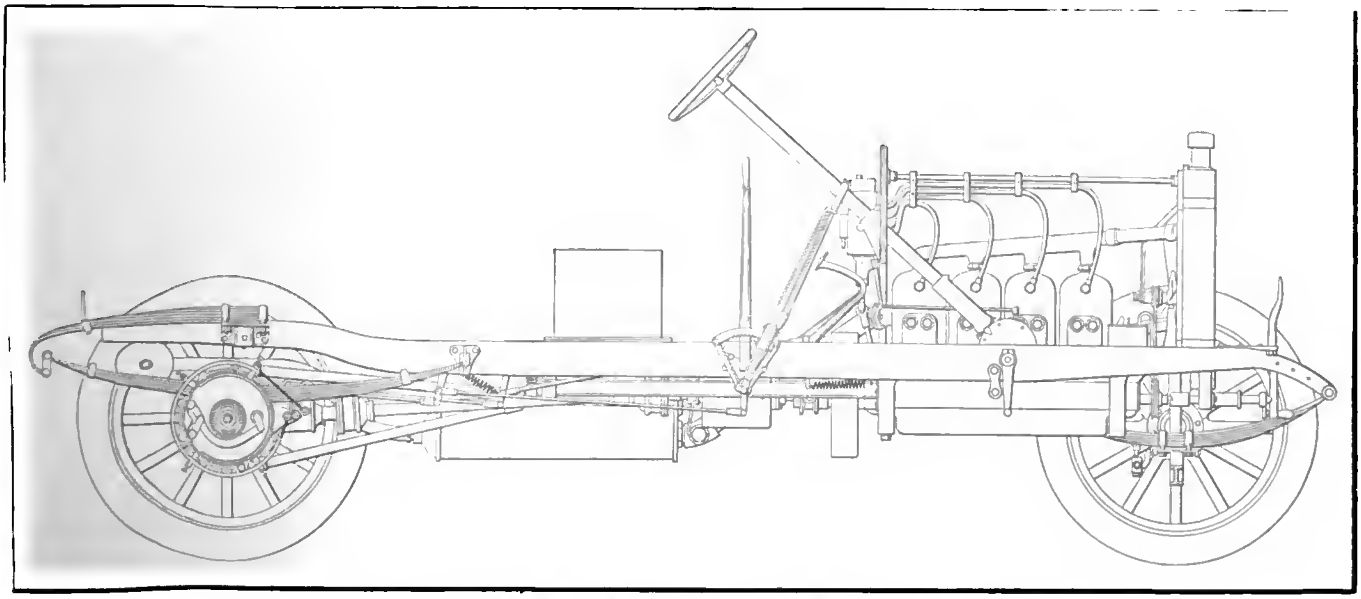


Left Side of High-Duty Motor Showing Exhaust Pipe

There is no intermingling of new and old gas for several reasons. In the first place, there is not time enough; and the escape of the exhaust gas through the port "K" has an ejector effect, creating a tendency to draw in the new gas through a partial vacuum caused by the rapid and complete discharge of the exhaust gas. The incoming gas, through the timing of the inlet port and the shape of the deflector plate on the top of the piston, must first pass to the top of the cylinder, then filling the partial vacuum caused by the exhaust of the exploded gases.

Exhaust in each case is no different from the ordinary case, the port being an opening in the side of the cylinder casting, which, opening the descending piston, uncovers at the proper time. In addition, the deflector on the top of the piston turns the incoming gases upward, away from the outgoing and worthless burned products. In effect, then, the uncertainty of crankcase compression and feeding by guess to the combustion chamber is replaced by exact and determinable compression in a small cylinder for that specific purpose, using a special piston, which compressed product is led accurately into the proper cylinder through a correctly timed rotating valve, mechanically driven. The whole effect should be to make the engine more reliable and efficient in just the proportion that approximations and guesswork are replaced by mechanical certainty.

In Model 36, the older form of engine is retained. This is shown on the page opposite for comparison with the newer type. It has the three ports, the gases being compressed in the crankcase, passing through a by-pass, screened to prevent back-firing.



Side Elevation of Model 46 Chassis, Showing Large Wheels, Springing, and Shape of Frame

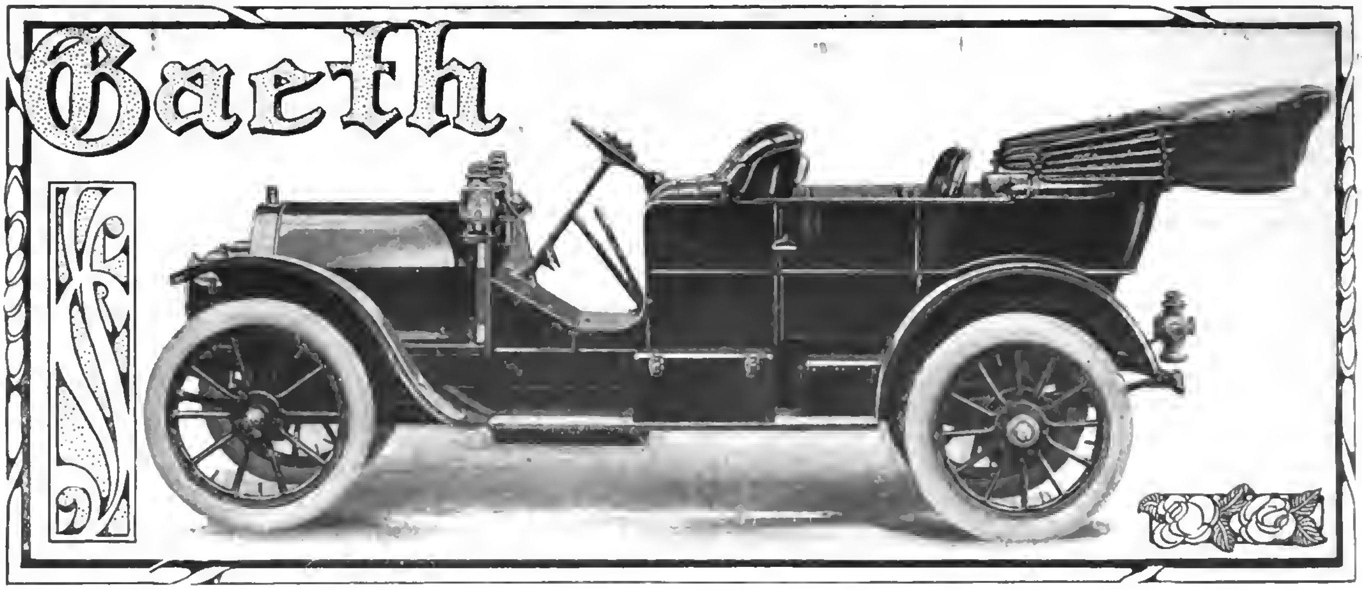


Fig. 1—Gaeth touring car with an attractively designed body following in general the straight-line type, fully equipped

MODEL XXI, 1910 Gaeth, represents a chassis which is normally designed for touring service, and with the side entrance body as presented in the title illustration, it represents characteristic Gaeth construction. Before proceeding with the discussion, involving the power plant and mechanical equipment of the above model, it will be in order to state that the Gaeth Automobile Company, of Cleveland, Ohio, manufactures a commercial type of automobile, in addition to the Model XXI chassis, as used for pleasure automobiles.

The motor, which is used in the Model XXI Gaeth chassis, is shown in Figs. 2 and 3. Referring to Fig. 3, the magneto M_1, which is responsible for the ignition work, is set on a raised surface of the extension of the crankcase (top half) and is driven by a flexibly contrived shaft, which takes its power from the half-time gear system in the housing H_1. The flange F_1, with its overhang H_2, and a similar overhang at the opposite end, butts against the chassis frame, and under pans are not required, because the shape of the crankcase, in view of the flaring extension referred to, renders the system self-contained and tight against foreign matter of any kind whatever.

The ignition system will require a little explanation, in view of a certain ingenuity of construction, involving the make-and-break principle, and in which a vertical shaft S_1, Fig. 2, raises up at the right side of the motor in a mid position between the two pairs of cylinders. The base of this shaft holds a spiral gear, engaging a similar gear attached to the intake valve camshaft, from which power is derived. A means is afforded for sliding the gear on the vertical shaft in the axlewise direction, for the purpose of adjusting the timing relation. A two-piece bronze sleeve is fastened over the camshaft, and bears in a groove in the end of the sliding gear. The spark level on the steering wheel is connected to this sleeve by suitable links and a motion, for the purpose of enabling the driver to suitably advance or retard the spark.

To the top of the vertical shaft S_1, Fig. 2, there is a pair of small cranks, which are related to as many push rods in a horizontal position, which are placed there to trip the contact arm of the igniter. The excellence in point of detail of this ignition system will best be appreciated by observing the character of the work indicated as I_1, Fig. 2, this being one of the vertical post stops

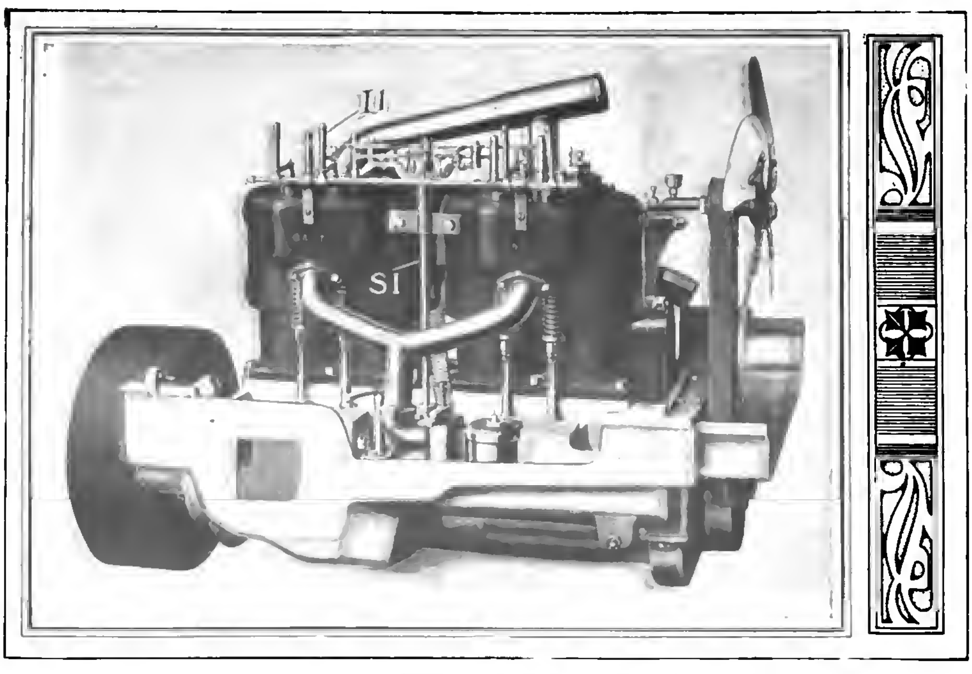


Fig. 3—Make-and-break ignition system actuated by a vertical shaft

The four-cylinder water-jacketed motor of the four-cycle type is of symmetrical design, with the cylinders cast in pairs. The bore is 4 7-8 and the stroke 5 1-4 inches. In the design of the cylinders, particular attention was paid to the water-jacketing, the idea being to allow a sufficient volume of water at every point to assure efficient cooling. The path of the current of water is directed in such a way that each portion of the water is heat-ladened to its maximum ability, and the ills of unequal expansion are avoided. The metal used in the cylinders, pistons and piston rings is a specialized gray iron product, which affords a hard white surface over the cylinder bore, and a close grain in the section with a sufficiently high average strength to indicate competence.

The valves are placed in offset extensions, with the inlet and exhaust on opposite sides T-fashion, and the valve diameters are substantially equal to half the cylinder bore, which condition, together with a properly arranged compression, well-timed ignition and suitable carburetion, is responsible for the tenacity with which the torque holds under conditions of increasing speed, so that the power of the motor increases in direct proportion to speed, up to a high point in the range of performance.

The camshafts, one for each valve system, placed on opposite sides within the crankcase, are supported by three well-designed white metal journals, and with the half-time gears. are completely enclosed. Means for profuse lubrication are provided, and silent performance, which is experienced, is due to:

(A) Accuracy of workmanship.
(B) Muffling effect of the housing.
(C) Precision of adjustment.

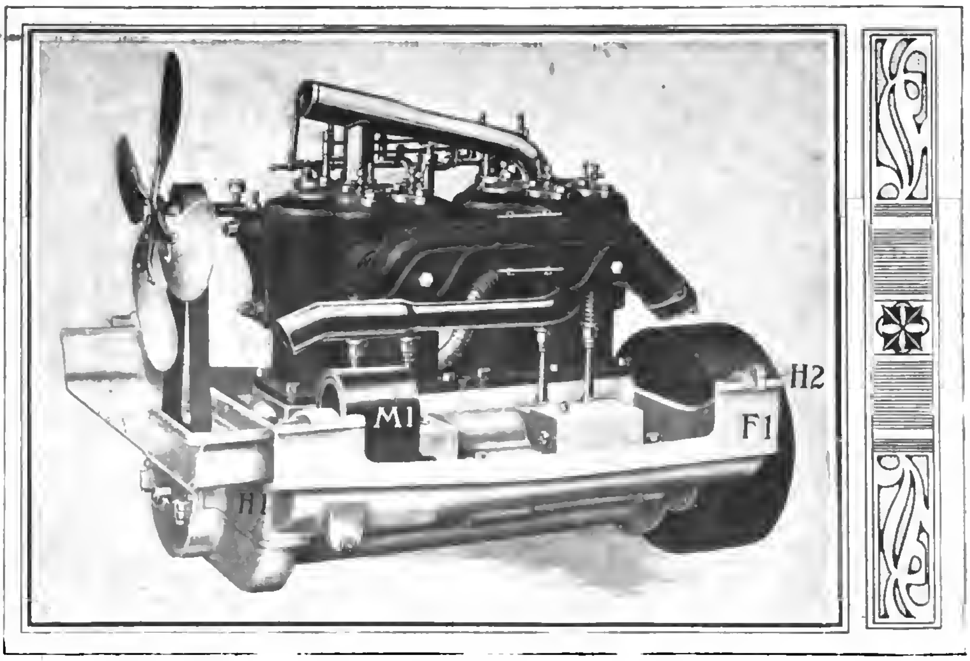


Fig. 3—Large pipes allow natural water circulation, without pump

Much of the good performance of the motor may be traced to the shape of the valves, which, by the way, are the same size for inlet and exhaust, lightweight of the reciprocating mass, and the well-designed valve springs which have life and strength sufficient to compel the roller to hug the cam faces. so that the valves close within the minimum allowable angular distance of travel of the camshaft.

As a further indication of the competence of design of the motor, the connecting rods and pistons may be examined, when it will be found that the pistons are shaped for strength in the absence of undue weight, and the connecting rods are drop forged from a suitable grade of carbon steel, after which they are annealed, thus inducing kinetic qualities, the idea being to make them not only stout, but light, in order that the secondary moments which increase as the speed square, will be so limited that the extreme fiber strain in the shear plane of the most critical point in the crankshaft will be within the allowable limit, taking as a basis the life of the steel. under conditions of diagonal work, remembering that it is but short, if the extreme fiber strain is any great proportion of the elastic limit of the material used.

Aluminum is used for the top and bottom half of the crankcase, transmission gear case, and such other parts as may be produced for the purpose of maintaining the total weight of the car within proper limits without endangering life, which is a matter of properly utilizing aluminum, it being the lighter of the metals with strength sufficient for the work it is placed to do.

In Fig. 4 are to be seen both of the axles, the front with the steering knuckles, and cross-connecting rod, and the rear with brakes, brake operating levers, truss rod, and other parts. The former is of the I shape, now so general, and has a deep drop in the center. The cross-connection, on the other hand, is carried straight across, being placed back of the axle, so as to be protected at all times. The spring pads, for the support and attachment of the springs, are forged integral with the bed. In the axle end construction, a thrust bearing is placed below the upper arm of the axle, thus taking up all heavy load from above.

The rear axle is composite, being of several parts, each best suited as to shape and material to the work to be done, the whole being united into a complete and sturdy unit, by riveting and welding, the spring pads being held on by means of bolts. The brakes are of two kinds, internal expanding and external contracting. The former are separately operated.

There are many other points of mechanical design which are characteristic of the Gaeth engineering office that accord fully with the methods thus far described, and a close study of the illustrations here given will render them at once apparent.

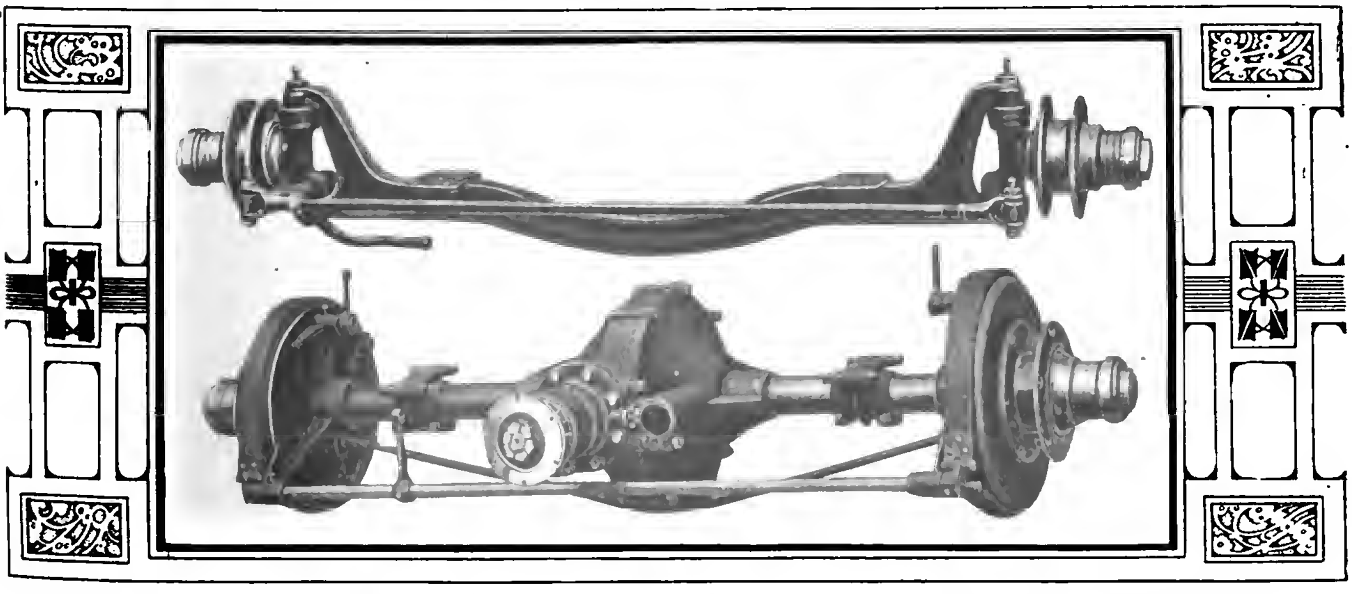


Fig. 4—Front and rear axles, both of standard design; the former an I-section forging, the latter of the floating type.

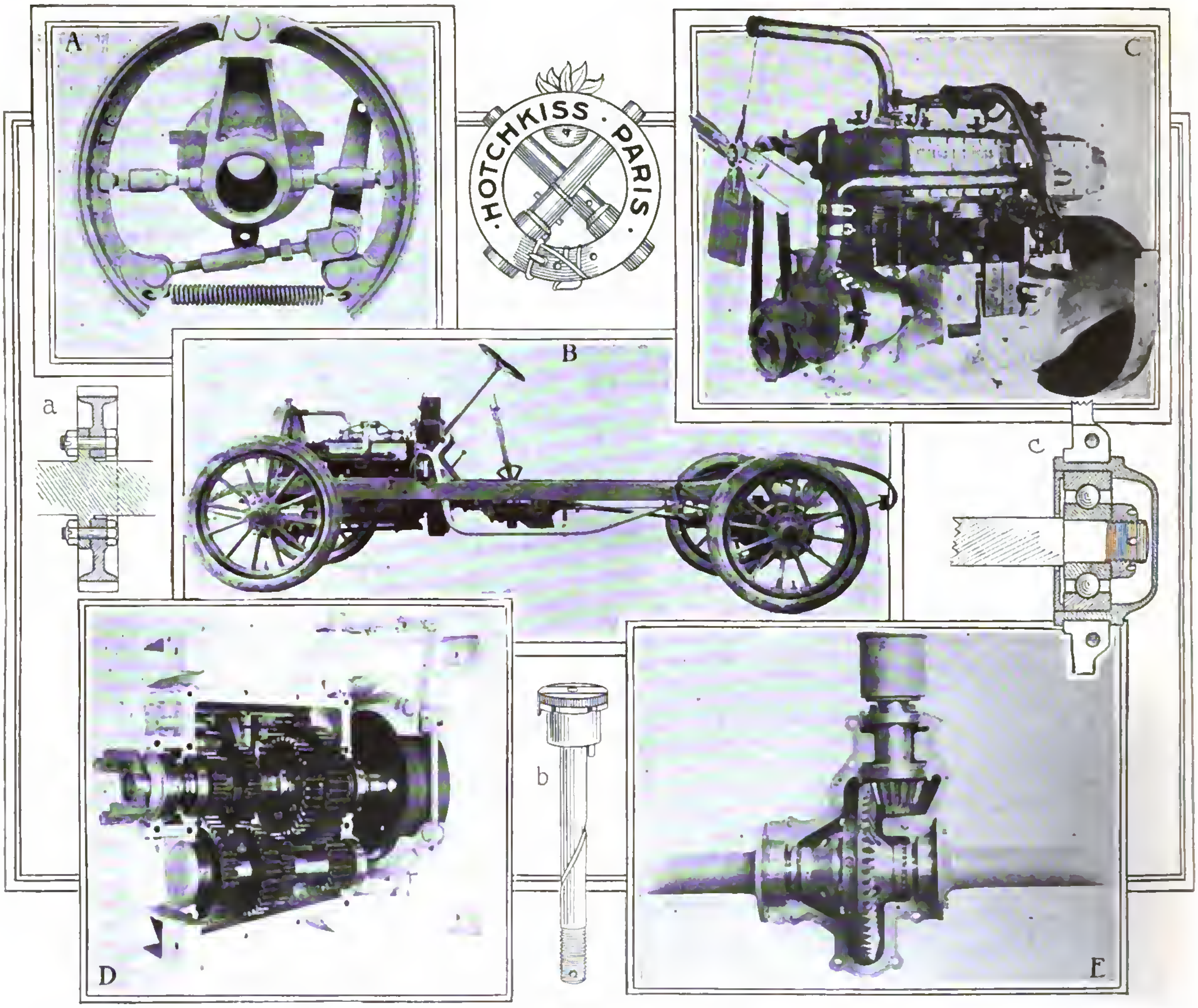


Fig. 1—Model T Hotchkiss showing the chassis side view motor, transmission gear, bevel drive, brake mechanism, and other details

MODEL T Hotchkiss as here mechanically considered, is offered for the purpose of presenting the characteristics of the French school of design, and the illustration *B* in the above group shows the chassis assembled, in which the side bars are of the channel section, with a rear kickup, and three-quarter elliptic springs (scroll type) are placed to absorb the road inequalities and induce a level platform. The general construction of the chassis approaches that which seems to be the trend from the point of view of standardization, and it is in the details in design of the component parts that much of interest will be found if the keen observer looks.

Referring to *A*, which is at the upper left-hand of Fig. 1, the internal expanding brake mechanism shows a stout spring release, which is diametrically the point of hinging of the two shoes, and the spring is prevented from pulling the shoes toward the axis in the radial plane by a pair of adjustable limit stops, which are jacks of the screw type in miniature. Lock nuts are responsible for the permanence of the adjustment of the jacks. When it is desired to apply pressure to the brake drum, motion is imparted to a lever arm, the fulcrum of which is at the terminus of one of the shoes, and a strut, with a turnbuckle to vary its length, engages the arm near the fulcrum, and is connected with the adjacent arm. By means of this adjustable strut, the shoes are expanded, and the distance of travel of the brake arm, for a full engagement of the brakes, may be varied by altering the length of the strut, through the good office of the turnbuckle.

The Model T motor is shown at *C* in the same figure, and among its conspicuous features there are a few which show upon the surface, as the location of the large water pump at the front of the motor case, fastened to the cover of the half-time gear housing, which brings the water intake to the pump within a few inches of the underside of the radiator, when the motor is in its proper position in the chassis, so that the arrangements for cooling are complete and much simplified. The magneto shows on the right side of the motor in a mid-position, and the wiring passes up through a conduit which is shaped for convenience, while the arrangement suggests system and freedom from ignition troubles. The air fan, which is run by a flat belt with a wide-faced flanged pulley at the driving and driven end, has unusually large veins and suggests capability. The cylinders are provided with separable jacket covers, which have three advantages, (a) the castings come from the foundry in a more perfect state, because the gases which are generated during the pouring process are tapped away through the openings thus afforded; (b) the castings may be freed from core sand; (c) in service, if the cooling water is full of sediment, and it forms a crust over the heated surfaces, the covers may be taken off and the crust may be gotten at and removed.

Referring to *E*, the jack shaft, bevel drive and differential gear system are presented, half of the housing being removed for the purpose. The differential gearing is compact, is of the bevel gear system, and the housing is provided with holes, through which grease may circulate for an obvious purpose. The bevel gear, which meshes with the driving pinion, is flanged to the differential housing, and it is conspicuous for its shape. The design of the bevel gear is symmetrical, with uniform thicknesses of metal at every point, and the noiseless performance obtained in practice is due to absence of deformation of the bevel gear during the heat-treating process to which it is subjected to give to it kinetic properties. The driving pinion fetches up on a taper, and a large castellated nut engaging a threaded portion on the end of the propeller shaft assists in forcing the pinion up on the taper and holds it in place. The shaft terminates with the pinion, and two annular types of ball bearings placed just back of the pinion carry the load. The bearings are relatively large, and are spaced far apart so that the tendency of the propeller shaft to float away from the bevel gear is adequately resisted. The shaft terminates in a universal joint just outside of the housing.

The transmission gear is shown at *D*, and the service brake drum is on an extension of the shaft, just outside of the case, and the method of its application is suggested by the arrangement of the links and levers there indicated. The system is selective, with four speeds and reverse, and the gears have wide faces, and are securely placed on shafts of relatively great diameter, considering the distances between bearings, so that shaft deflections are reduced to the infinitesimal increment.

The sketch (a) shows how the gears are flanged and bolted to the shafts, and it is pointed out that the gears are of symmetrical design, with even thicknesses of walls, hence they may be finished and heat-treated with the minimum difficulty, from the point of view of deformation, so that in service undue strains will not be present and noiseless performance will be more nearly assured. Sketch (b) shows a detail which represents the knuckle pin, which is made of a fine grade of alloy steel, is threaded at the lower end, has an integral bowl-shaped enlargement at the upper end, in which a cavity is fastened for the purpose of storing grease, and a compressor top, with a suitable lock, may be screwed down for the purpose of forcing grease into the bore of the pin, thence out through holes, which register with a groove, the latter being shown. Sketch (c) suggests the secure manner of placing the radial ball-bearings which are used in Hotchkiss cars. The bearings are a sucking fit over the spindle, press up to a shoulder and are held in place by castellated nuts. Separate bronze housings are used in conjunction with these bearings, and means are at hand for retaining the non-acid grease which is recommended for use with ball-bearings.

SOME INDICATIONS OF EXCELLENT SERVICE

Fig. 2 presents a group of parts which were taken from a Hotchkiss car and put under seal by the technical committee of the R. A. C. After the car, which was rated at 45-horsepower, traveled 10,000 kilometers in France (6,250 miles) it subsequently entered the English Tour, and made 15,000 miles under the observation of the technical committee of the R. A. C. The photographs were taken with the seals of the R. A. C. intact, and a close inspection of them develops nothing by way of noticeable depreciation or even ordinary wear.

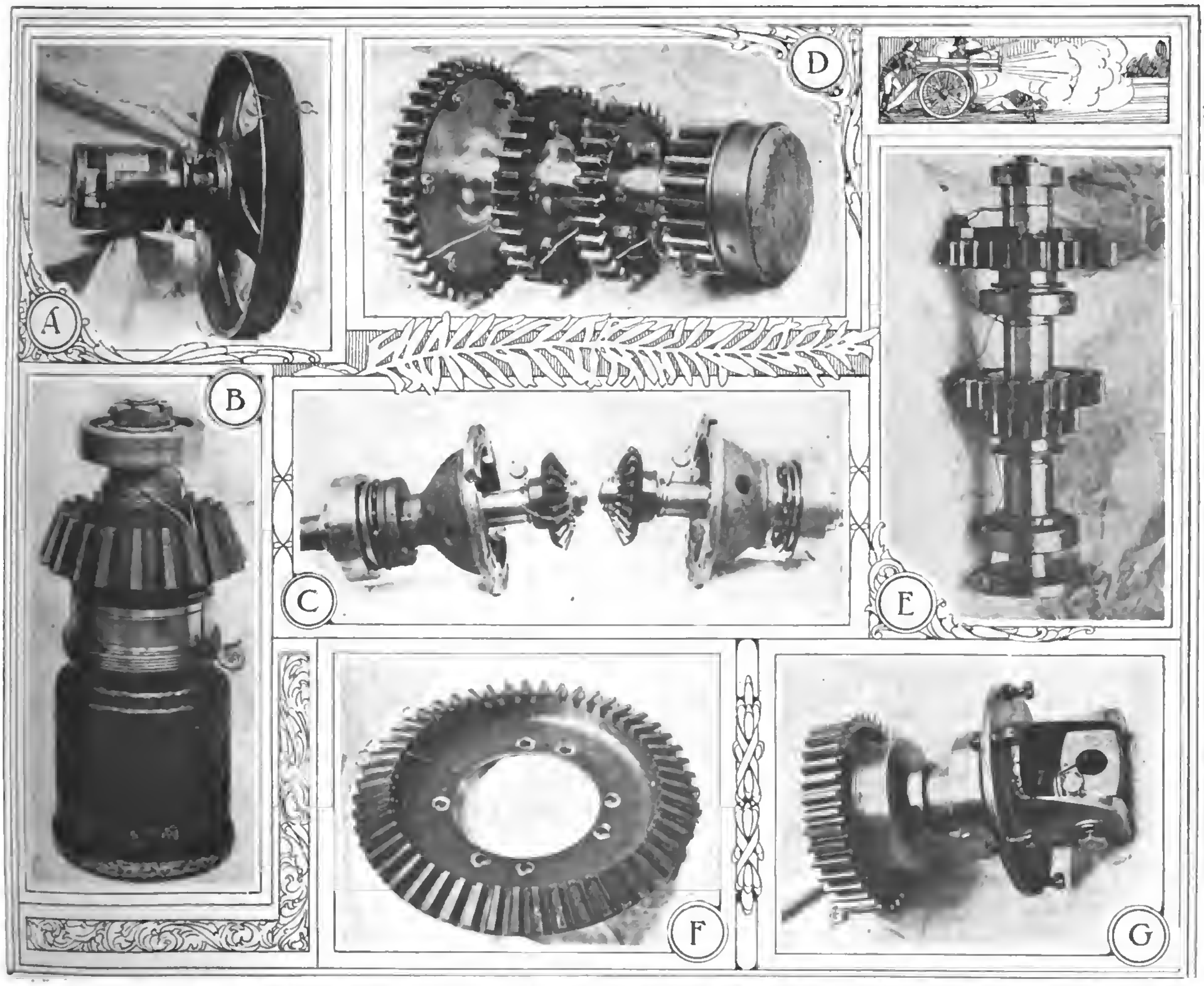


Fig. 2—Transmission gears, bevel gear system, differential set, universal joints and clutch, as taken from a Hotchkiss car, by the R.A.C. Committee after an endurance run, showing the seals in place

Fig. 1—Six-cylinder Napier landau with long wheelbase, excellence of accommodation, ample power, definite control, and class distinction

GLANCING at the title illustration discloses a Napier six-cylinder automobile, in this particular example, fitted with **a landaulet body, which is selected to accentuate the characteristics** of Napier cars from the point of view of appearance and accommodation. It will be observed that the wheelbase is sufficiently long, not only to afford room for a six-cylinder motor, but to include a wide side entrance in the body design, and at the same time leave for the driver's accommodation a full-sized seat and ample foot room.

It is distinctly in the path of wisdom to make the wheel base such as to permit of utilizing a motor, if of the six-cylinder type, which will not be cramped in point of design for no better purpose than to save room, and the side entrance of the body must of necessity be wide. It is an excellent idea so to place the door that it will swing open in the forward direction. In this design the door is far enough towards the front of the car to clear the rear mudguards. It is also advantageous to allow the standard proportions for the driver's seat, and the regular amount of foot room, thus permitting him to assume an easy and natural position.

The Napier six-cylinder motors are made as follows:

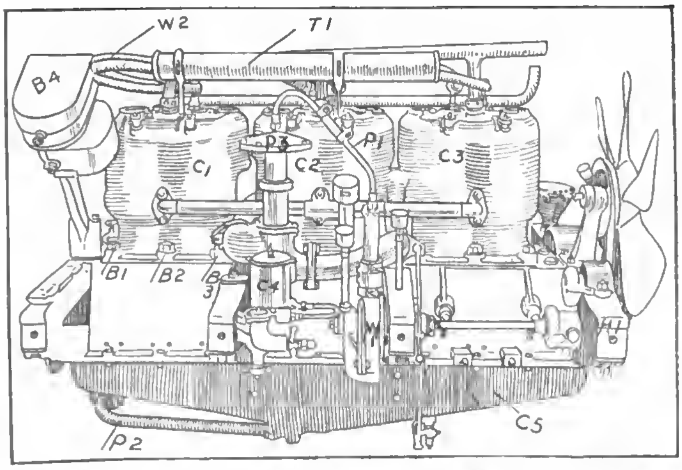


Fig. 2—Sketch of right side of six-cylinder Napier motor, showing the diaphragm connection from the carbureter to the water pump, secure wiring, and four points of fastening to the chassis frame.

(A) Thirty horsepower, shaft drive (R. A. C. rating 25.3 horsepower), which is known as No. 16, with a landau body, which includes a canopy over the driver with a means for carrying it on the runabout opposite the driver's seat on the right side.

(B) Forty horsepower, chain drive, with a special chassis, including a three-speed transmission, pressed steel frame, 11-foot 2-inch wheel base, standard gauge, three-quarter platform near rear, and a wheel equipment which includes 880 by 120 (millimeter measurement) tires on all wheels. The gearcase has ball bearings, and the anti-friction equipment extends throughout, with the exception of the crankshaft, which has plain bearings.

(C) The 45-horsepower motor (R. A. C. rating 38.4 horsepower), unlike the 40, is fitted into a chassis which rolls on wire wheels. The tire equipment on this chassis is 880 by 120 front, and 895 by 135 rear, in millimeters. This model is a shaft drive, has a three-speed transmission and pressed steel frame. The wheelbase is 11 feet 2 inches, with standard gauge.

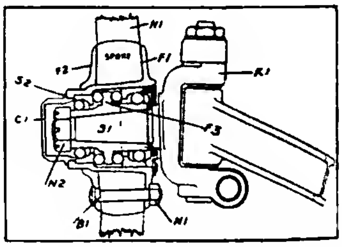


Fig. 3—Sketch of the front wheel and knuckle, sectioned to depict ball bearings for radial and thrust loading.

(D) The 60-horsepower motor (R. A. C. rating 60-horsepower) has a motor with a bore of 4 inches and a stroke of 5 inches, and six cylinders, of course. The wheelbase of this chassis is 11 feet 2 inches, with standard gauge. The tire equipment is 880 by 120 front, and 895 by 135 rear, in millimeters.

(E) The 90-horsepower motor (R. A. C. rating 89.9 horsepower) is a shaft-drive car, with wire-spoked wheels, and a wheelbase of 11 feet 11 inches, with standard tread. The tire equipment is 935 by 135, front and rear, in millimeters.

In addition to the models as above outlined, the six-cylinder Grand Prix is to be remembered, the R.A.C. rating of which is 59.2 horsepower. Then, there are commercial models of the Napier for every conceivable purpose.

It would be difficult to state just which of the Napier models are the most popular, or which have the greatest power. The best way, perhaps, for one who may be interested, will be for him to consult his own individual needs, with the understanding that there is a Napier model to be had to fill substantially every one. In order, however, to bring out the characteristics of the Napier school of design, reference may be had to Fig. 2, of a six-cylinder motor, in which the cylinders C1, C2, and C3 are cast in pairs, have a symmetrical exterior, six holding-down bolts, B1, B2, B3, etc., three of which are on each side of each pair of cylinders, and the flanging is so contrived that imperfections in the section of the casting at the junction of the flange with the wall are aborted, and in the same way, the thicknesses of walls and scheme of design assure perfection of the foundry work, ease and precision of the machining process, and other desirable properties.

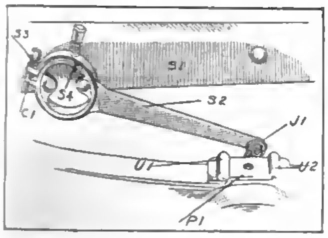


Fig. 5—Sketch of Napier shock absorber, method of applying, and means afforded for taking up lost motion using a spring.

The carbureter, C4, is on the right side of the motor, is especially designed for the desired flexibility of the motor, has means for converting the atomized fuel into gas form before it enters the cylinders, and carbon formations are thereby reduced to an unimportant minimum. The water pump, W1, is located in front of the carbureter, and is driven by a shaft which has two bearings in motor arms, and connects with the half-time gear system, which is in the housing H1.

The lower half of the crankcase, C5, is so shaped that the lubricating oil is held therein, and is circulated through the pipe, P1, by a pump, thence to the journals to be lubricated, and back, thus saving all but the small amount which is burned in the cylinders, with the added advantage, however, that it is properly filtered during each cycle of its travel.

Ignition involves the use of the Napier synchronized accumulator and high-tension magneto. This system is well known for its simplicity, and the excellence of the spark afforded, and require but the use of one coil, in conjunction with a low-tension make and break, with means for perfectly timing the spark. The magneto is especially provided with a synchronized gear-driven mechanism, which renders it fit, without detracting from stability, or adding complication. Referring again to Fig. 2, it will be observed that the wiring, W2, is suitably encased in a tube, T1, and that the wiring passes out of a box, B4.

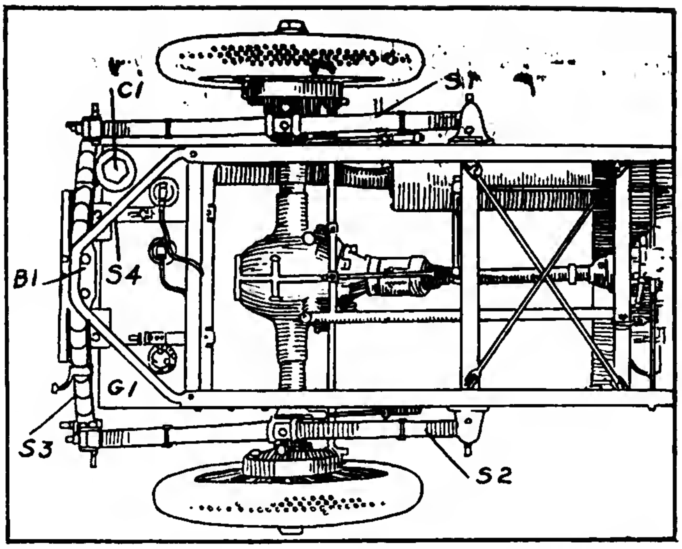


Fig. 4.—Sketch of rear of chassis, showing the long half-elliptic side members and cross member of the platform spring system, live rear axle, rear bracing, and gasoline tank.

Fig. 4 shows the rear of a Napier chassis, with long half elliptic springs, S1 and S2, a lateral spring, S3, at the rear, and a stout support, S4, which takes the work at a midpoint on the lateral spring. A secure bolting system, B1, maintains the position of the lateral spring, S3, and the gasoline tank, G1, is nested under the chassis frame in front of the lateral spring, S3, with a filler cap, C1, in a clear situation, as shown.

Fig. 3 shows the front wheel hub in section, with stout hickory spokes, H1, clamped between flanges F1 and F2, with bolts B1, so arranged that they may be pulled up tight by means of a nut, N1, without causing trouble by turning with the nut.. The knuckle, K1, is of the desired proportions, with a tapered spindle, S1, and the double system of ball bearings, the central members of which, being placed to take thrust loads, with a flange, F3, so placed as to interfere with axlewise motion. The hub nut, N2, presses the inner race up against the tapered spindle, and is locked by means of a cotter pin which registers with castellations in the nut. The hub cap, C1, screws up against a shoulder, S2, hence it will stay in place without other locking means.

Fig. 6—Napier taxicab and town car model with a wheelbase long enough to make the entrance commodious and chassis low to match

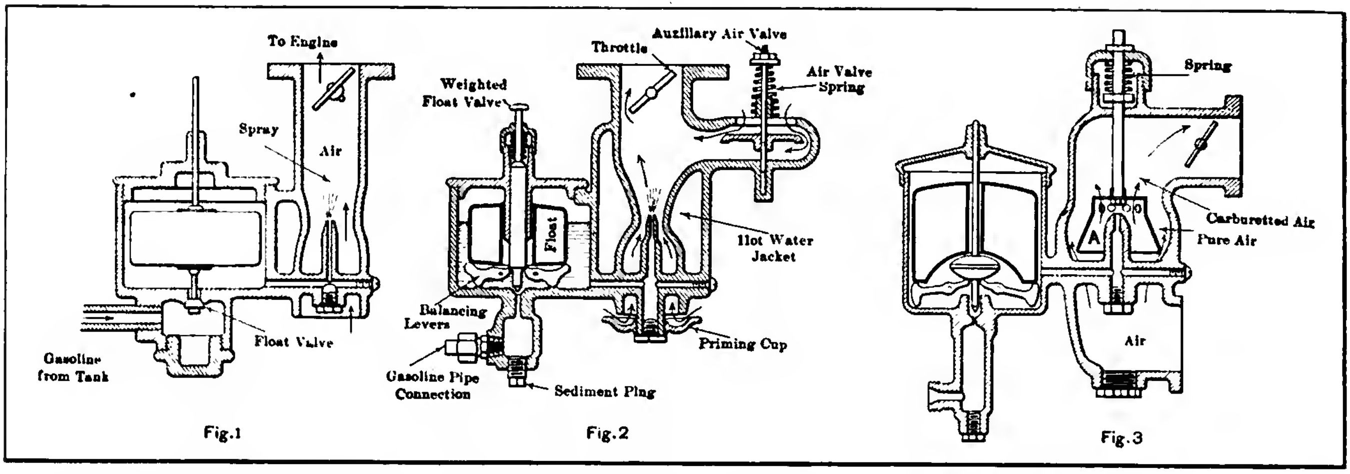


Fig. 1—Elementary non-automatic float-feed carbureter. Fig. 2—Automatic float-feed carbureter having Venturi mixing tube and spring controlled auxiliary air valve. Fig. 3—Automatic float-feed carbureter in which all air enters by one intake. The spring controlled valve A determines by its lift the amount of air which passes around it without taking up gasoline. At low speeds the bottom edge of this valve A almost touches the casing, so that practically all the air goes up past the spray nozzle.

THE CARBURETER, ITS ADJUSTMENT, AND THE NOVICE

By HERBERT L. TOWLE.

PERHAPS the best advice for the novice regarding his carbureter is to let it alone till he understands something of its working. It is very easy to spoil a good adjustment by random tinkering, and much less easy to restore it.

Nevertheless it is certain that, some time or other, every owner will be thankful to know as much as possible about his carbureter. At best the carbureter is a somewhat delicate device, and cannot be otherwise, from the fact that the forces acting on it are only those of the engine suction. Some time or other—it may be next month or next year—some trivial thing will go wrong. If the owner understands his carbureter he will trace and correct the trouble in a few minutes. If he does not, he will waste hours hunting for it, or pay the too-willing garage man to help him make a mountain of a mole-hill.

It is common prudence, therefore, for the reader to take the first opportunity to learn all about carbureters in general, and his own in particular. You should know what the spray nozzle, float and auxiliary air valve are; how they work and how to get at them; how to drain off sediment, clean the strainer and disconnect the gasoline pipe; what the several adjustments are, and what results may be expected if they are changed; what changes are likely to be required by variations in weather, altitude and fuel; and, finally, what the symptoms and the treatment are of the commoner derangements to float, gasoline supply and air valve. Although the information last named cannot come first it is quite as important as the preceding to your peace of mind and economy of purse.

In Fig. 1 is shown an elementary type of carbureter, now obsolete, but the basis of most modern types. It works on the principle of an atomizer, air being sucked past a nozzle from which a jet of gasoline is aspirated. The normal gasoline level is kept just below the nozzle by a float controlling a valve through which the gasoline must pass on its way from the tank. The tank is placed higher than the carbureter or else is under air pressure to lift the gasoline. This type of carbureter is unsatisfactory for two reasons:

1. When the engine is running slowly the velocity of the air past the spray nozzle is not sufficient to draw gasoline, or to break it into spray, if drawn. To increase the air velocity at slow speeds, the passage around the spray nozzle must be constricted, and that would reduce the capacity of the carbureter at high speeds.

2. When correctly adjusted for low speed, too much gasoline is delivered at high speed. This fact is due to liquids and gases obeying different laws of flow. To a certain extent this difficulty may be met by using special forms of nozzle orifice.

To overcome both objections at a stroke the automatic carbureter was devised, a common form of which is shown in Fig. 2. Here the air passage around the spray nozzle is constricted so much that a small flow of air will produce a spray. To admit sufficient air for high speeds, and at the same time to dilute the carbureted stream—which, as above noted, is too rich at high speeds—pure air is admitted through an auxiliary valve which opens only when the suction exceeds a certain amount. The lift of this valve and the quantity of air passing through it depend on the suction, the form of the spring, and the shape of the air passage around the valve. When properly proportioned this carbureter will deliver gasoline and air in nearly constant ratio at all degrees of suction within its range. To arrive at the correct proportions, however, is a difficult matter, and not all carbureters

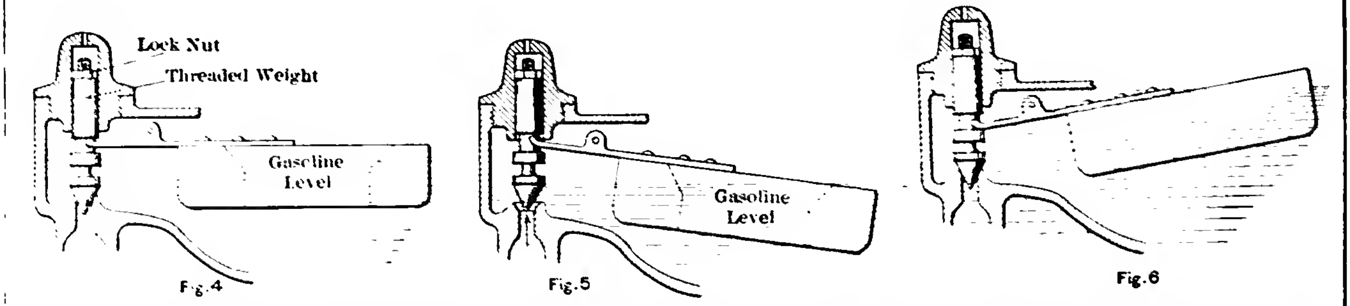


Fig. 4—Simple type of float and float-valves with gasoline level normal. Fig. 5—The same, with low gasoline level, showing how float-valve opens. Fig. 6—The same, with leaky float-valve. The float rises but cannot check the leak, and float chamber floods

are equally successful in that regard. The common adjustments are four in number:

1. The float valve, which regulates the gasoline level.

2. A needle valve controlling the size of the spray orifice (not shown in Fig. 2).

3. The tension of the spring controlling the auxiliary air valve.

4. A stop limiting the extreme opening of the latter.

Raising the gasoline level makes it easier to start the engine, but if carried too far causes gasoline to run continuously from the nozzle. Opening or closing the needle valve controlling the spray orifice gives more or less gasoline throughout the entire range of action. The auxiliary air valve spring is under some tension when the valve is closed, therefore a certain suction is required to open it. This compels all the air to go past the spray nozzle at low speeds. The exact form, length and tension of the auxiliary valve spring have a great influence on the opening of the valve at different degrees of suction. Slackening the spring obviously permits the valve to open more or at a lower suction, and vice versa. The function of the stop is to prevent the valve from opening too much under high suctions. The object of this is partly to prevent fluttering of the valve, but chiefly to prevent excessive air from being drawn in. If the spring controlling the valve is of equal diameter throughout its length, and but one spring is used, the valve will open too much at high speeds unless arrested by the stop. This fact is met in most recent carbureters by making the spring conical, so that its resistance to bending increases progressively, or by adding a second and stiffer spring which comes into action when the valve is partly open. Such a valve is much more nearly automatic than that with the simple helical form of spring.

Starting from the typical form in Fig. 2, modifications of detail have been indefinitely multiplied. Some carbureters have two or more separate nozzles and mixing tubes, one large, one small, of which the smallest starts first with the weakest suction, and the second and others (if any), are brought into action successively as the suction increases. In some carbureters, bronze balls seating over holes of different sizes take the place of the spring-controlled air valve and open one after another. In still others, all the air enters by a single primary opening, but divides, part of it going past the spray nozzle and taking up gasoline, while the remainder is shunted around the spray nozzle and dilutes the carbureted stream. The automatic valve acts on the pure air supply only, increasing it with the suction. An example of this form of carbureter is shown in Fig. 3. The auxiliary valve has somewhat the form of a bell, and is attached to a stem controlled by spring. As the suction increases the bell lifts and more air passes under its lower edge to join the carbureted stream coming through perforations in the upper part of the bell.

Whatever his carbureter, the novice can with a little trouble identify its various elements; and, aided by sectional illustrations, he can learn how to get at them for inspection. The internal parts most apt to need attention are the strainer (if any), located usually between the gasoline pipe and the carbureter, but sometimes built in underneath the float chamber; the float valve and float, and the spray nozzle. Of these the strainer needs occasional cleaning; the float valve is adjustable to vary the gasoline level; the float needs no attention unless it becomes soaked with gasoline, or punctured (if of metal); the spray nozzle takes care of itself unless choked by a particle of dirt, which must be poked out with a wire. Besides these are the sediment plug or pet-cock; the needle, if any, adjusting the spray nozzle, and the air valve spring and stop, all of which are external and visible.

We come now to the minor adjustments needed by any carbureter owing to changes of weather and the like. Few carbureters are as efficient on a very wet day as on a dry day, on account of the reduced capacity of the air to absorb further moisture. For this reason an excess of gasoline must be supplied by increasing slightly the needle valve opening of the spray nozzle, if there is one. Carbureters having no spray needle are provided with other means of regulation, usually by modifying the suction at which the auxiliary valve opens. To produce an effect similar to enlarging the auxiliary air valve spring tension is increased, thus admitting less air.

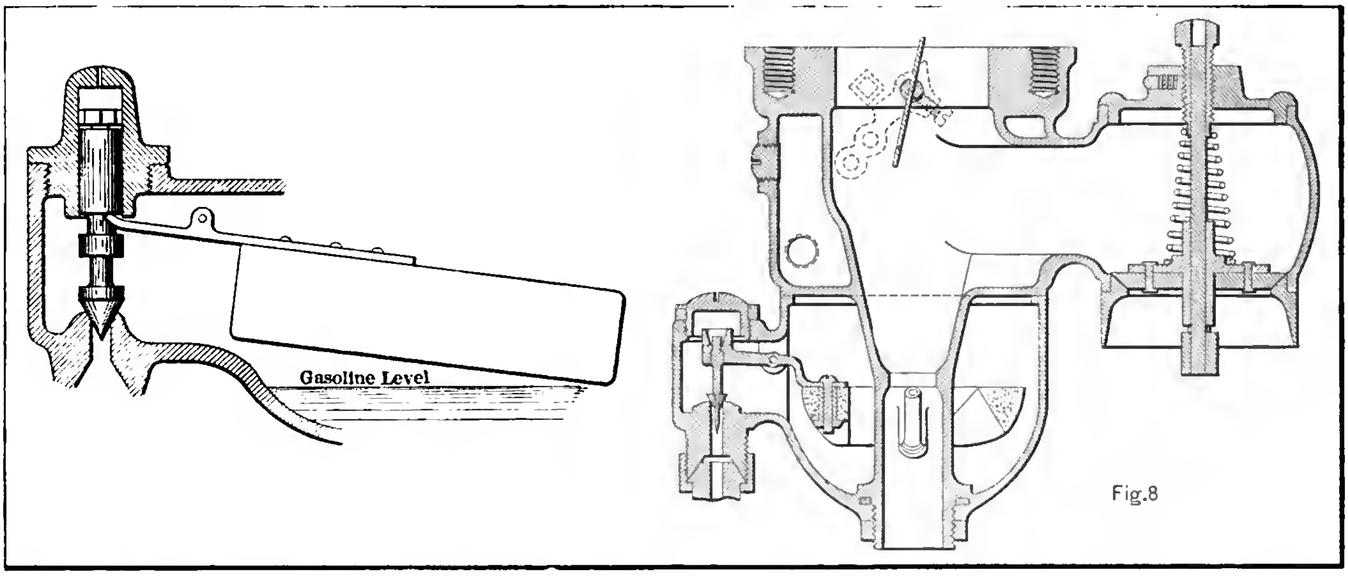


Fig. 7—The same. Threaded weight on float-valve stem is loose, and the stem settles downward by gravity and shuts off the gasoline despite depression of float. Fig. 8—Section which shows how the float relates to the other parts

A change in fuel density always demands readjustment, sometimes of every adjustable element, in order to get the best possible results. If the gasoline be heavier the float will ride higher and therefore maintain a lower gasoline level, thus demanding the adjustment of the float valve. As the heavier gasoline is more viscous the spray opening may need to be slightly enlarged. Additional heat is likely to be required. A marked change in altitude is another thing which sometimes upsets carbureter equilibrium.

Every owner has to change adjustments more or less from winter to summer, although the best carbureter is that requiring the least change. Gasoline, like any other liquid, absorbs heat on evaporating, and unless the air and surrounding piping are warm enough to supply the heat easily the air may be so chilled as to freeze the moisture contained in it. The ice thus formed will choke the mixing chamber. To prevent this, many carbureters are "hot water jacketed."

(To be continued.)

Test of Franklin Air-Cooled Motor*

By L. R. Evans, M.E. and R. P. Lay, M.E.

MATERIAL for this article was taken from a thesis, the work on which was done by the writers in 1907 at Sibley College, Cornell University.

The main object of the work was to study the variation in the volumetric efficicney of the motor caused by changing the timing, the shape and size of the valves and the material used for the cooling fins. Several additional items were observed during the tests so that we were able to compute other results. The complete engine and transmission were furnished by the manufacturers from their 1907 stock. They also sent two additional sets of cylinders having different cooling fins or valves. Each set of cylinders was put on the same crankcase and tested in the same way.

The following is a brief description of the engine and the method of making the tests:

The Engine—For clearness it may be advisable to give a description of the motor on which the tests were conducted. It is of the four-cylinder, four-cycle type, with a 4-inch bore and stroke and a rated capacity of 20 horsepower at a piston speed of 1,000 feet per minute. The cylinders are cooled by radial flanges, either cast integral or shrunk on to the cylinders, a fan being used to force air between them while the flywheel is designed to further increase the draft. The boot, hood and footboard are all designed so as to give air a direct passage from front to rear.

Three different sets of cylinders were used in the tests, each being of a different design. The first set was made of close-grained cast iron with the cooling fins cast integral with the cylinder shells. The second and third sets were cast-iron shells with very thin walls, carefully machined on the outside, on which phosphor-bronze flanges were shrunk to form the cooling fins. These disks were spaced equally on each separate cylinder, but the number of discs on the various cylinders varied with their positions relative to the fan. No. 1, the forward cylinder, had 12 fins, Nos. 2 and 4, 14, while No. 3 had 17. the purpose of this design being to keep all the cylinders at the same temperature, approximately. The first and second sets of cylinders had flat heads with two openings for valves which were separate, while the third set had spherical heads with one opening in which the valves were placed concentrically—that is, the exhaust valve was placed within the inlet valve, which formed its seat.

*Paper to have been read at the Winter meeting of the Society of Automobile Engineers, 1909.

Pistons and Wrist Pins—The pistons were cast of the best quality of close-grained gray iron and were finished on the outside by grinding, the inside being left rough. Each piston was provided with three eccentric piston rings, made of cast iron and ground to fit the cylinders. Hollow wrist pins made of cold rolled stock, hardened and then ground, were used in each case. They were held in place by cotter keys and were kept from rotating by means of small tool steel pins set crosswise in their ends so as to mesh with a slot cut in the pistons.

Connecting rods were made of nickel steel, drop forged with an elliptical section. The crank end was fitted with a split babbit bearing held together with four cap screws while the wrist pin end was bushed with a bronze bearing, pinned in place to prevent rotation.

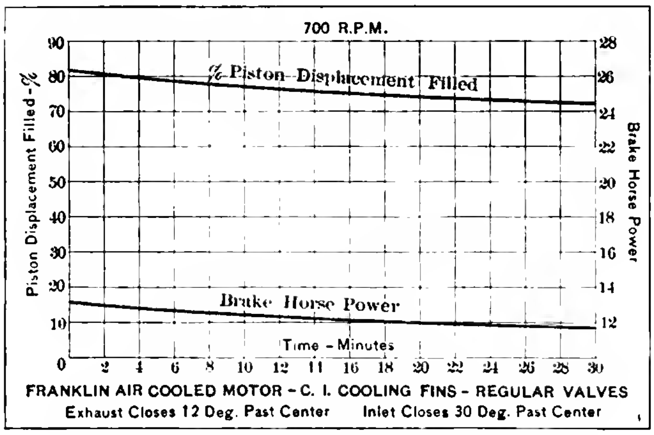
Crankshaft was made of the best quality nickel steel, drop forged and finished by means of lathe and grinder to 1.5 inch at both the crank and the connecting rod bearings.

Crankcase and Main Bearing—The crankcase was cast of a special aluminum alloy, being finished inside and out by means of a boring mill and milling machine. The main bearings, five in number, were made of die cast babbit with aluminum alloy pedestals.

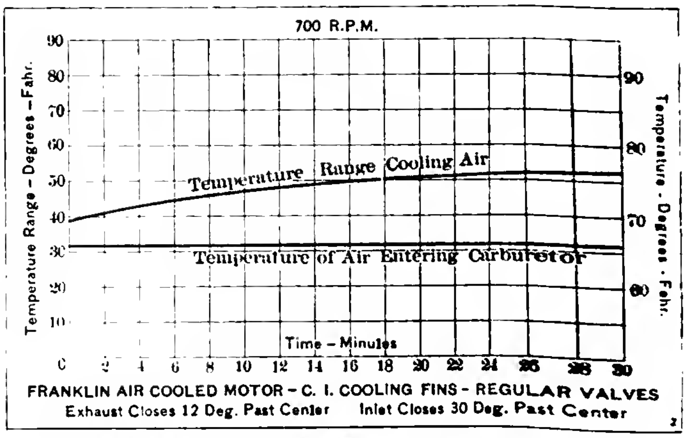
Flywheel, Clutch and Fan—The flywheel, which was made of iron cast with blades instead of spokes, also carried a clutch of the multiple disc type with alternate bronze and steel discs The six-bladed aluminum fan was gear-driven from the main shaft by two to one bevel gears, the fan being connected to its drive shaft by means of a friction clutch, so as to minimize the strains induced by sudden stoppage of the engine.

Valves and Mechanism—The valves were three in number. all mechanically operated; the inlet valve, the exhaust valve and the auxiliary exhaust valves respectively. The inlet and exhaust valves were placed in the heads of the cylinders, while the auxiliary exhaust valve was connected to a port so placed in the cylinder that when the piston had moved through seven-eighths of its stroke. the port starts to open. Through this port nearly all of the products of combustion escaped so that but little was left to pass through the true or main exhaust valve. It is to the auxiliary exhaust that the successful cooling of the motor is almost entirely due.

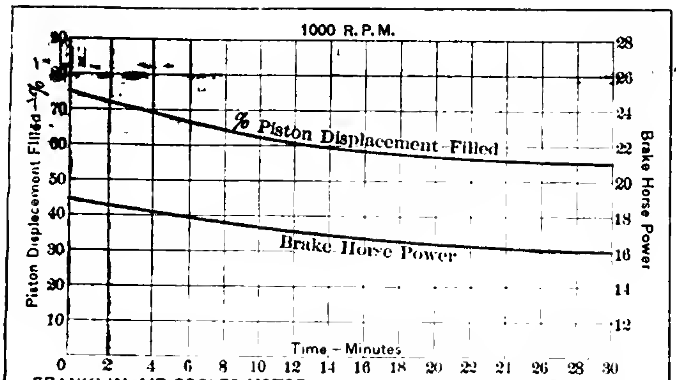
The first two sets of cylinders had separate valves for both inlet and exhaust in the head, but the last set tested were fitted with concentric valves. This form of valve gave a larger area of opening for the inlet valve and hence a greater charge of



Horsepower in Constant Relation to Cylinder Filling

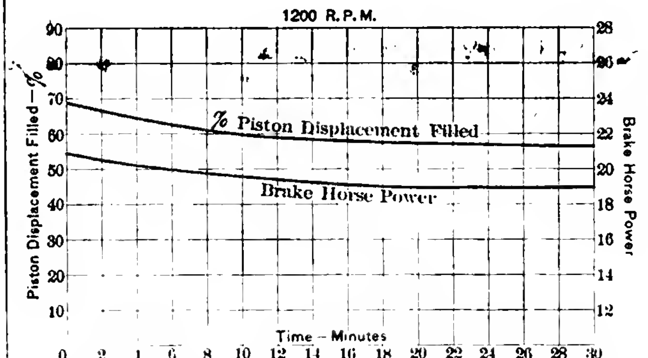


Temperature of Cooling Air Soon Reaches a Maximum



FRANKLIN AIR COOLED MOTOR—C.I. COOLING FINS—REGULAR VALVES
Exhaust Closes 12 Deg. Past Center — Inlet Closes 30 Deg. Past Center 3

Cylinder Filling Not So Good at Higher Motor Speeds



FRANKLIN AIR COOLED MOTOR—C.I. COOLING FINS—REGULAR VALVES
Exhaust Closes 12 Deg. Past Center — Inlet Closes 30 Deg. Past Center 5

Horsepower Becomes Constant After 18 Minutes' Running

mixture was introduced into the cylinders by each suction stroke, with a consequent increase in the power of the engine. In all cases the valves were actuatd by eccentric cams, through push rods and walking beams, so linked together that the motion of the valve was about twice the movement or throw of the cam.

Timing—The first set of cylinders was tested with the valves timed in two different ways. First, the valves were timed so that the inlet valve opened 7 degrees before center and closed 17 degrees past center, while the exhaust opened 13 degrees past center and closed on center. This has been called timing A. Next, the relative position of the two-to-one camshaft gears were changed by one tooth so that the inlet valve opened 5 degrees past center and closed 30 degrees past center, while the exhaust valve opened on center and closed 12 degrees past center. This has been called timing B. The auxiliary exhaust valves were always timed so as to open about the middle of the expansion stroke.

Carbureter—The carbureter was of the float-feed type with a multiple jet gasoline nozzle placed in the center of a Venturi tube. A butterfly throttle valve was used, connected to which was a second valve of the same type that controlled the opening of a by-pass through which air could be drawn around the nozzle. By means of the auxiliary air which did not pass the nozzle, the proportions of the explosive mixture were approximately maintained constant for all speeds of the engine. The float feed was so adjusted that the gasoline level was about 1-8 inch below the top of the spray nozzle at all times. The supply of gasoline to the spray nozzle was controlled by a needle valve which was operated from the dashboard. A flap valve was placed in the intake pipe of the carbureter in order to furnish sufficient suction when the engine was cranked to start. This valve drops down and closes the intake pipe and a greater suction is produced in the carbureter with the result that a much richer mixture is available for starting. After the engine is cranked, this valve opens and remains open.

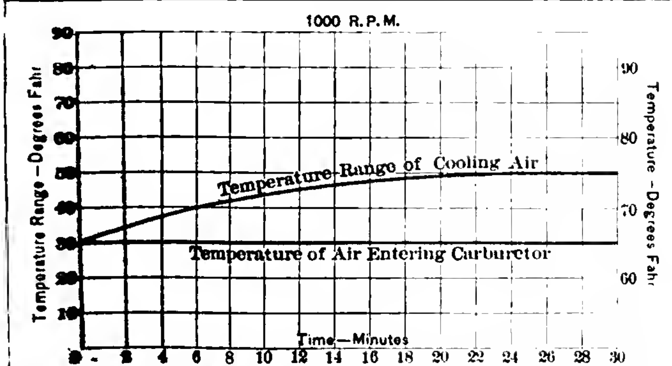
Ignition—The ignition system consisted of a Pittsfield four-unit spark coil, mounted on the dash, a Pittsfield timer and a Witherbee storage cell. Pittsfield spark plugs with mica cores were used throughout the test. In the first set of cylinders the plugs were placed in the sides, but in the last two sets they were placed in the tops of the cylinders as nearly central as possible. The timer was so adjusted that the time of ignition could be regulated to suit any speed of the engine.

Lubrication—Splash and force-feed lubrication was used in this motor, the engine being provided with a sight and force-feed McCord oiler mounted on the dash and belted to the end of the camshaft. Two pipes were run to the center portions of the crankcase, while the remaining two were connected to the rear main bearing and the fan gearcase respectively. Throughout the test Floyde 600 degrees fire test lubricating oil was used in the oiler, while from time to time a small quantity of powdered graphite was placed in the crankcase.

Control—The engine was provided with a spark and throttle control, and the necessary levers were mounted on the dash and on the engine, being connected to the timer and throttle respectively. In addition to this, a governor, which was mounted on the camshaft .was connected to the throttle valve in such a manner that the engine was prevented from racing when the load was suddenly removed.

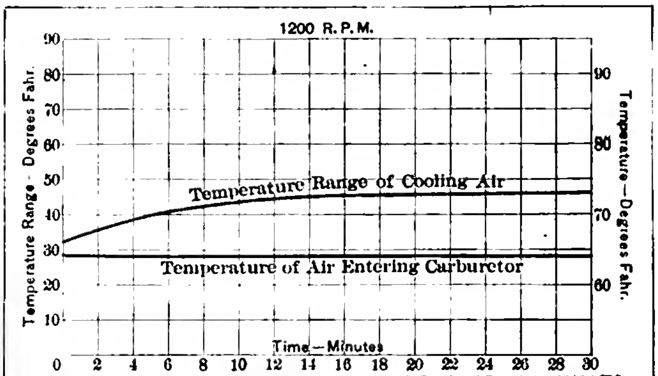
Transmission was of the progressive sliding-gear type, with three speeds forward and one reverse. On the high speed, the crankshaft of the engine was directly connected to the driveshaft of the transmission and it was this speed that was used throughout the test, the drum of the Prony brake being mounted on the end of the transmission driving shaft.

General arrangement of the apparatus was this: The air drawn into the engine through the carbureter was measured by a Wylie air meter, manufactured by the Equitable Meter Company, of Pittsburgh, Pa. A large air receiver was connected in the line to steady the flow of air. The gasoline was drawn from



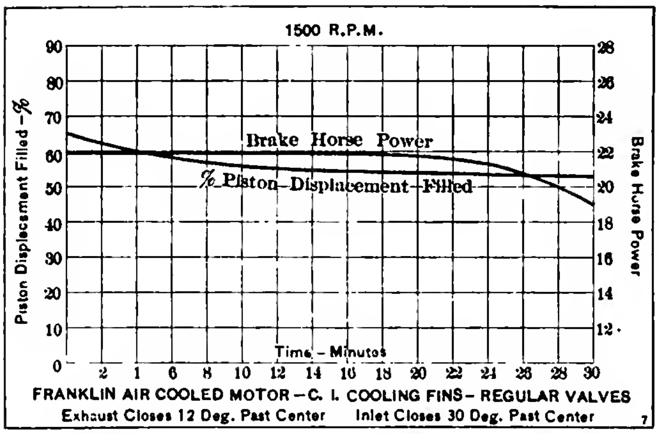
FRANKLIN AIR COOLED MOTOR—C.I. COOLING FINS—REGULAR VALVES
Exhaust Closes 12 Deg. Past Center — Inlet Closes 30 Deg. Past Center 4

Temperature of Cooling Air a Maximum at 24 Minutes

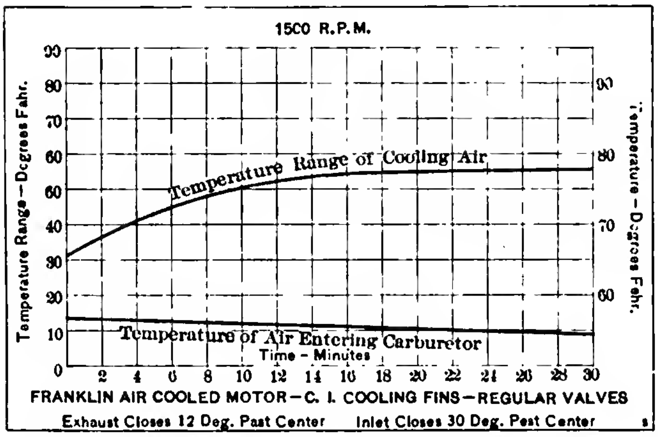


FRANKLIN AIR COOLED MOTOR—C.I. COOLING FINS—REGULAR VALVES
Exhaust Closes 12 Deg. Past Center — Inlet Closes 30 Deg. Past Center 6

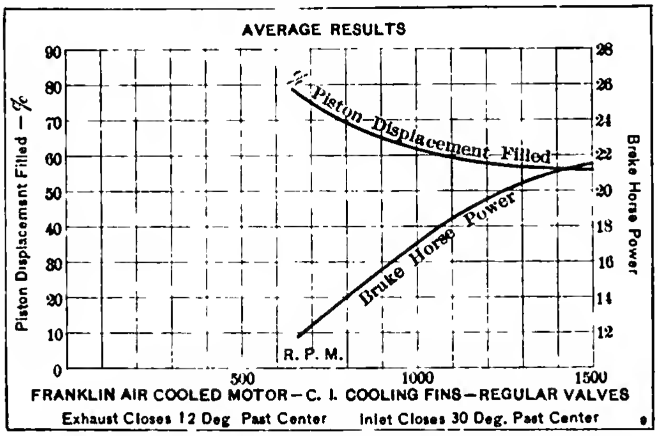
Air Temperature a Maximum Sooner at Higher Speed



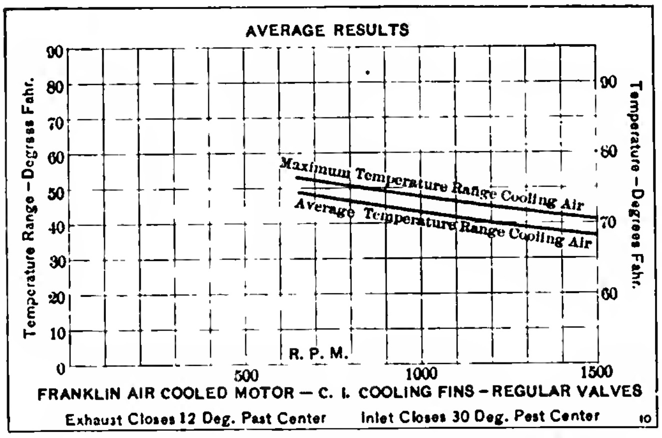
Cylinder Filling and Horsepower Diverge at 1,500 R.P.M.



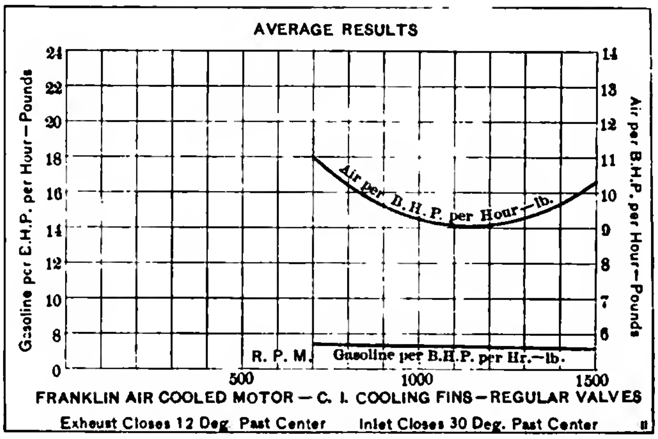
Still More Rapid Maximum of Cooling Air Temperature



Curve of Horsepower Droops Rapidly Above 1,100 R.P.M.



The Curves Are Not Parallel, Owing to Different Scales



Explaining the Need of Entirely Automatic Carbureters

a calibrated tank outside the building. The energy was absorbed by a Prony brake.

The air meter was calibrated by the manufacturer and also, under the conditions of the test, by an electrical measuring device contained in the 5-inch pipe connected between the meter and engine. The results of these two calibrations showed that the meter was correct within the range used during these runs. The lower heating value of the gasoline used was found by test to be 18,480 B.t.u. per pound.

Description of Test—The general object and method of procedure used in obtaining the data for the different runs is best shown by the following outline on which the tests were based:

Object: Study of volume and weights of air drawn into motor.

Method: By metering the carbureter air.

Plan: A. Cylinders with cast-iron cooling fins and separate valves were placed on engine and the effect of temperature and valve timing on the volume of fuel mixture drawn into engine was determined.

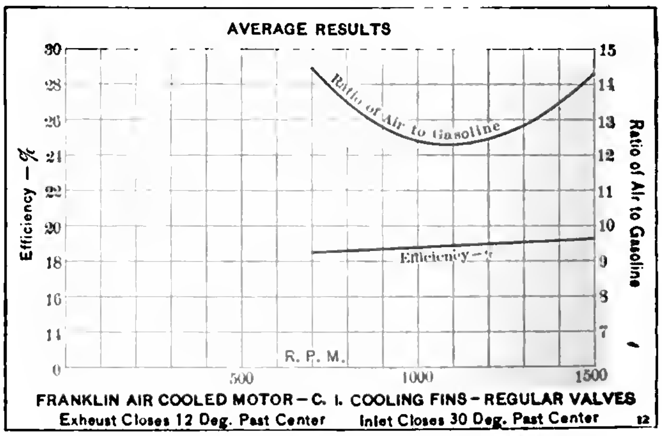
a. Accurate data was obtained with valves timed regularly timing B (exhaust closes 12 degrees past center and inlet closes 30 degrees past center), 30-minute tests being run at speeds of 700, 1,000, 1,200 and 1,500 r.p.m., with readings taken every two minutes.

b. Camshaft gears were shifted one tooth so that exhaust closed on center and inlet closed about 17 degrees past center, timing A. Tests were made at speeds of 700, 1,000, 1,200 and 1,-500 r.p.m.

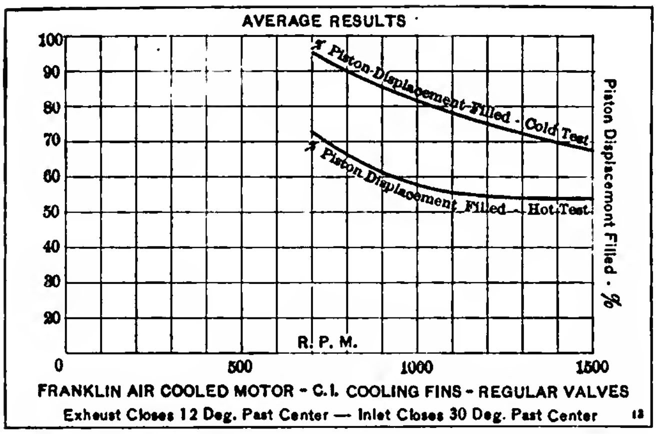
B. Cylinders with phosphor-bronze cooling fins and separate valves were placed on engine, and the effect of temperature and valve timing on the volume of fuel mixture drawn into engine was determined.

a. Tests according to (A-a) above were run off.

C. Cylinders with phosphor-bronze cooling fins and concentric valves were placed on engine and the effect of temperature



Proportions of Mixture Vary with Constant Efficiency



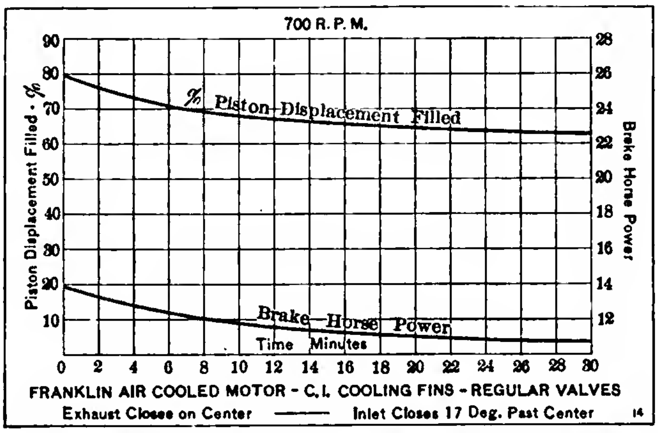
Showing the Effects of Running Both When Hot and Cold

on the volume of fuel mixture drawn into engine was determined.

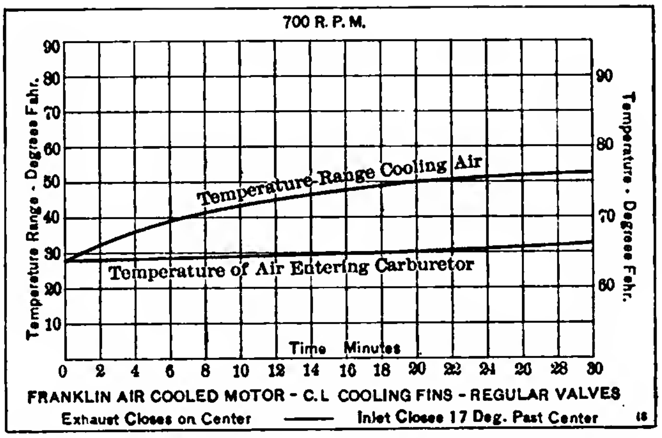
a. Tests according to (A-a) above were run off.

All of the tests, which were of one-half hour duration, were made as follows: Starting with the engine cold and the throttle wide open, the spark, carbureter needle-valve and the brake were adjusted so as to give maximum power at a given constant speed, at which the run was to be made. Then the gasoline tank gauge and air meter were read and the continuous counter, having been set at zero, was engaged with the brake drum shaft. During the run the following readings were taken every two minutes: Air meter, continuous counter, brake scales, temperature of air entering carbureter, temperature of air entering hood of engine, temperature of air leaving hood of engine, pressure in air receiver, pressure in suction header and temperature of gasoline. At the end of the run the air meter and the gasoline tank gauge were read, the continuous counter was disengaged from the shaft and the specific gravity of the gasoline was determined.

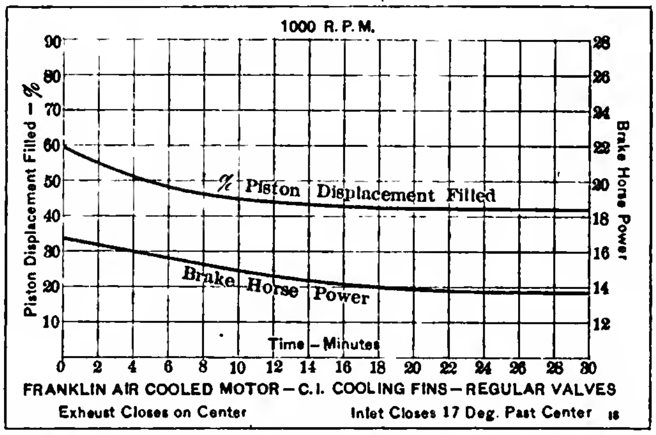
The results appearing in this article were computed from a large mass of data selected as follows: The engine was first put into such condition that it would pull the proper maximum horsepower at 1,500 r.p.m., then a complete set of tests, as. for instance (A-a), were made, starting with 1,500 r.p.m. At the end of each run the engine was carefully inspected for leaky valves, faulty ignition, etc., and the valves timed hot immediately after the engine was stopped. After satisfactory data was obtained for the four runs of the set, check runs were made precisely similar to the first. Then from the checked data, that data which was most consistent was selected for computation. Whenever, as frequently happened, the second set of runs did not check the first, then more runs were made until two runs were obtained that did check. Sometimes it was found necessary to make as high as seven runs before satisfactory data was obtained. It was hoped that in this manner all sources of error would be eliminated. As a further precaution, the engine was torn down and completely rebuilt after the data for each series



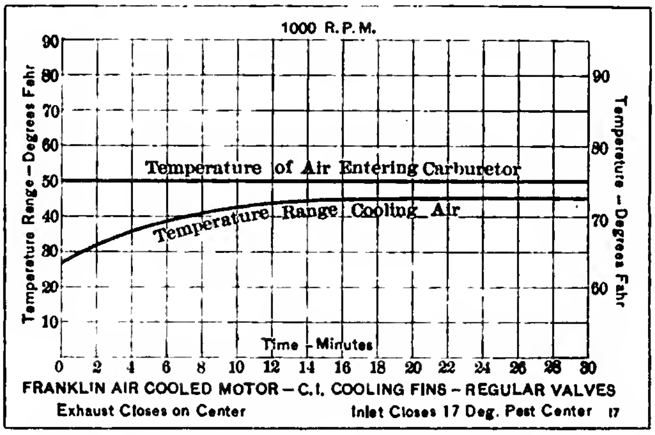
Horsepower Much Impaired by the Change in Valve Timing



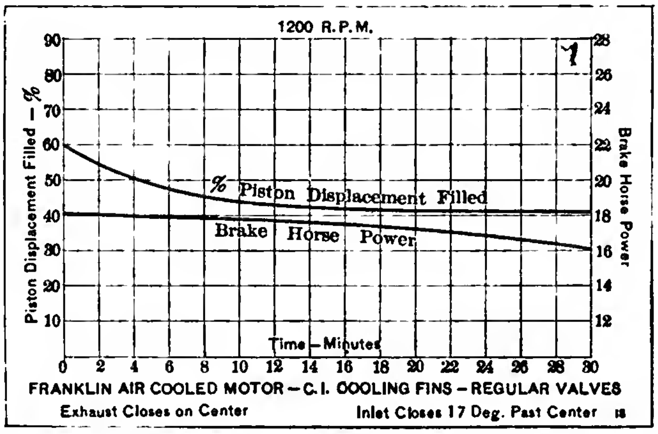
Greater Relative Increase in Temperature of Air Used



Horsepower Still Further Reduced at Higher Motor Speed



Cooling Air Slower in Reaching Its Maximum Temperature



Shape of Horsepower Curve Much Changed by Valve Timing

of tests had been satisfactorily obtained. The data is not given because it would take up too much space, but in the following table are given the most important average results:

From the results of the first set of tests it was evident that timing B gave so much better results than timing A that the rest of the tests were run with only the one timing B. For each set of runs will be found curves showing the variation during the runs of the temperatures and the volumetric efficiency and other sets showing the ratio of air to gasoline, etc.

The volumetric efficiency is less than 100 per cent., because the valve opening is not large enough and the charge is throttled in entering the cylinder; also because the cylinder is hotter than the entering gas and causes it to expand. In order to separate these two losses, the engine was belted to an electric motor and run at same speeds as during the tests. The spark was shut off, but everything else the same, even leaving the gasoline turned on. The valves were timed with the motor cold. Readings were taken for a half-hour run and from them the cold volumetric efficiency computed.

Sets of curves for each set of runs were plotted showing the volumetric efficiency with the engine hot and cold. The ordinate between the curve for the cold test and the 100 per cent. line is, of course, the loss due to the small valve opening, the ordinate between the two curves being the loss due to the hot cylinder. The effect on the efficiency of changing the timing can be seen by comparing the first two curves.

SUMMARY OF RESULTS IN TEST OF FRANKLIN AIR-COOLED ENGINE USING TWO DIFFERING KINDS OF COOLING FINS

	Cast-iron Cooling Fins								Phosphor-bronze Cooling Fins							
	Regular Valves								Regular Valves				Concentric Valves			
	Timing A, R. P. M.				Timing B, R. P. M.				Timing B, R. P. M.				Timing B, R. P. M.			
	700	1000	1200	1500	700	1000	1200	1500	700	1000	1200	1500	700	1000	1200	1500
Temperature of entering air	65	77	73	66	66	65	64	56	76	76	76	75	77	79	79	79
Temperature range of cooling air	45	42	39	40	48	45	40	49	49	46	44	43	42	43	42	41
Brake horse-power	11.75	14.78	17.39	17.65	12.4	17 13	19.52	21.4	12.2	17.9	20.5	21.85	12.2	16.8	21.4	23.2
Weight of gasoline per B. H. P. per hour	0.804	0 777	0.742	0.778	0.74	0.728	0.724	0.721	0.842	0.710	0.705	0.772	0.696	0 755	0.708	0.830
Air per B. H. P. per hour, cu. ft.	139	106	107	142	148	123	127	137	157	137	137	151	147	130	127	144
Air per B. H. P. per hour, lbs.	10.38	7.75	7.85	10.48	11	9.05	9.45	10.3	11.40	9.93	9.93	11.0	10.66	9.36	9.00	10.50
Air per B. H. P. per hour, at 32° F. and 14.7 lbs. per sq. in., cu. ft.	128	96.2	97.4	130	136	112	117	128	147	123	123	136	132	116	111.2	128
Ratio air to gasoline by weight	12.9	9.85	10.56	13.5	14.8	12.4	13	14.3	13.50	13.97	14.1	14.2	11.2	12.50	12.68	12.60
Efficiency of motor calculated on B. H. P., per cent.	17.12	17.68	18.60	17.65	18.6	18.9	19 02	19.3	16.3	19.4	19.5	17.85	14.60	18.20	19.50	16.70
Volumetric efficiency, per cent.	66.5	44.8	44.5	47.2	75	60 4	58.4	55.5	78.6	66.5	66.5	63.6	73.2	62.3	64	64.8

How Efficient Lubrication Reduces Maintenance

ASIDE from the qualities of oils which have been previously mentioned, there are a number of qualities which are worth mentioning, in fact are spoken of daily. These are the matters of color, fluidity, flash point, fire test and cold test, all of which are of some vital importance. To define and expand upon these will be well worth the space taken up.

Color is a very misleading quantity, because it has very little influence upon the actual worth of the lubricant as a preventer or reducer of friction. When the word light is used in connection with oils, what is meant is the specific gravity and not the color. Color or lack or it is either inherent in the oil, and a result of the process by which it is made, or it is produced by artificial means. Bleaching with acids may result in clearing the color of the oil, but it may also leave traces of acid in the oil, so that the slight benefit to be gained (if any) from this process is attended with much danger. Filtration will achieve the same result with no corresponding drawbacks, so that an automobilist who for some reason desires a light colored or clear oil should insist on one which is either made that way, or in which the result is achieved by filtration.

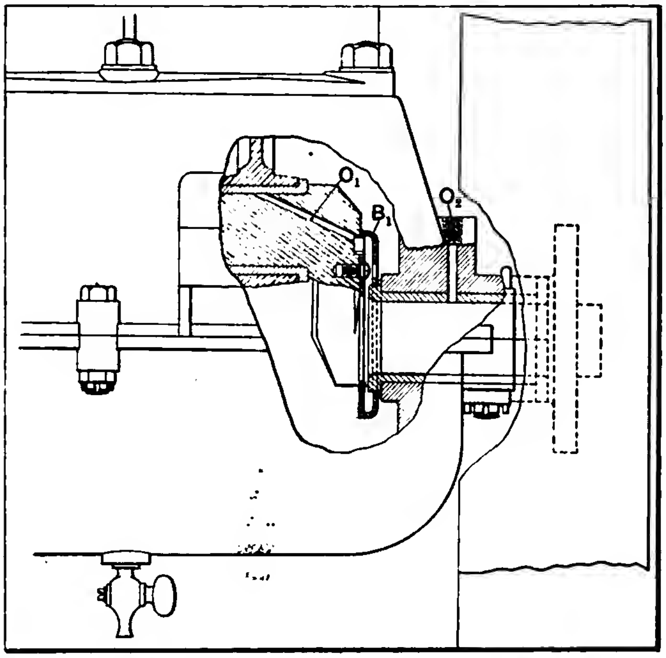
Specific gravity is usually measured in degrees Baumé, at a known or fixed temperature. The latter is a necessity, since the lubricant would have a variable weight per unit amount, as compared with a standard, in varying weather, such as summer and winter. In other words, cold weather would expand the lubricant just as it does other fluids (barring water), so that the unit weight would be less in colder weather. Figures showing the general average are not available, but as a few instances the following are cited. The Pennsylvania Railroad specifies that one grade of oil (paraffine and neutral oils) must have a specific gravity of 60 deg. Fahr. below 24 deg. and above 35 deg. Baumé. Another grade of lubricant (well oil) must have a specific gravity between 28 and 31 deg. Baumé, at 60 deg. Fahr.

Fluidity is that quality of oils and other lubricants which has previously been discussed under the head of body, that being the more usual term for it. By this, reference is had to the thinness of the lubricant, which produces easy flowing qualities, or the lack of which gives the opposite result, sometimes desirable.

Flash point is a temperature measurement, and is that temperature at which the vapor arising from the surface of the oil will take fire, or flash. That is to say, it is the *lowest* temperature at which the oil vapors will flash. Naturally this is a decidedly variable quantity, the flash point varying with the service for which the oil is intended. Thus, oils for cylinder use should have a very high flash point, while oil for transmission and rear axle bearings may have any old flash point. This quality of oils is closely allied with burning point, or fire test as it is usually called, so that in specifying one the other is usually specified also. Thus, for what is called 150 fire test oil, the Pennsylvania Railroad specifies that the flash point must be above 130 deg. Fahr. and the oil must not burn until the temperature passes 151 deg. Fahr. Another oil known as 300 test must not flash below 249 deg. nor burn below 298 deg. Fahr.

In automobile work, the fire test (and with it the flash point) will bear close watching, for cyinder use in particular. Thus, if an oil has a low fire test, when exposed to the very high temperatures of combustion, it will burn, and thus leave a residue, the presence of which is highly undesirable. This residue is what is known as carbon deposit, and it is very difficult to avoid, but much more difficult to remove. In the ordinary cylinder, the temperatures may run as high as 2,000 deg. Fahr., but such extremely high figures are only momentary, tapering down at one end to an exhaust temperature of perhaps 300 deg. Fahr., and at the other a varying temperature, which may be as low as the external air, or as high as the temperature of compression, just before explosion. The latter figure might he in the neighborhood of 125 deg. Fahr.

This gives a range of temperature of from, say, 60 to 125 deg. for the suction and compression strokes, jumping to 2,000 at explosion, falling off from that figure to 300 at exhaust, and then repeating. The lower temperatures prevail for two strokes, or one-half of the whole cycle, while the highest temperature prevails for but an instant, so that the average temperature which would be effective for this part of the cycle might be taken as close to an average of the initial and final temperatures, or in the case cited above, 2,000 and 300, or, say, 1,100 deg. Fahr. Doubtless



Ring Oiling Scheme for Lubricating the Crankshaft Bearings

a much lower figure would be more fair, for the pressure and with it the temperature falls off very rapidly, not only at the start but throughout half of the stroke, slowing down to a very gradual drop only at the end of the curve, just before the exhaust opening point is reached. For these and other thermodynamical considerations it would be well to consider the average value of the cylinder temperature during the power stroke as closer to 850 deg. Fahr. than to the figure previously given.

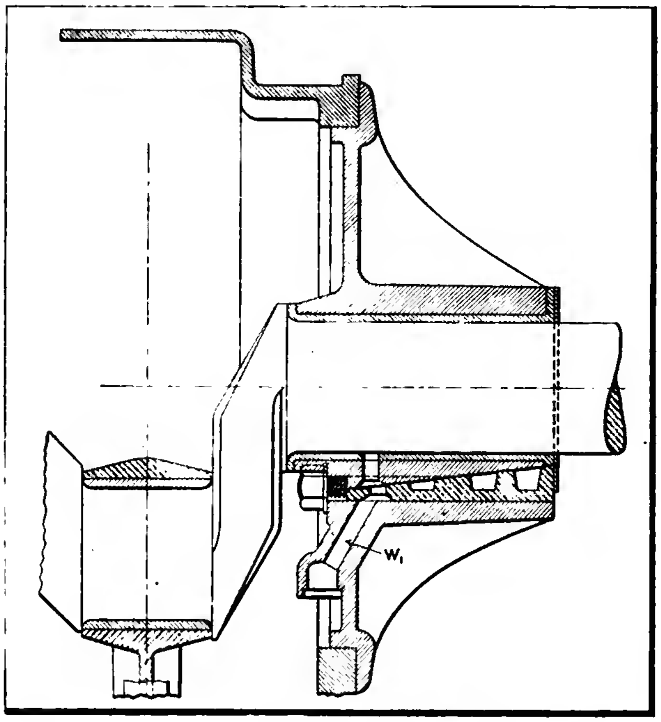
Following this line of reasoning, if the suction stroke be considered as varying from a remanent temperature of, say, 100 down to a final temperature of the mixture of 60, the average is 80 deg. The compression varies similarly from 60 up to 125, an average of say 90 deg., while the exhaust varies from, say, 300 down to 200, an average value of 250. If these four average temperatures be averaged over the whole four strokes, a figure of 315 deg. Fahr. is gained for the whole average cycle temperature. This, then, would be a good minimum value to assign to cylinder oils, bearing in mind at the same time the fact that this is momentarily exceeded by perhaps as much as 1,800 deg. Without a doubt, the above line of reasoning leads to the conclusion that cylinder oils should not have a lower fire test than 400 deg. Fahr., while a higher figure is, to say the least, on the side of safety.

Cold test is a quality not spoken of as much as the others, that is to say, it is generally neglected; this, too, without cause, for it is important. Cold test consists of testing the oil to see at what minimum temperature the oil will congeal. This is tested by gradually lowering the temperature of the oil, and noting the first point at which it ceases to flow readily. For winter use, however, the determination of the quantity is of much greater importance, and so is determined by another method. For this purpose the method employed is as follows: The oil is frozen, and then the temperature is gradually raised until a point is reached at which the frozen oil will just flow. This then is taken as the cold test point. Motorists in selecting an oil for winter use, other than for those parts like the cylinder, which keep the oil warm at all times when in use, should be selected according to the part of the country in which the car is to be used. Thus, for the average Northern United States location, a cold test of 10 deg. Fahr. would be sufficient, while Canada would require a lower figure of, say, 5 deg. down to zero.

On the other hand, the Southern States would not need such a low point, and since this quality influences the fluidity, otherwise called body, to a large extent, it is desirable to keep the cold test as high as possible so that the body qualities may be of the greatest possible use to the motorist. This then leads one back to the starting point, that is, to the statement that the cold test is generally neglected, and indicates a reason why it is neglected, namely, to gain all of the benefits of fluidity. However there is no reason why it should be entirely neglected, for it is possible to select the oil with care, and gain the maximum advantage with the minimum disadvantage.

To sum up, then, the points to be examined are: Identification of the lubricant as an animal or mineral oil, or a compound, as a solid lubricant or a compound of solid with fluid; density or specific gravity; viscosity; flash point; burning point; acidity; coefficient of friction, and cold test. These eight qualities are given in very nearly the proper order of importance, although nothing is said about cost, which in the usual case ought to be listed just as all other qualities. That is, instead of making it the main or deciding factor, it should have no more weight than any one of the eight other qualities, or, if desired, it may be inserted in the list above, giving it a place according to its worth.

When a man makes price the deciding factor in buying oils he makes a big mistake, for that should be second to quality. If economy were the real item, it would be better to go without oil. In considering price it should be valued according to two things; first, the actual cost of the oil itself, and second, the actual cost of the repairs or replacements which its use will entail, or did entail, in some period of time. Upon this basis, the best oil will be selected regardless of price every time. More than this, another slant is given the oil-buying question by this idea. If the oil be cheap, too cheap, so that the quality is poor, the amount of power lost in friction will be very high. This power loss will not be noticeable in repair bills, but it will appear, nevertheless, in upkeep bills, gasoline, oil, waste, etc. It can be checked up rather carefully by observing the mileage per gallon of fuel, using several different kinds of lubricant. Finally, every driver who is vitally interested in the subject of proper lubrication should keep tabs on all kinds of oil used and the results.



Another Bearing Lubrication Method as Used on Rambler Cars

FRENCH BUILDERS FAVOR SMALL FOUR-CYLINDER MOTOR

By W. F. BRADLEY

PARIS, March 21—After developing the one-lunger to a wonderful degree of efficiency, French small car builders are now showing a decided preference for four-cylinder motors of very small volume and low, or moderate power. An example of this is to be found in the conversion of the firm of Sizaire-Naudin, to the multiple cylinder idea, after several years devoted exclusively to the development of the one-lunger. The new production will be examined with particular interest from the fact that the firm has met with phenomenal success in the single-cylinder class, and has produced single-cylinder racers with a ratio of stroke to bore, which a few years ago would have been declared impossible. With a bore limited to 3 9-10 inches, the firm has shown how to make a nominal 8 horsepower develop 26 horsepower and break all speed records for its class. Part of the result is due to a stroke of 10 inches, relatively large valve diameters, light reciprocating parts, efficient lubrication, and the use of the most appropriate of metals.

The new four is the outcome of racing and touring experience with monocylindrique motors. Nominally, it is of the same power as the firm's single-cylinder model and can be fitted under the same bonnet without any structural changes. The four cylinders have a bore and stroke of 70 by 120 millimeters (2 7/10 by 4 7/10 inches) and though rated at 12 horsepower, has developed as high as 26 horsepower, on a 10 hours' bench test. The bore is long in relation to the stroke, but is short in comparison with a second motor already designed and tested on the road, and intended for next season's market, in which, for the same bore, the stroke is carried up to 170 millimeters, or 6 7/10 inches. This is the greatest ratio of stroke to bore that has ever been attempted on a car designed for the ordinary user.

CYLINDERS CAST EN BLOC A FEATURE

Block casting of the cylinders, thermo-syphon water circulation, high-tension ignition with fixed sparking point, are all modern features which have been adopted on the new Sizaire-Naudin. A distinctive feature is that the crankcase is divided into two parts vertically, and not horizontally, the two halves being bolted together, and each one carrying a ball bearing for the crankshaft, as in single-cylinder design. Naturally there is no central bearing, but this cannot be considered a novelty, in view of the fact that most constructors of small motors have decided that two bearings only are preferable. The use of ball bearings for the crankshaft, however, is new, Sizaire-Naudin being the only French maker of small motors to use other than plain bearings for the crankshaft. They have been led to this move by their experience with the high-powered 100-millimeter single-cylinder racing motors, all of which had ball bearings throughout.

INTEGRAL CAMSHAFT ON BALL BEARINGS

The camshaft, too, is mounted on ball bearings, and is machined out of the solid with integral cams. Although all eight valves are mechanically operated, there are only four cams for the entire set. The valves are superimposed, the inlets being inverted over the exhausts, and all having a diameter of 50 millimeters, compared with 70 millimeters for the cylinder. This is a much larger valve diameter than would be possible with the valves side by side on such a closely set motor. The exhausts are operated from below by tappets, according to standard practice, the only distinctive feature being a considerable lead to the exhaust opening.

Parallel with the camshaft, but on a slightly lower plane, is a fixed shaft on which are mounted four small rockers, one end of which comes in contact with the face of the cam, while the opposite end touches the intake valve tappets. The rocker arm is made to follow the profile of the cam by reason of a spring on its under face, just below the tappet. A spike-like projection on the tappet centers the spring, the lower seating of which is on the upper face of the crankcase. Holes are bored in suitable positions on the face of the crankchamber to receive these projections when this end of the rocker arm is depressed. Considered in a vertical plane, the camshaft has above it the exhaust valve tappet, and below it the small rocker arm operating the inlet valve tappet and the inlet valve by means of a vertical push rod, and an overhead rocker arm.

The overhead mechanism is the one that has been applied to single-cylinder models since the beginning, and has only been modified in detail for the new work it has to perform. On the cylinder head is bolted a steel housing which also serves as intake manifold. It is in two parts, each one receiving two valves, and is held down by five bolts. A lip is formed on the outer face of the housing, under which is slipped the lower bar of a steel link, the upper bar of which receives the rocker arm. At each end of the rocker arm is a socket, into one of which the extremity of the intake valve is received. while the other receives the ball end of the vertical push rod. The extremity of the push rod is threaded onto the main portion and locked with a couple of nuts, thus allowing for adjustment of the tappets. The exhaust valve springs being hidden by a movable steel plate, the only visible parts in movement are the vertical push rods and rocker arms.

IGNITION BY HIGH-TENSION BOSCH MAGNETO

A high-tension Bosch magneto is relied on for ignition. On the model described, it is in a very low and inaccessible position, driven by external gears. It has been decided, however, to raise it to the level of the frame members for more convenient examination. The instrument is a new model just produced by the Bosch company and remarkable for its small size. It is considerably smaller than the one employed on the single-cylinder models and is provided with glass inspection plates for verifying the contacts, without dismounting. The leads pass through a straight metal tube level with the base of the cylinders until they come opposite their respective plugs, from which point the insulated cable is passed up to the sparking plug. The only visible wiring therefore consists of four vertical lengths. At present a Zenith carbureter is employed, but will be changed later for one of the firm's own design.

Unusually large diameter inlet and outlet pipes are used for the water circulation. The supply of cooling water is contained in a plain vertical tube radiator, at the back of which is a large brass tank supplying a good head of water for the cylinders. The tank is only secured at the forward end, where it enters into the head of the radiator, to which it is riveted and brazed. A ventilator fan is not employed on the French models, but will be fitted where the car is intended for service in hot climates. Provision has been made for mounting it.

Splash is relied on entirely for lubricating the motor, the oil being carried from a dashboard lubricator to the rear bearing of the crankshaft, from which point it falls into the crankchamber. Both gasoline and oil tanks are carried on the dashboard, the former being in front and the latter just behind it. The arrangement reduces piping to a minimum.

Chassis features of the four-cylinder model are identical with those of the single. Suspension in front is by means of a transverse inverted semi-elliptic spring, mounted above a special type of front axle. A single plate clutch is employed, and the drive is taken direct from this point to the rear axle without passing through a gearbox. There are three forward speeds and reverse, all but the reverse giving direct drive through spur, instead of bevel gears. Rear suspension is of the three-quarter elliptic type. Fitted with a two-seated body a speed of over 50 miles an hour is guaranteed with this small car.

LATEST WEARING APPAREL FOR WOMEN AUTOMOBILISTS

THE illustrations offered in this article will afford an excellent idea of some of the leading styles of millinery and motoring coats, which are available for the season just entered. They represent a greater measure of stability, without detracting from smartness, than has ruled heretofore, and the earlier criticism, which had for its basis the fact that service was secondary to ultra fashion, does not now hold. The motoring costumes for this year will more nearly accord with the basis for true art, because excellence of appearance will not be at the expense of utility.

SMART MOTOR COAT AND BLERIOT TURBAN FROM RENARD

The influence of Rostand's play, "Chantecler," has so pervaded spring styles that even fabrics derive their names from features of the barnyard drama. "Rooster track," is the name given to this peculiar check pattern as depicted in Fig. 2, and it is used for some of the smartest of the new motor coats. This garment has particularly graceful lines, fitting the figure more closely than motor wraps of preceding seasons, yet having roomy armholes which make the coat most comfortable. There is a touch of bright color—also a direct result of the Chantecler influence—in the leather tabs which decorate the coat. These red tabs, with their brass eyelets are placed on lapels and cuffs; and form an odd belt arrangement at front and back of the coat. This notion of belting the garment at the front, leaving the sides in long lines, is a novel one and gives a trim look to a portion of the coat which often hangs ungracefully.

The turban is an eminently comfortable model for use under a motor veil. The drapery of very soft horsehair straw may be drawn down entirely over the hair at the back, and the turban is smartly trimmed with a metal ornament and a "bleriot" or shaving brush standing stiffly erect.

Fig. 1—Comfortable coat for wet weather wear

A PRACTICAL COAT

Secure against the most persistent onslaughts of rain and wind will be the maid enveloped in one of these cosy mackintoshes as presented in Fig. 1, which are big enough to fit easily over another coat beneath, and so cleverly cut that the effect is graceful and pleasing, and not in the least bulky. The gathered hood which may be turned up over hair and hat is an especially satisfactory feature, and when the hood is dropped on the shoulders a very trim, buttoned-up collar is revealed at the top of the coat, which fastens, as wet weather garments should, snugly up to the neck.

This garment, which comes from the New York Mackintosh Co., is of blue rainproof material with trimmings in the shape of black satin bands on the cuffs and covered black satin buttons. The seamless shoulder, and sleeve cut in one with the body of the coat give great freedom to the arms and make it possible to slip the mackintosh over even a wool wrap without discomfort. The pleats set in at the side under a simulated pocket flap, add jauntiness and grace to the coat, and the full hood in Red Ridinghood style has a youthful suggestion that is rather attractive.

NOTES ON FEMININE MOTORING APPAREL

Paris, March 14—There is no article of clothing in greater demand or of more service and comfort to the feminine contingent of automobilists than the knitted sweater, which may be worn under the loose coats when extra warmth is required. Many variations of the loose coat sweater are to be had. There are the full-length garment and many of shorter lengths, but the one best liked is that of the knee length. There are those of the single-breasted order, with the neck cut in a deep V; the double-breasted with a high, close collar, and those which fasten on the left side. White still heads the list, but there are many pretty models in dark blues, greens, grays, browns and new reds.

When it comes to headgear the motorist can satisfy her liking for hat, bonnet or hood. There are small hats of toque and mushroom shape, while the turbans offer no resistance to the wind, and these shapes lend themselves admirably to the draping possibilities of the veil. The motor car is wholly responsible for the revival of the picturesque hood. There are practical fur and cloth hoods for cold weather, which have as trimming little animal heads or big choux of soft ribbon, and which tie under the chin with ribbon strings.

Among late novelties are leather neckties of the four-in-hand style and a motor ring to fit over the gloved finger.

Fig. 2—New long coat of rooster track fabric

Worthy Ideas from France and Germany

Features of the La Buire (French) Chassis

Characteristic, and at the same time thoroughly workmanlike, is the design of the La Buire cars, made by the company of the same name at Lyons, France. A notable feature is the use in the change-gear and axles of a new type of double-row ball bearing, the balls in each row alternating, so that the bearing is no thicker than a single-row bearing of the same diameter.

La Buire motors are made in four sizes: three four-cylinders, 75 by 120, 85 by 140, and 105 by 150 mm., rated at 10, 15 and 24 horsepower, respectively, and one six-cylinder, 85 by 140, rated at 18 horsepower. The four-cylinder 15-horsepower motor, which is typical of the rest, has a block cylinder casting with all valves on the left side. The exhaust manifold is separate and bolted on; it has three openings connecting with the exhaust ports, and between these is provided with deep cooling flanges. The inlet ports are led between the front and rear pairs of cylinders, connecting with a Y-shaped manifold on the right side. Two plates cover the valve stems and springs. The camshaft is driven by a Renold silent chain.

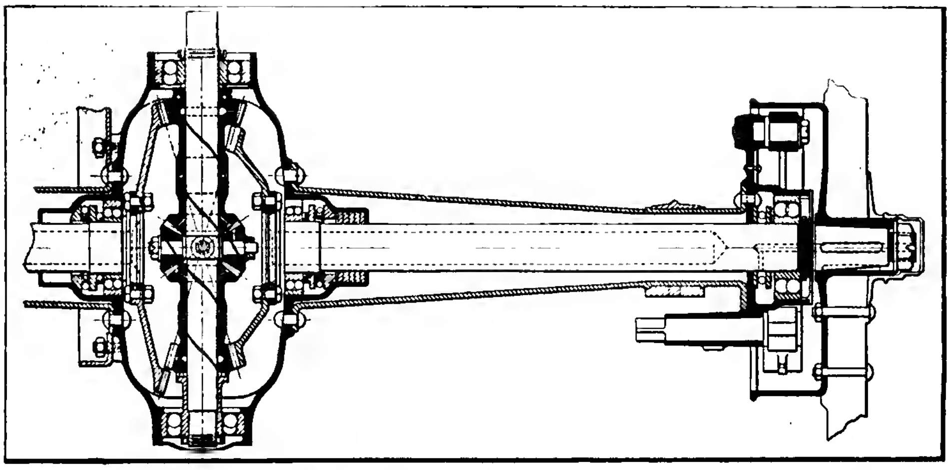
The water pump (centrifugal) and the magneto are mounted on the ends of a transverse shaft driven by skew gears on the front end of the camshaft. The water connections are made by union joints. This arrangement of the magneto brings it on the right side, with its circuit-breaker and distributor easily accessible.

Change-gear and clutch are united in the same case. the former being a four-speed selective two-throw type, and the latter a multiple-disc. The sliding-gear shaft is exceptionally long, forming at its front end a spindle which serves to line up the clutch shafts. The shaft itself has milled splines and for the sake of stiffness is made of large diameter and drilled out hollow. The constant-mesh gears have helical teeth, to secure silent operation, and since the end thrust otherwise would be considerable, are made double and reversed, forming what is known as herringbone gears. The gear case fills the whole space between the frame members, taking the place of part of the dust pan.

The rear axle is live and arched, the method of driving the inclined shafts being one which no American constructor has ever tried, although it is quite well known abroad. Each live shaft has a bevel gear on its inner end, these being of different diameters, although with the same gear ratio between themselves and their pinions. The pinion shaft extends clear through the case between them. having the pinion driving the left wheel on its front end and that driving the right wheel on its rear end. The differential is in the middle, between the two pinions.

The rear wheels are keyed directly on to the live shafts, and to secure the necessary additional strength at their outer ends these latter are made of large diameter and then drilled out from the inside ends—a repetition of the commendable, though expensive, process observed in the change-gear. The axle proper is built up of two dish-shaped pieces enclosing the bevels, and two tubular members. The latter have flanges turned at each end, and are riveted on one side to the bevel gear casing and on the other to the flange supporting the brake shoes, which also carries the outer bearings. Ball-thrust bearings are used extensively, there being no less than six of them in the axle, in addition to the six double-row ball bearings.

Drive to the rear axle is through a doubly-jointed shaft, not enclosed; a pressed-steel torsion lever is provided. The rear springs are three-quarter elliptics, or, optionally, full elliptics of the scroll type. The front springs are the usual semi-elliptics.



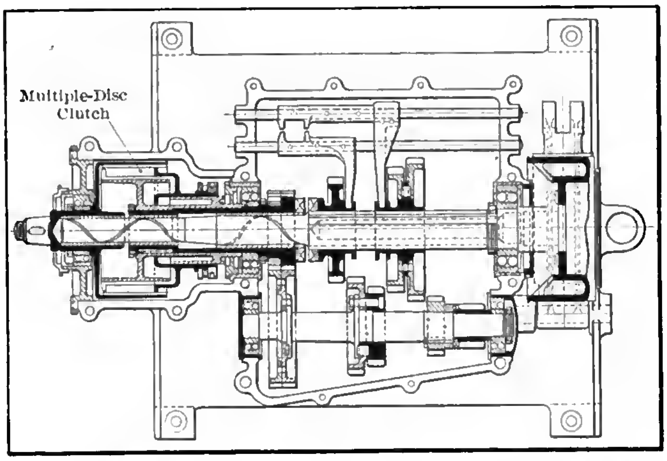
La Buire Uses an Arched Rear Axle with Drive through Two Pairs of Bevels

The Jaugey Carbureter, a Floatless Design

With the object of providing a carbureter which will work in any position and under any conditions, M. P. Jaugey, a French engineer, has invented a new floatless design, which is the subject of a description in *La France Automobile*, March 5. A photograph of one of the carbureters mounted on the inventor's car, a Clément-Bayard, was given in The Automobile of March 10, page 515. It is now possible to show a sectional drawing of the device.

The pipe from the gasoline tank opens directly into a closed cylinder pierced with three small holes, which are opened or closed by a piston sliding in the cylinder. This cylinder lies across the body of the carbureter, directly in the path of the air passing from the air inlet to the motor; the cylinder is surrounded by a concentric cylindrical shell which acts as the throttle valve. There are three air inlets; one always open, but with a shutter which can be adjusted to provide for different weather conditions; a second mechanically operated, and a third automatic, spring-controlled. The piston which varies the gasoline feed, the throttle valve and the mechanical air inlet are all coupled together and move in unison.

Most novel is the mechanically operated air valve. It consists of eight rods of different lengths arranged around and parallel to a central stem and registering with holes in the wall of the carbureter, in such a manner that the available air opening through the various holes is increased or decreased by sliding the device out or in. The central stem projects into the carbureter and acts as a stop to limit the opening of the auxiliary valve.



Four-Speed Gear and Multiple-Disc Clutch of La Buire

When the throttle is closed to stop the engine, the piston controlling the gasoline feed comes to a firm seat, and the throttle itself closes up all opening into the cylinder, so that there can be no leakage of gasoline. At low-speed running the throttle is opened slightly, thereby uncovering the first of the three gasoline outlets and providing a sufficient opening in the mechanical air inlet. Any variation in the speed of the motor with a constant throttle position brings the auxiliary air valve into action. At higher speeds the throttle is opened progressively, uncovering the second and finally the third of the gasoline outlets, with a corresponding area of air inlet.

This carbureter can be attached to the car in any position without impairing its functionment. On his demonstrating car M. Jaugey had it fastened to the side of the driver's seat, in the position usually occupied by the horn, and connected with the motor by some five feet of flexible tubing. It does not need to be heated, and will work under a film of ice, provided it has a free air inlet.

Drive Through Belt and Variable Pulleys

The Fouillaron system of belt drive is quite well known in Europe, having been in use there for a number of years with good success. So far as is known, though, the only time it has appeared in this country was at the St. Louis World's Fair, at which Fouillaron had an exhibit.

The motor shaft and the drive shaft run parallel to each other, and bear similar extensible pulleys. These pulleys have two cone-shaped members of pressed steel, slotted in such manner that they telescope into each other. The telescoping action varies the effective diameter of the pulley. By an ingenious system of lever connections the two pulleys, one on each shaft, are connected so that as one moves together to increase the diameter, the other spreads apart to decrease its diameter, so that the length of the belt need not vary.

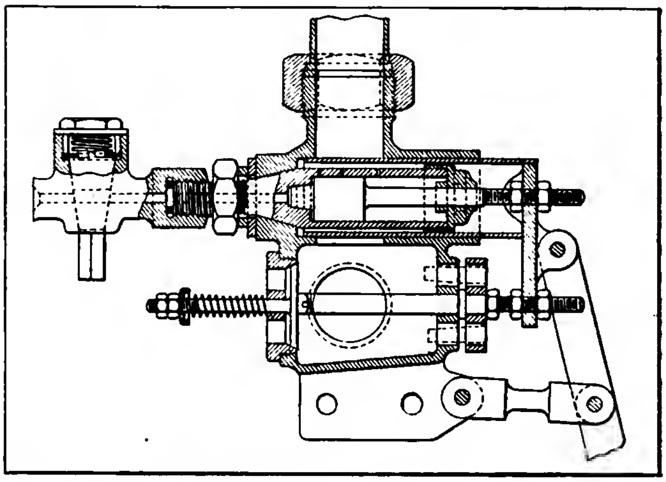
The belt itself is a special construction of raw-hide, triangular in section, and very efficient as a power transmitter. The device yields a wide range of speed ratios, not so complete perhaps as that of the friction-wheel devices, but still wider than that of any standard type of change-gear.

The drawing given herewith, reproduced from *Der Motorwagen*, shows the application of this transmission to a comparatively high-powered four-cylinder car. In order to allow an ample distance between the centers of the shafts, these have been set at an angle, the motor lying diagonally in the car. There seems to be no objection to this arrangement, strange though it looks, except that the motor might be difficult to crank. In the drawing the car is shown on its highest gear ratio, the drive shaft turning at about three times the speed of the motor shaft; this of course necessitates a big reduction in the bevel gears on the axle. For the lowest ratio the arrangement is reversed, and the drive shaft turns at one-third motor speed.

Miesse Horizontal Air-Cooled Aero Motor

This motor, the product of a prominent Belgian firm located at Brussels, was illustrated in The Automobile, issue of March 3, although it was not possible to secure a description of it at that time. It is distinguished by the horizontal position of its cylinders, which are four in number, opposed in pairs; by its system of air-cooling, and by its concentric valves actuated by a single cam.

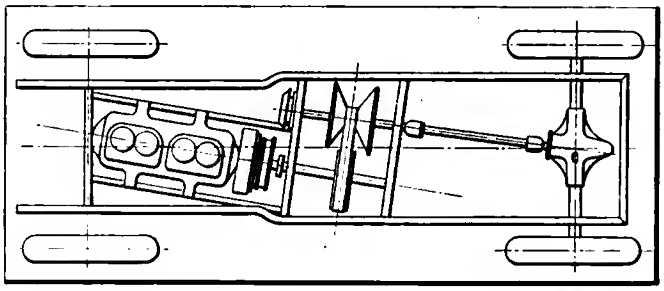
Cylinders are 120 mm. bore by 160 mm. stroke, and the motor is claimed to develop 60 horsepower at 1,200 r.p.m.; the weight



Jaugey Floatless Carbureter, Attached in Any Position

is given as 90 kg. (198 lbs.). The crankshaft is of the two-throw type. The air-cooling feature will be familiar to American readers, at least in principle; it differs from any present examples, however, in using a separate centrifugal blower for each cylinder. The four blowers are located on top of the crankcase in pairs, each pair on a shaft driven by spur gears from the camshaft, and connected with its cylinder by a separate pipe. The cylinders are provided with longitudinal cooling fins and a sheet-metal jacket; the air enters at the top, around the valve seats.

The concentric valves are so arranged that the inlet is the outer one and the exhaust the inner. The arrangement by which they are operated from a single cam is particularly ingenious. The inlet valve, of a cylindrical shape with the exhaust passage through its center, has no apparent connection with the actuating mechanism. There are really two exhaust valves, on the same stem, arranged so that when the lower one closes the lower end of the inlet valve sleeve, the upper one leaves the upper end wide open, and vice versa, or both can be half way open at the same time, thus leaving a through passage. During the compression and explosion strokes the lower exhaust valve is seated. During the exhaust stroke the valves are in the half-way position. At the end of the exhaust stroke the valve stem moves still further down, bringing the lower valve wide open but closing the upper one, and so shutting off the passage. Upon a further downward movement the upper exhaust valve, bearing down on its seat on the inlet valve shell, forces the latter open, and so the cycle is completed.



Sketch in Plan of Fouillaron Belt-Drive Transmission

Hydraulic Transmission Details

Editor THE AUTOMOBILE:

[2,206]—Having read in a recent issue of an hydraulic motor gear, I am very anxious to get more details, and also some statement as to its future possibilities. I would therefore appreciate seeing something on this subject under letters.

Boston. HAROLD W. PIERCE.

There are, broadly speaking, two hydraulic transmissions now on the market in an operating form, one English, the Torbina, the other American, the Manly. The former was described in THE AUTOMOBILE of March 3, page 467, while the latter was described in two separate issues for Dec. 10, 1908, and Feb. 4, 1909, page 243.

The latter has just been adopted by the American-La France Company for use on all of the commercial and fire service motor wagons made by them.

As to the possibilities, one can only estimate, in which one man's unfavorable opinion is as good as another's favorable one: The advantages claimed are elimination of the clutch and transmission, as well as the operating means for both. Moreover, the ordinary transmission permits but three or at most four speeds, all others being secured by a variation in the running of the engine. With the hydraulic transmission, on the other hand, an infinite number of speeds may be obtained, allowing the engine to be run at a constant speed, at which it is more efficient.

Purifying Still of Large Size

Editor THE AUTOMOBILE:

[2,207]—I am much interested in the subject of water purification, in particular for use in automobile cooling systems, and want to ask you something about it. Would it cost much to build or have made a fairly large distilling apparatus in order to purify and soften your own water? I was much interested in the letter on this subject in last week's issue of "The Automobile," but want a large sized one so not to be bothering all the time.

Albany, N. Y. CARL COYLE.

Below is shown a sketch of a large sized still, as promised last week, which can be made, that is, the metal parts, by any tinsmith. The boiler, if it may be so called, is of any sheet metal, providing it has a heavy bottom to stand the repeated heatings well. It has at the top a filling cap, and an outlet of gradually reduced diameter, which leads the stem up to the top of the condenser. The latter is made from a water-tight barrel, inserted in which is a coil of copper pipes. Copper is expensive, and other metals may be used, but it really is the best for the purpose. The barrel is filled with water, and if large enough, one filling will suffice for a whole season's use. The size of the still should be such as to make more than a radiator full at one operation.

LETTERS INTERESTING

All Dry Batteries Have the Same Voltage

Editor THE AUTOMOBILE:

[2,208]—Would you be so kind as to give me an explanation of the difference in voltage between No. 6 dry cells and No. 8 dry cells? The ignition on my motor was produced by six No. 6 dry cells (20 amperes), but on account of short duration of same I am now using four No. 8 dry cells (30 amperes). Will the change in the battery affect the coil or cause any damage to the spark plugs? C. L.

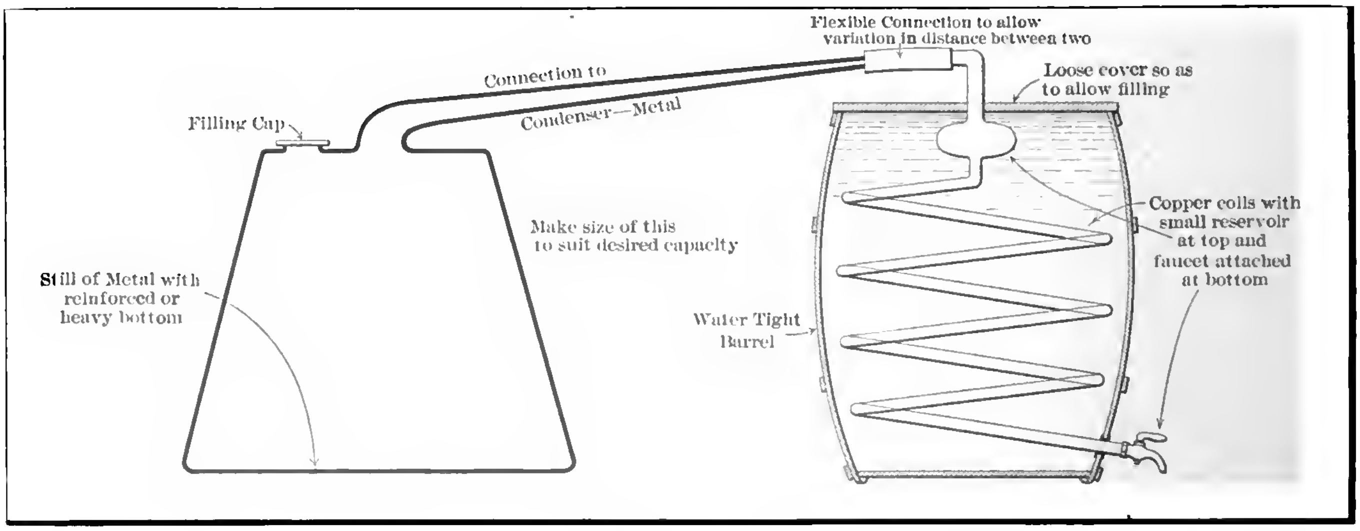
La Crescent, Minn.

The size or number does not make any difference in the voltage of the dry cells. In any sort of battery which produces electricity by chemical action, there is a certain definite difference in potential or voltage between the materials used, regardless of the quantity of the materials.

Dry cells for automobile ignition are commonly wired in series, an arrangement by which the difference in potential of each cell is multiplied by the number of cells. A dry cell, of any size, gives from 1 1-4 to 1 1-2 volts when new, so that with your first set of six cells in series you were getting a total of about 8 volts, and with the present set of four you get 5 to 6 volts. The amperage of the battery, with this wiring, is the same as that of a single cell.

The reason your first batteries did not last long enough was that the amperage was not sufficient. Amperage measures the quantity of the electric current, just as you measure gasoline by gallons. On the same car a 30-ampere battery will last half again as long as a 20-ampere one. Voltage measures the pressure or strength of the current, and 6 volts is about right for automobile work.

No change in the batteries or the current supplied by them will effect the coil in any way, that is, in any detrimental way, all coils being constructed for heavier loads than they are ever called upon to carry. Aside from the coil, which has just been explained, there is no other trouble which may be caused in the ignition circuit, unless it be in the wiring, which may have a very scanty insulation, the latter being so scant as to break down under higher voltages and thus give trouble.



Sketch Showing Component Parts of Large-Sized Still for Purifying Water to Use in Automobile Cooling Systems

ANSWERED AND DISCUSSED

How to Become a Chauffeur

Editor THE AUTOMOBILE:

[2,209]—Will you kindly give me some information on the following matters? I wish to become a competent automobile mechanic and chauffeur, able to drive and repair any make of car, also to handle and repair marine engines. I have not the slightest knowledge at present of that kind of work. How can I most quickly learn this trade, having due regard for thoroughness of training? What wages do men of this class earn usually in the United States? A. D. MACK.

Inlet Baddeck, Nova Scotia.

There are two ways to go about this matter, both of which have some advantages and also some disadvantages. Thus, you can start in with some good automobile school, take a thorough course, then take a place driving a car, being careful to select such a place as will not offer too much difficulty. Beyond that, you will learn much and improve as you go along. This has the double disadvantage of being both slow and not very thorough, moreover, it presupposes a knowledge of mechanical work.

The other method is to go into some factory, and gradually work around from one department to another, staying long enough to learn the part of the work done there thoroughly. When you feel that you have learned all about the making and assembling of the car, then try to get into testing and demonstrating work, which leads naturally to driving. This process, while attended by some large difficulties, is by far the best, and will give better results than any other way. Moreover, factory men are more in demand than school men, and usually get higher wages. The disadvantages are that the factory heads oppose the shifting around so that this process means changing from one factory to another. Moreover, this process is necessarily a long one, covering several years. It has the big advantages of being very thorough, and of bringing in an income while learning, also, as spoken of before, this class of men get more money.

It is very difficult to give you any correct idea of the wages paid, as they vary with the individuals and situations to such a large extent. Some country places, expect to get a good man for $40 a month, with board and rooms. Some city places on the other hand, offer as high as $50 per week for men of the highest skill. As a fair average $25 might be said to cover the large city position, and slightly less the smaller city, and about half that figure for the country. It is said that washers in New York City receive $20 per week, and brass polishers, $13.

Correct Pronunciation for the Autoist

Editor THE AUTOMOBILE:

[2,210]—Will you please give in "Letters Interesting, Answered and Discussed" the correct pronunciation of the following words: chauffeur, chassis, garage? HERRON & SON.

Boyne City, Mich.

As these words have not yet been recognized by the dictionaries, the really correct pronunciation is that of the French, from which they originated. Most automobilists, however, have adopted a half-way pronunciation, about as follows: chauffeur is pronounced "sho-fer," usually accenting the first syllable, but sometimes the second—the latter is regarded as more elegant; chassis is "shass-iss," accenting the first syllable, and garage is "ga-razh" ("zh" like "s" in pleasure), with accent on the last syllable.

Large Wheels Have Many Advantages

Editor THE AUTOMOBILE:

[2,211]—Please give me some information as to what advantage a 36-inch wheel has over a 34-inch, if any. READER.

Malone, N. Y.

Large wheels have in general two advantages; they are easier riding and less expensive on tires. Their easy riding is due to the fact that they do not drop so far into holes, and do not rise so sharply over rocks and humps. A large wheel will bridge across a hole that a smaller one would drop into bodily; and in the same way, being less sharply curved than a small wheel, it meets an obstruction in the road sooner and easier.

In the second place, a large wheel turns fewer times than a small one in traveling the same distance. A 34-inch wheel turns 593 times in one mile, whereas a 36-in one turns 560 times. This, together with the facts above mentioned, makes it less wearing on tires, so that, although the first cost of a 36-inch tire is greater than that of a 34-inch, the large tire will last more than enough longer to make up the difference.

Garage Drainage Problems

Editor THE AUTOMOBILE:

[2,212]—I will appreciate very much any reference you can suggest to assist in gaining information on what is being done in the best practice in the matter of protecting garages from accumulations of explosive vapors in their drainage systems.

Philadelphia. J. HOGELSON.

This is a very important problem and one which the various municipalities have done very little with. The reason why there is so little literature on the subject is concealed within this statement. However, THE AUTOMOBILE has several times published something on the subject, the latest being found in the Dec. 23 issue, on pages 1084 and 1085, the subject of the article being The Private Garage Problem, and the specific matter dealing with the drainage systems required in Milwaukee, and some other municipalities. New York City has a specific law dealing with this subject, copies of which can be obtained.

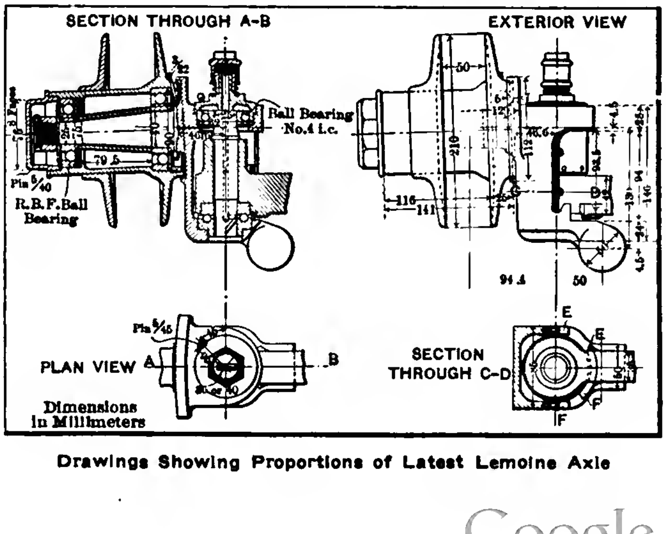
Latest Type Lemoine Axle

Editor THE AUTOMOBILE:

[2,213]—In "The Automobile" which came to hand recently we find that the information you give one of your correspondents in regard to the Lemoine type of axle is incorrect, both as regards the illustration and the description. The type of axle you illustrate was made by Lemoine many years ago before the automobile was the perfected machine it is to-day. This axle is not manufactured at the present time nor has it been for several years. The type of axle known specifically as the "Lemoine type" is that shown in the illustrations enclosed. We will ask you to publish these illustrations in order to correct the erroneous information which your reply conveys. The blue prints we are sending herewith give a very good idea of the Lemoine type of knuckle which can be entirely enclosed to exclude grit and dirt. It is this type of axle for which the Etablissements Lemoine control the patents.

INTERNATIONAL ENGINEERING CO.,

New York City. American Agents; Etablissements Lemoine.



Drawings Showing Proportions of Latest Lemoine Axle

THE LEGISLATIVE SITUATION IN NEW YORK

By XENOPHON P. HUDDY, LL.B.

THE State of New York will have a new automobile law in all probability before the present session of the legislature adjourns. The existing law was passed in 1904 and has remained on the statute books practically unchanged up to the present time. It has served as a model and foundation for motor vehicle enactments in many other States, improved upon, however, in other jurisdictions in many respects. On the whole, the 1904 law has worked fairly well, but the development of conditions arising out of the operation of motor vehicles on the public highways and certain defects in the 1904 law have brought about an urgent need for a new enactment in this State covering the subject. Last year both of the houses of the legislature passed a motor vehicle law which contained no limit on speed except that of reasonable and proper driving. This feature of the bill governing speed was believed to be objectionable and therefore was vetoed by the Governor.

No attempt this year is seriously made on the part of automobilists to have enacted such a broad speed provision. Those who have the best interests of the automobile industry at heart and also the safety of the public, believe that a general speed limitation of this nature would be inadvisable at this time, however many good arguments can be presented in favor of it.

It is very generally conceded that the State of New York needs a new law, but the old law is a great deal better than many bills which have been introduced into the legislature this session. If a better law cannot be passed this year it would be much wiser to allow the old one to remain. In fact, many arguments can logically be advanced in favor of no new legislation. It is always considered an advantage to be working under a known law which has been in existence for several years, inasmuch as everybody is familiar with its provisions and it is not like new legislation which may be discovered to be invalid on account of some mistake. In other words the old law has been tried out and found to be valid. On the other hand, the 1904 law contains many defects, such as, for example, it permits any person to obtain a driver's license, even though he may be blind or a cripple or of immature age. Also the registration and licensing fees are small as compared with those in other States.

It is very generally agreed among automobilists that a reasonable license fee should be paid for the privilege of operating motor vehicles on the public highways, and this license should be renewed annually. In the State of New York to-day $2 is paid for a license and no renewal is required. There is hardly any other State in the Union where automobile travel exists to any extent with so small registration fees, but the objection by automobilists to paying a tax may reasonably and justly be made. There is a vast difference between a license fee and a tax. A license fee is imposed under the police authority of the State which constitutes the power to enact regulations to protect the safety and general welfare of the public. It has nothing to do with the taxing power. The State may do many things under the police power, but just as soon as it attempts to regulate conduct with a view to protecting the public safety by taxation, it is exceeding its constitutional authority. So it should be a principal to be adhered to by all automobilists that the automobilist cannot be taxed for the privilege of using the public highways. Make the iicense fee fair and reasonable so that the State may receive a fair amount of revenue therefrom, but do not make the fee so large that it will constitute an exercise of the power of taxation, which power is the power to destroy, as was long ago announced by the Supreme Court of the United States, in the case of the United States vs. Bank of Maryland.

The main features of a proper automobile law are: to provide a method of identifying offenders, to regulate speed and the operation of automobiles with a view to the safety of the public and to procure revenue. Originally revenue was not considered an essential feature of automobile legislation. Now it is looked upon as one of the main objects. No objection can be made on the part of automobilists to contributing a certain reasonable amount of revenue which is to be applied for the construction and maintenance of roads. That automobiles more or less wear out highways is conceded. Automobilists desire good roads which save their machines and make their tire expenses less. For these reasons automobile users are willing that the registration fees in the State of New York be increased and be made payable annually, but the amount of the fees must not be so great as to make the license charges, taxes.

In regard to the speed of automobiles, this presents a question which is surrounded with more difficulties than any other feature of motor vehicle legislation. Some desire practically no speed limits. Others want very small arbitrary limitations. Then again there are those who believe that we should have a *prima facie* provision, similar to that which exists in the States of Massachusetts and Connecticut. Of course, we cannot have all these and it is merely a question of choosing which is the best. There is very much to be said in favor of incorporating the *prima facie* limitation clause in a speed regulation. For example, if the law provides that 25 or 30 miles an hour shall not be exceeded in the country districts and if a person exceeds this limit it shall be evidence of dangerous driving or a violation of the law. Such a provision would permit the defendant to prove as a matter of fact that no danger was created. In other words, if this provision is inserted, many technical violations of the law would be done away with and undue hardship and oppression would be eliminated. It is very generally conceded by the authorities that automobilists should not be arrested if they exceed the speed limit of 10 miles an hour by a few fractions of a minute. Several of the bills introduced at Albany have raised the speed limit of 10 miles an hour to 15 miles an hour in the built-up sections of cities. This is a wise change, for it has been demonstrated in New York City, for example, that it is practically impossible to comply with the 10-mile rate and that all vehicles exceed this limit. Fifteen miles an hour is a more just rate. In the sections not built up 20 miles per hour can safely be allowed. In the country districts 30 miles an hour is not excessive. Of course, under no circumstances should an automobile be driven at a dangerous rate of speed considering the conditions.

Coming to the question of chauffeurs, we find that a condition of affairs exists which is not at all easy to deal with. Many accidents have been caused by chauffeurs. So also have owners been the cause of collisions and injuries. Whether there should be any distinction between chauffeurs and owners as to licenses to drive is disputable. It is regarded by some that the chauffeur is engaged in a special occupation and for that reason alone he is placed in a separate class and should be subject to regulations different from those who do not make a business of driving for hire. There is much good sense and logic in this argument. On the other hand, it is said that the owner who drives his car can do just as much damage as the chauffeur, and the owner should possess the same qualifications and the same kind of a license as required of a chauffeur.

Whether an examination of automobile drivers would have a tendency to eliminate the reckless operation of motor vehicles and would protect the public better seems to be another question concerning which there is much to be said. Of course, wrongful conduct can never be legislated out of existence. It would seem that an examination might call for physical soundness of a driver and a certain amount of knowledge concerning the safe condition of the machine which he is operating. Beyond these it is somewhat doubtful whether an examination would be of any value. A license to drive, however, should be subject to suspension and revocation for causes not technical. This is very generally conceded.

In regard to penalties, no objection can be made to making them severe for violations which are not purely technical. In the method of arrest and prosecuting automobilists, however, as much red tape as possible should be eliminated. Under the present law in New York an automobilist is arrested, then taken before a police captain where bail must be given, then taken before a police magistrate where a hearing is had, and then bail is given again, then he is bound over to the Court of Special Sessions where he must go to plead and then go again to this court for his trial, where he is often compelled to wait all day until his case is called. After the trial he may depart upon paying his fine if convicted. This process is entirely and altogether too lengthy and annoying. It clogs the courts with unnecessary business, takes the time of policemen and court attendants which might be devoted to more serious and important matters and on the whole it is highly objectionable. It would be very much better to allow the magistrates to dispose of automobile cases forthwith. This view is shared by many judges.

In the enactment of a new automobile law for the State of New York many factions are to be taken into consideration. We have the owners of automobiles, taxicab proprietors, manufacturers and dealers, garage keepers, tire manufacturers and chauffeurs. They are all vitally concerned. Each class has its own ideas about the proper kind of legislation and no two are exactly the same, so whatever law is enacted will be the subject of a compromise to a certain extent. One thing is to be remembered, however, that there does not exist to-day the prejudice against automobiles which former legislators had to contend with, and it is quite likely that when the New York State Legislature has finished its work this session on automobile legislation a very good law will be enacted.

SURPRISING RESULTS FROM NEW TWO-CYCLE ENGINE

RESULTS which will surprise many have been obtained with a new form of two-cycle engine, shown and described at the recent meeting of the A. C. A. at the club house on Fifty-fourth street, New York City. That this subject possesses much of live, human interest was clearly shown in the attendance, which far surpassed any previous attendance for this year's meetings. Not alone were there many in attendance, but they were interested to the extent of digging down into the details, as well as wanting an explanation of the theory. After a brief mention of the latter, J. H. Freeman, who described the engine for the inventor, Mr. Newcomb, told of the advantages to be derived from its successful operation.

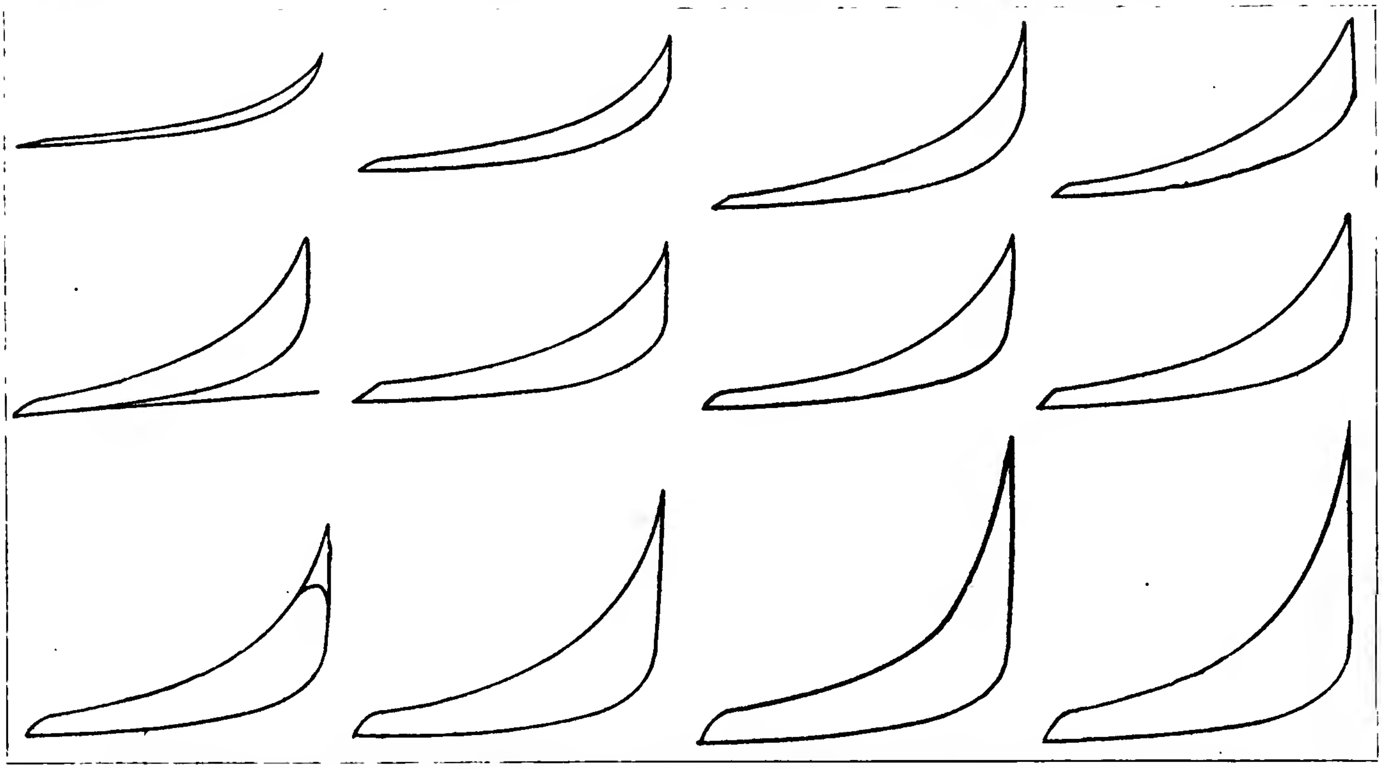
This talk was followed by a test, in which the engine, after refusing to start, behaved very well, and showed up in excellent shape. The ordinary form of two-cycle, three-port arrangement is used, but the fuel is injected, preferably from above, by means of a small pump. The latter is driven off of what corresponds to a camshaft on the ordinary four-cycle engine. This may be varied as to height of lift, and also time of lifting, so that the fuel injection may be varied within wide limits. Appended is a test and the results of the same:

NEWCOMB TWO-CYCLE ENGINE

Tests Made at Columbia University

No.	Speed.	M.E.P.	B.H.P.	I.H.P.	Air Per Hour.	Fuel Per Hour.	Fuel Per B.H.P. Hour.	Fuel Per I.H.P. Hour.	Mech Eff.
1	470	37.3	4.	5.8	147.	3.46	.87	.59	.69
2	470	42.	5.2	6.5	146.2	3.75	.72	.575	.80
3	470	52.4	6.8	8.1	147.7	4.22	.62	.52	.84
5	475	77.5	9.3	12.1	148.	7.05	.75	.58	.77
7	600	27.2	3.18	5.4	156.	3.25	1.	.6	.59
8	620	35.	4.2	7.15	163.8	3.6	.86	.505	.59
10	600	36.8	5.6	7.3	162.8	3.7	.66	.505	.77
11	620	40.	6.7	8.2	162.	4.05	.6	.495	.82
13	620	51.	8.55	10.4	161.4	4.68	.545	.45	.83
14	550	62.8	8.6	11.6	...	5.54	.65	.475	.74
16	600	74.	10.5	14.5	158.	8.35	.79	.575	.73

Single cylinder 5 1-2 by 5 1-2 inches (effective piston stroke 4 3-4 inches), ratio of compression about 1 to 5.



Various Manograph Curves from Newcomb Two-Cycle Fuel-Injection Engine, Arranged in Order of Increasing Power

THE AUTOMOBILE

Vol. XXII Thursday, March 31, 1910 No. 13

THE CLASS JOURNAL COMPANY
H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Contests will soon be the most conspicuous of autoing events, and much interest will be taken in them. The rules, as promulgated by the Contest Board of the A. A. A., are now in force, and they were revised, apparently with the expectation of being able to eliminate the faults as developed during the past year. The autoing public will readily understand that strictly racing types of automobiles are built out of special materials, under the most exacting conditions, and from designs gotten out by engineers of accentuated skill and experience. The interest of the public in this class of automobiles is passive, and from a sportsman's point of view.

Reliability contests, known as Class "A" in the A. A. A. rules, and other events, which are supposed to bring out the capabilities of "stock cars," interest the autoing public on an entirely different basis. These events are supposed to test the capabilities of the cars, and are claimed by the contestants to represent the way by which purchasers will be enabled to observe performance, and thereby have the means at hand for the purpose of separating the sheep from the goats.

It is to be hoped that the rules as they are now in force, will make it impossible for any unfair contestant to use special racing magnetos on so-called "stock cars," or other devices which will increase speed and endurance beyond that which may obtain in the regular stock cars of the same make. The only fair way of trying out stock cars is to use them as they are regularly put out, and to forbid the use of special magnetos, ball-bearings, carbureters, tires, materials in general, and methods. The mere fact that two cars look alike, come out of the same plant, and in general are made from the same drawings, does not make them alike. Purchasers of automobiles, if they are inveigled into the belief that a car as it enters a stock contest is a stock car, if it is not, will ultimately look upon every contest as the device of the unscrupulous, and the honest makers of real automobiles will be made to suffer accordingly.

It is not enough to dismiss this subject when it is brought to the attention of the proper board, with a wave of the hand, and a statement that the rules had been complied with. An unscrupulous act is rendered none the less so if it is done by rule, and in the long run makers of real automobiles will be compelled, by force of public opinion, to exclude the class of men who enter a special car which is not on a par with their regular automobiles.

* * *

At the last annual meeting of the Society of Automobile Engineers it was pointed out by President H. E. Coffin, in his inaugural address, that motor building, as a science, is in the primary grade. Glancing over the industry, and examining critically beneath the surface, seems to bear out President Coffin's contention. There is undoubtedly a considerable amount of activity in the various laboratories in the several plants, much of which is directed against the motors of to-day, with the hope, perchance, that the motors of to-morrow will be better.

The poppet valve of motor has probably reached the maximum of its capability, and tests have shown that it will utilize 20 per cent of the terminal value of the fuel in useful work, and that 80 per cent is lost, either in the exhaust, the water-jacket, noise, or molecular work. This seems to be a poor showing, but the average steam engine delivers about 8 per cent of the thermal value of the fuel used, and the finest engines of this generic type used on ocean liners will scarcely approach 17 per cent as a figure of the thermal efficiency.

Just now the two-cycle fuel-injection motor is receiving its quota of attention, and it promises much. The latest idea is to inject the fuel after the ports are covered, and to vary the time of the fuel injection to suit the running conditions. In this way, it is possible to alter the ratio of the fuel to air, hence vary the power to suit the needs and to employ a very high compression without having to cope with the ills of pre-ignition, since the timing of the fuel, as it is injected into the body of air in the cylinder, may be such as to eliminate pre-ignition trouble.

Earlier designs of two-cycle motors invariably delivered less than they promised theoretically, because a homogeneous mixture was made in the crankbox and was transferred to the cylinders under conditions of bad scavenging. Within the last two or three years attention has been paid to the mechanical arrangements which have to do with scavenging and the performance of two-cycle motors improved wonderfully as a result. It is now claimed that the direct injection of fuel, in addition to the other improvements wrought, will increase the thermal efficiency of automobile types of motors to a material extent. As a further effort in the direction of improvement, one school of engineers is working on two-cycle types of motors, using forms of slide or piston valves, the idea being to afford a more commodious exit for the burned gas, and to time the valve action to suit the specific conditions.

N. Y. Automobile Trade Association Banquet

THE New York Automobile Trade Association gave its annual dinner in the rooms of the Automobile Club of America on Wednesday evening, March 3d. M. Haradon, president of the Association, presided as its toastmaster, and after an elaborate menu, in introducing the speakers, announced that the Association consists at present of sixty-seven firms doing business in the automobile trade in the City of New York, and that the objects of the organization are co-operative tending to uniform garage rates and regulations, and a uniformity in prices. He introduced as the first speaker Mr. Whiteside, assistant District-Attorney, who gave some careful advice to the law breakers, and was followed by Col. Edward Cornell, chairman of the Highways Protective Society, who explained the mission of the Society in its work for good roads, careful driving and proper use of public thoroughfares by all classes of vehicles. He ascribed a majority of the accidents happening to automobilists as due to intoxicants, and in this particular pointed out that the owner is a more dangerous man than the professional chauffeur. Next followed Oliver A. Quayle, Chairman of the Legislative Committee of the New York State Automobile Association, who explained the situation at Albany, and stated that the only two prominent bills before the Legislature both restrict the passage of speed trap regulations by local authorities, and allows the automobilist fifteen miles an hour in cities and villages, with a maximum of thirty miles in the open highways. Quoting statistics of accidents, he found in the City of New York in one year 180 deaths caused by automobiles, 246 by horse-drawn vehicles, 240 persons killed by trolleys. Outside of the City of New York 15 persons were killed by automobiles, 26 by horse-drawn vehicles and 12 by trolleys. The editor of "The Schoolmaster," Creswell MacLaughlin, confined himself to drastic remarks on general political economy and the solemnity of the occasion of which he was a participant. After which John C. Wetmore, introduced as the "Dean of the automobile writers," closed in his usual happy manner. The dinner was well attended and a live interest was shown in general conditions.

Ohio Clubs May Withdraw From A. A. A.

COLUMBUS, O., March 28—An amendment to the constitution and by-laws of the Ohio State Automobile Association, permitting that organization to withdraw from the A. A. A. was adopted at the annual meeting of that organization in this city. During the year there was a gain of 400 members.

The report of the secretary, Dr. A. B. Heyl, of Cincinnati, showed the membership in good standing to be 1,773.

The board of directors elected consists of W. F. Bonnell, Harry L. Vail, Fred T. Sholes, Walter C. Baker, W. H. Wherry, Lyman Lawrence, T. M. Cagwin, George Collister, F. J. Baird, C. J. Forbes, Jr., and Paul T. Lawrence, of Cleveland; C. L. Bonnifield, G. W. Drach, L. J. Merkle, G. W. Cleveland, A. B. Heyl, McKim Cooke, L. S. Colter, Charles Ireland, A. P. Streitman, William Perin and Carl Streit, of Cincinnati; Perin B. Monypeny, C. Roy Clough, Nelson J. Ruggles, Herman Hoster, C. E. Firestone and William M. Frisbie, of Columbus; Harold Sprigg and Philip H. Worman, Dayton; G. E. Mentel, Springfield; W. R. Huntington, Elyria, and James A. Allen, Kenton. Directors from other cities will be elected later.

Harry L. Vail, of Cleveland, was re-elected president; Dr. A. B. Heyl, of Cincinnati, secretary, and L. S. Colter, Cincinnati, treasurer. Perin B. Monypeny, of Columbus, was elected first vice-president; James A. Allen, of Kenton, second vice-president, and Cyrus E. Mead, of Dayton, third vice-president.

Coming Events in the Automobiling World

Mar. 26-Apr. 2...Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.
Mar. 26-Apr. 2...Montreal, Automobile and Motor Boat Show, Official Motor and Sportsmen's Show Committee of the Automobile and Aero Club of Canada, in the Coliseum. E. M. Wilcox, Manager, 123 Bay St., Toronto.
Apr. 6-9..........Watertown, N. Y., Automobile Show, Watertown Automobile Dealers' and Manufacturers' Association, in the State Armory.
Apr. 9-16.........Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.
Apr. 11-16........Harrisburg, Pa., Kelker Bldg., Automobile and Sportsman's Show, Harrisburg Automobile Dealers' Association. B. R. Johnson, Manager.
Apr. 11-16........Erie, Pa., Meyer Block, Automobile and Motorcycle Show.
Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911..Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Apr. 6-9..........Memphis, Tenn., National Aviation Meet, Aero Club of Memphis (member Aero C. A.).
Apr. 8-10 & 13-17.Los Angeles, Cal., Inaugural Meet, Motordrome.
Apr. 30-May 2...Philadelphia, Roadability Run to Atlantic City, Quaker City Motor Club.
May 2............Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.
May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.
June 11..........Wilkesbarre, Pa., Annual Hill Climb Up Giants' Despair, Wilkesbarre Automobile Club.

Foreign Shows and Races

Mar. 19-Apr. 3...Berlin Automobile Show.
Mar. 22..........Elegance Competition at Monte Carlo.
Mar. 27-Apr. 4...Prague, Austria-Hungary, Automobile Show.
Mar. 28..........Brooklands, England, Easter Meeting.
Mar. 31-Apr. 8...French Spring Wheel Competition.
Apr. 2-24.........Turin, Italy, Automobile Show.
Apr. 27-28........Brooklands, England, Two-Day Meeting.
May 1-Oct. 1......Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.
June 2-8.........Prince Henry (German) Touring Competition.
June 13-18.......Scotland, Scottish Reliability Trials.
June 20..........French Voiturette Race.
June 21..........French Stock-Car Race.
June 22-July 5...Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27..........Speed Trials at Kiev, Russia.
July 12-18........Ostend, Belgium, Automobile Week.
July 20-25........Boulogne, France, Automobile Week.
Aug. 1-15.........Ardennes, France, Meeting.
Aug. 15-Sept. 15.French Industrial Vehicle Trials.
Aug. 21..........Salon, France, One and Five Kilometer Trials.
Aug. 28..........Mont Ventoux, France, Hill Climb.

"SECRET TIME" TO LEVEL EXPERT AND NOVICE IN RUN

THE third annual Roadability run, under the auspices of the Quaker City Motor Club, will take place Saturday, April 30. The start will be from the club rooms, Hotel Walton, Philadelphia, and the course will be by a roundabout route to Atlantic City. The run will be made according to the rules and approved supplementary regulations of the A. A. A., and with the endorsement of the Philadelphia Automobile Trade Association, in co-operation with the Board of Trade and municipal authorities of Atlantic City.

It will be open to all pleasure cars and under the plans formulated by Secretary H. C. Harbach of the Quaker City Motor Club, unusual interest is given the affair. The handicapping rules are unique, in that the winner of the first prize may finish anywhere in the procession and the first car past the finishing line may earn one of the least of the awards. This unusual condition is created by the selection of a certain definite but secret time for the run and awarding the highest prizes to the cars that most closely approximate that time. The secret time will be within the legal speed limit of the State of New Jersey and will be fixed by Mayor John E. Reyburn of Philadelphia and his confrere Mayor Franklin P. Stoy of Atlantic City.

By adopting such a plan, the club has placed a penalty upon illegal speed and has equalized the chances of the fastest cars with those of more moderate speed and power. In addition to five principal prizes which will be of sterling plate, 160 approximation prizes have also been provided.

The object of the run under the conditions is to afford a contest in which the novices and owners of private machines will be upon the same plane as the experts and professional chauffeurs.

Each car is required to carry two or more passengers. At the conclusion of the run, the cars will park on the Million-Dollar pier, where trophies will be awarded and prizes distributed.

An impromptu auto show will be held after the awards have been made. Last year seventy cars finished in the run of the Quaker City Motor Club and this year a material increase in that number is expected, as 165 prizes have been prepared.

The return trip may be made at the convenience of the contestant, as the jurisdiction of the club does not extend any further than the finish of the run.

RUSH ENTRIES FOR LOS ANGELES MEET

LOS ANGELES, Mar. 27—The track board at Playa del Rey has been completed and a number of the drivers who are going to compete at the April meeting tried out their cars on the new saucer, during the past few days. The finishing touches were put upon the track surface, when the boards were treated with a powdery coat of crushed shell. Great speed was attained by some of the cars and the drivers are enthusiastic about the prospects for a successful meeting.

Among the entries made during the week are those of an Isotta car, by J. B. Marquis and a Reo Bird, by Bruno Siebel; three Marmon cars which will be driven by Ray Harroun; a Corbin, by Al Livingston; two Appersons by Harold Hanshue; a Cole "30" by William Endicott and a Darracq which will be driven by Ben Kerscher. In addition to the entries of De Palma, Robertson, Oldfield, Lescault, Bragg and Hearne, this list makes a formidable appearance. There are also prospects of entries of several more Fords, Buicks, a Velie, Sterling, Stearns, etc.

An interesting feature of the meeting will be the appearance of several of the speed marvels of the past, among which are old "999," the famous racer of Henry Ford that held world's records, which will compete in the free-for-all classes and "Whistling Billy," the White steamer which marked a step in the development of automobile speed under the guidance of Webb Jay. This car has been reconstructed and on the board saucer, its trials have demonstrated that it still possesses the same brilliant speed that dazzled race-goers years ago.

Three concrete subways give entrance to the inside of the track and with a 300-foot paddock, grandstands and bleachers, the accommodations for the public are ample.

A point has been raised that the board surface of the track will become oily from the slopped lubrication of the cars and that the curves might be dangerous. The management, however, declares that the construction of the saucer has been so framed that this danger is minimized and that the coating of pulverized shell will take up any amount of oil that is likely to be spilled by the racers. In addition to its use as a motordrome, the track has been equipped with aerodromes and the Aero Club of California will make it its official headquarters.

DECIDE ON ROUTE OF GLIDDEN TOUR

A meeting of the contest board of the A. A. A. has been called for Wednesday, March 30, to determine upon the course of the Glidden tour of 1910. It had been generally understood that the start of the tour would take place at Cincinnati and that its course would be Southwesterly to Oklahoma City, thence Northeasterly to Chicago, but a distinct impression has been given that this route will be changed materially.

Indianapolis has made a strong bid to supersede the Queen City as the starting point and the indications are that its claims will be urged with power and insistence before the board. One reason underlying the contemplated action by the board is the fact that an effort has been made by a manufacturing concern to forestall some of its rivals by anticipating the selection of the Cincinnati route.

The meeting of the board is of much importance as the details of the tour route will be taken up and a definite decision concerning a number of points, that have not been positively settled so far will be made. Cincinnati's claims will be represented actively, but the indications point to a sharp change in the official itinerary.

HARRISBURG RELIABILITY RUN

HARRISBURG, Mar. 30—The Fourth Annual Reliability Contest of the Motor Club of Harrisburg will be held on May 9th, 10th and 11th and promises to be one of the largest and best contests of the year in the East. The route will lead from Harrisburg to Reading to Philadelphia to Atlantic City on the first day; Atlantic City to Sea Isle City to Cape May to Wildwood on the second day, and from Wildwood to Philadelphia to Lancaster and back to Harrisburg on the third day.

The rules which governed last year's contest, modified to meet the demands of the A. A. A., will be used. There will be four classes ranking from price classification and handsome trophies will be awarded in each class. A technical examination will follow the contest and the final ranking of the cars will be made from road records and technical examination. In the last three years the Harrisburg club has conducted contests without a protest and the 1910 contest promises to prove the most successful in the history of the club. Prominent automobile men, including David Beecroft, of Chicago, will serve as officials while the contest will have the support of makers and the A. A. A.

DEATH TAKES PIONEERS FROM AUTOMOBILE BUSINESS

FATHER OF PIERCE-ARROW IS DEAD

BUFFALO, Mar. 26—George Norman Pierce, father of the Pierce-Arrow car and one of the founders of the Pierce-Arrow Motor Car Company, was buried to-day in Forest Lawn. The funeral was held at the home of his oldest son, Percy P. Pierce, at 168 College street. The services were private.

Mr. Pierce died of heart disease at the Lenox Hotel on Wednesday night. He had apartments in the hotel for the Winter, having been in the habit of dividing the year between the Lenox, Sturgeon Point on the Lake Shore, and San Antonio, Tex.

Mr. Pierce was born in Freiendsville, near Waverley, N. Y., 64 years ago and received his education in the public schools and a business college. He married Miss Louisa H. Day of Boston, by whom he is survived, together with eight children.

He began business in Buffalo as a member of the firm of Heintz, Pierce & Munschauer, making refrigerators and bird cages in 1872. From this, the firm diverged into the making of bicycles and tricycles on Hanover street when the bicycle craze swept the world. The Pierce bicycles obtained wide reputation. The motor car began to occupy Mr. Pierce's attention in 1898, work being carried on in the Hanover street plant until 1907.

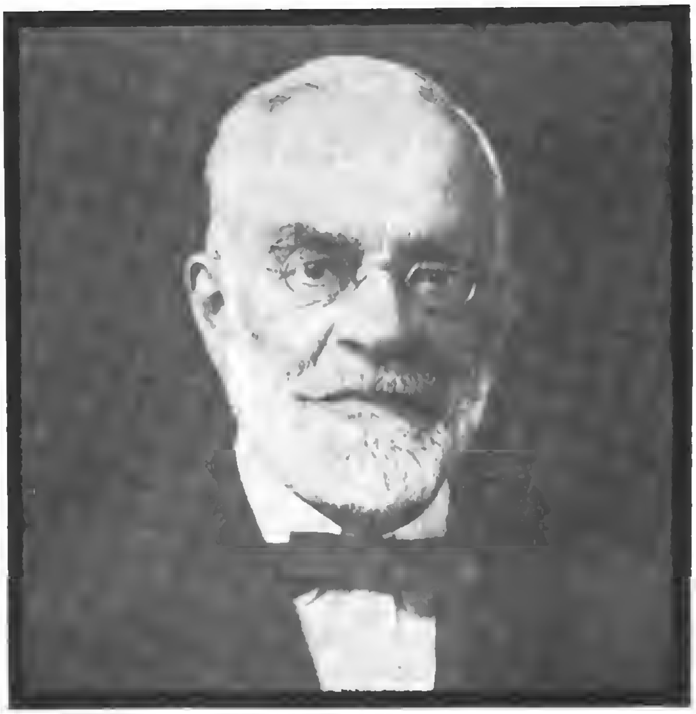
HEART DISEASE CLAIMS J. A. BRISCOE

Joseph A. Briscoe, one of the pioneers in the manufacturing line at Detroit, died last Friday after an attack of heart disease. Mr. Briscoe was the father of Benjamin Briscoe, president of the United States Motor Company and Frank Briscoe, president of the Brush Runabout Company. He was treasurer of the Briscoe Manufacturing Company of Detroit, although for the past two years he had not been actively engaged in business but devoted himself to horticulture.

He was 72 years of age and his whole life had been full of industry and accomplishment. He was the first engineer to take a locomotive into Detroit and has always been identified with engineering and machinery.

He was born at Philadelphia and removed to Detroit when an infant, spending practically his whole life in the Michigan metropolis. In his youth, Mr. Briscoe invented a machine for making nuts and bolts and was one of the founders of the Michigan Bolt and Nut Works, which is still in existence. He was also connected with a large iron mill at Sharon, Pa., and in the later years of his life engaged in the insurance business, being at one time agent of a life and accident insurance company.

George Norman Pierce, Founder of Pierce-Arrow Motor Company, formerly the George N. Pierce Co., who is dead at Buffalo, N. Y.



Joseph A. Briscoe, father of Benjamin and Frank Briscoe, and himself treasurer of the Briscoe Mfg. Co., who is dead at Detroit

FIRST ANNUAL BANQUET OF A.L.A.M. APRIL 7

Amid sumptuous surroundings, the first annual dinner of the A. L. A. M. will be held April 7 at the Hotel Astor. The function will be most elaborate and it is expected that a gathering, thoroughly representative of the manufacturing industry will assemble.

Governor Fred N. Warner of Michigan will be one of the speakers, his acceptance of the invitation tendered him having been received Tuesday. William H. Edwards, head of the street cleaning department of New York will also make an address as will Arthur Brisbane and Col. Charles Clifton, president of the association.

Job Hedges, noted for the quality of his after-dinner speeches will act as toastmaster.

The list of speakers represents a wide field and as considerable latitude is allowed in the choicc of subjects, the oratorical program is attracting much attention among the members of the association.

It is expected that 200 will be present, the attendance being limited to three representatives from each of the concerns identified with the association.

Acceptances have been coming in at a satisfactory rate and a special effort is being made to make the occasion notable.

LATEST DOINGS OF THE A. A. A. CONTEST BOARD

THE Contest Board of the A. A. A. held an important session March 29, at which a number of matters of interest came up for action.

It was decided to sanction a race meet on the Indianapolis Motor Speedway, May 30, under the title of the National Stock Car Championship Automobile Race Meet.

This event follows the Grand Circuit meeting at Indianapolis, May 27-28, and will be the first time that stock cars will contest under the new rules of the A. A. A. All classes of stock cars are eligible to entry in one or more of the races, which will number fifteen.

Gold medals will be awarded the winners in each race; silver medals to the seconds, and bronze medals to the cars that finish third.

Owing to the fact that the races will have a national character, special care has been observed by the board in preparing the details of the rules.

It was definitely decided that the Glidden Tour of 1910 will start from Cincinnati in the middle part of June. The rules and entry blanks for the tour have been finally approved.

In view of the friction that has sometimes followed various events held under the jurisdiction of the board, owing to varying constructions placed by local officials upon the rules, the board decided to issue printed instructions to its representatives all over the country, so that rulings might be more uniform.

The board certified the record of Oldfield at Daytona, in which he broke the beach record for the mile, flying and standing starts; the kilometer flying start, and the two-mile flying start.

The appeal of the Columbia car, which finished second to the Pennsylvania entry in the tour from Los Angeles to Phœnix, which was concluded with a race at Phœnix, was sustained, and the purse of $500 was awarded the Columbia. The question was raised when the wheels of the Pennsylvania car were changed after completing the tour, but before the car took part in the race.

LOUISVILLE SHOW PROVED A SUCCESS

The third annual exhibition of the Louisville Automobile Dealers' Association, which closed Saturday night after holding attention for three days, will go down in the city's history as the greatest event of the kind ever held in this locality and was a fitting introduction to what seems to be destined to be the biggest and best motor year for all concerned. Although the exact figures cannot be had because of the tendency of some dealers to keep their sales secret, officers of the association say that fully 100 cars were sold at the show, representing $200,000. This means that about half of the exhibit changed hands and will soon be speeding up and down the streets of Louisville and the highways of Kentucky.

The dealers anticipate a big month in sales. They say that the show has stirred interest in motor circles ,and that many who could not definitely decide upon a purchase while the show was in progress will do so this month. Many of the dealers have already applied for space in the 1911 show, which will be on a much larger scale than even the exhibition this year.

TRADE ASS'N WILL FIGHT FREIGHT INCREASE

CHICAGO, Mar. 29—Instead of celebrating the opening of the driving season by a week's carnival, the Chicago Automobile Trade Association at its meeting last night decided to substitute a floral parade to be held on the night of May 7. The carnival feature has been postponed until Fall when the dealers will have more time to handle it. The meeting also discussed the threatened 25 per cent increase in freight rates which the A. L. A. M. now is fighting and a resolution pledging the support of the local association was passed and will be forwarded to the traffic department of the A. L. A. M. Fourteen new members were admitted and the association now comprises about 60 of the most prominent concerns in the city. J. B. Maus, manager of the Pennsylvania Tire branch, qualified as secretary, to fill the vacancy caused by the resignation of F. E. Sparks.

PIERCE-ARROW 1911 DELIVERIES

The Pierce-Arrow Motor Car Company, of Buffalo, N. Y., will have its 1911 models, particularly the 6-cylinder 66, so far advanced by the middle of July that a limited number of deliveries to customers who may care to tour abroad are being promised. It is the Pierce-Arrow idea that it is an advantage to thus start delivering in the middle of the touring season, since it affords opportunity to tour abroad in season.

TEN MILES OF LONG ISLAND PARKWAY

By September, ten more miles will be added to the Long Island motor parkway, the clearing, grading and blasting necessary upon the course having been practically completed from Bethpage Lodge to Lake Ronkonkoma. The stretch from Meadow Brook Lodge to Great Neck, which was prepared in 1909 is being given a surface of bituminous macadam and the new work will be treated similarly this summer.

In constructing this section, ten highways are crossed either above or below grade, while steel and concrete viaducts traverse branches of the Long Island Railroad and the trolley line running from Hicksville to Mineola. Two toll lodges have been built, one at Great Neck and the other near Mineola.

The plan that is being worked out in the construction and improvement of this parkway is very similar to the original idea.

PLANS NATIONAL AUTOMOBILE SHOW

Stewart McDonald, general manager of the Moon Motor Car Company, has started a movement in St. Louis to hold a national automobile show in that city for two weeks in the latter part of September, during the National Good Roads convention. The Million Population Club of St. Louis has taken up the plan, which provides for holding the show in tents under the auspices of either the National Association of Automobile Manufacturers or the Association of Licensed Automobile Manufacturers.

HARTFORD DEALERS HOLD ANNUAL MEETING

At the annual meeting of the Hartford Automobile Dealers' Association held Wednesday evening of this week the following officers were re-elected: President, Ralph D. Britton; vice-president, L. H. Elmer; secretary, S. A. Miner; treasurer, Fred W. Dart. Following the election, plans for the show to be held in 1911 were discussed. The present show committee: Fred W. Dart, E. G. Biddle and W. L. Ledger were instructed to look into the matter and to report at the next meeting.

COL. CHARLES CLIFTON HAS RETURNED

Substantially a month ago, Col. Charles Clifton, president of the A. L. A. M., and the Pierce-Arrow Motor Car Company, and Mrs. Clifton, departed for the Carribean Sea and adjacent interesting points, for a rest and recreation, and after an interesting voyage, leaving dull care behind, returned much invigorated, and the pressure which Col. Clifton is accustomed to applying to affairs automobile will be felt again.

UNITED STATES MOTOR COMPANY ABSORBS WINTON

With rumors flying thick and fast as to combinations, mergers and the like, the denials flying fully as fast, the layman is at a loss just what to believe. In the latest report to the effect that the United States Motor Company has acquired the Winton Motor Carriage Company, of Cleveland, there is more of truth than in other stories going the rounds lately; in fact, coming as it does directly from the inside of the acquired concern, it may be taken as a settled fact. With this acquisition, the United States Company holds an enviable position in the industry, due to the prestige which was added to the combination by the subsidizing of Alexander Winton, a pioneer in the automobile industry, and the possessor of an immense and well-equipped plant at Cleveland, to say nothing of a vast and well organized selling organization, with factory branches in New York, Chicago, Boston, Philadelphia, Baltimore, Pittsburgh, Cleveland, Detroit, Minneapolis. San Francisco and Seattle.

Rumors of further mergers of automobile companies have been plentiful during the past week, but so far as could be determined, their foundation is not sound. It was reported rather persistently that the Studebakers had gained control of the Ford Automobile Company of Detroit, but the rumor was definitely nailed by a statement to the contrary by F. S. Fish, director of the Studebaker company and by a general denial of further activities in the merger line, by W. R. Ennis of New York. The home office of the Ford Company also denied the story and branded it as "made of whole cloth." Mr. Ennis said that so far as he knew, there were no more mergers contemplated by the Studebaker interests and their allies in Indiana.

In the meantime Ford is holding the fort and it is said that he is entertaining offers from competent sources, one of which is mentioned as the United States Motor Company, but this rumor cannot be confirmed.

NEW FACTORY FOR BOSCH MAGNETO

Plans for the largest magneto factory in America are being prepared for the new Bosch Magneto Company's plant, which will be erected at Springfield, Mass., this Spring. Several of the preliminary contracts have been let and the work is being rushed along as fast as possible. The factory site at Springfield consists of seven acres and was purchased by the company during the past month.

The buildings will be of reinforced concrete and will be constructed upon lines of most modern development and design. Particular attention has been directed toward sanitary improvements.

ALL-CONNECTICUT RELIABILITY RUN

Hartford, Conn., Mar. 28—Progress has been made by the contest committee of the Automobile Club of Hartford for the forthcoming three-day, all Connecticut reliability run, which is to be conducted under the rules of the A. A. A. Entry blanks to the number of 3,000 will soon be issued and will be circulated about the country generally, it being the intention of the committee to see that each manufacturer receives two blanks.

Entries close Wednesday, May 18, and all cars must report to the technical committee the day before the start of the first day's run, at the club garage.

HAMMOND NOT GUILTY OF LARCENY

Chauncey W. Hammond, charged with stealing $17,000 from the E-M-F Company by switching satchels in the First National Bank of Detroit, Nov. 19, 1909, was acquitted of the charge by a jury in Judge Phelan's court.

The jury deliberated for two hours and took four ballots before the members all agreed upon their verdict.

Hammond is still held on charges of padding payrolls, but the bail on this count is comparatively trifling as compared with that required on the major indictment. Hammond was formerly paymaster of the E-M-F Company but at the time of the loss of the money he was not in its employ.

MUCH BUSINESS IN SIGHT ON COAST

W. A. Paterson, president and general manager of the W. A. Paterson Co., Flint, Mich., is touring California in a Paterson "30." Mr. Paterson is optimistic over the winter's business on the coast, finding the "30" well established in popular favor by reason of its sturdy qualities. Strong evidence of its strength was given last week when the Paterson won out in the annual hill climbing contest at Oakland., one of the most trying tests of the season.

E-M-F DIRECTORS ON STUDEBAKER BOARD

South Bend, Ind., Mar. 25—As the result of the merging of the interests of the Studebaker Brothers Manufacturing Company and E-M-F Company, a meeting of the board of directors of the Studebaker Brothers Manufacturing Company was held at the offices of that company in South Bend on Wednesday and at the invitation of the management, Walter E. Flanders, president and general manager of the E-M-F Company, and Frederick W. Stevens, of J. P. Morgan Company, of New York, accepted the nomination and were elected members of the board of directors of the Studebaker Brothers Manufacturing Company. Both are members of the board of directors of the E-M-F Company.

FIRE DESTROYS TWENTY-FIVE CARS

Camden, N. J., Mar. 28—When the assessor comes around he will have twenty-five fewer automobiles to record as being owned here. A fierce fire in the garage of J. G. Reeves, 106 North Seventh street, last Wednesday morning reduced that many cars to rusty scrap in something less than an hour. Despite the fact that the cars were all stored on the ground floor, the blaze was so intense and the gasoline explositions so terrifying that but one car could be removed, and that was used by an employee to summon the engines. It is estimated that the loss was $75,000.

SWANN BILL PASSES SENATE

Baltimore, Mar. 27—Decorated with a number of amendments, the Swann motor vehicle bill has been passed by the State Senate and will now be thrashed over in the House. The chief change in the measure as it stands is a provision to allow the city of Baltimore one-fifth of the revenue from licenses, after the running expenses of the Automobile Commissioner have been paid. This revenue is to be applied to street improvements.

MOTORISTS FAVOR NATIONAL LAW

Chicago, Mar. 28—Pressure is being brought to bear upon Congressman James R. Mann, of the First District of Illinois, by the Chicago Motor Club and other automobile interests to influence a favorable report on the Federal Registration Automobile bill, now pending before the Interstate and Foreign Commerce Committee.

PARKER GEAR WILL BE MANUFACTURED

It is learned that the Parker transmission which was illustrated in The Automobile recently, will be manufactured by the Parker Transmission & Appliance Company, now located at Springfield, Mass.

Krit Car Won First Place in Event One

After the Races, Crowd Starting Home

White Star, a Home Product, Also a Winner

EMF, *Cohen* Up, Won But Was Disqualified

Oldknow in a Buick Winner of Event Four

ATLANTA, GA., Mar. 26—Although there were fewer entries and fewer starters in the Atlanta hill climb this year than last, and though the crowd was smaller and the marks slower, it was none the less a creditable affair and the time for the .88 mile made by A. R. Almand, driving Ed Inman's Simplex car, 47 4-5, was the fastest ever shown by a gasoline car on the hill. The mark of 45 4-5 made last year by a White Steamer still stands and is likely to for some years to come.

The names of Strang and Burman, which conjured crowds of large proportions to the Stewart Avenue hill last Spring, were missing from the lists of drivers. Only local men took part in any of the events, although several of the factories had mechanics on hand to see that the cars were in good trim.

As has ever been the case with events held in Georgia, the course was policed in a most excellent manner, the crowds stayed where they belonged and there was nothing which bore the faintest possible resemblance to an accident.

The climb was set for 1:30 and everything was in readiness then but the timing apparatus, a home-made contrivance that worked well last year and that showed real class in the preliminary warm-ups this year. At the critical moment it quit utterly and after an hour of tinkering it was given up as a bad job and the cars were timed by stop watches at the top and with the aid of a telephone which, fortunately, remained in working order.

The wrestling match with the timing apparatus consumed an hour and at 2:30 the first of the little cars got away in the baby class and thereafter they were run up rather steadily; but it was well on toward dark before the Simplex came whirling up, the last car to climb and the winner in the free-for-all.

The Krit and the Hupmobile had things their own way in the class for cars costing $800 or under, owing to the fact that the Flanders arrived too late to take part. Of these the Krit had made the better time in practice, showing 1:18 and though it could not approach this mark in the climb it made 1:25 which was good enough to win. The first time the Krit came up there was bad team play on the part of the timers and it had to make a second run, which it did successfully.

Class 2 had a goodly number of entries and starters but it was hardly a close contest, for the Buick showed 1:07 right at the start and spoiled the fun. Nearest to it came the Warren-Detroit which made a mark of 1:15 1-5. A Ford was third.

Class 3 was the only one enlivened by a protest. In this event the E-M-F burned out its wiring a few minutes before it was time to start. Another E-M-F was accordingly borrowed and made the lowest time in the class, 1:15. It was disqualified, however, for being shy a few stock parts, including a lamp and a dust pan. This disqualification gave first place to a White Star, an Atlanta-made car, which consumed 3-5 second more. A Buick was second and a Parry third.

In class 4 four of the six starters were Buicks and three of the four were "placed." William Oldknow's car, which came through the New York to Atlanta run with a perfect score, was first in this event with a mark of :57 2-5. This was the best time

Hill Climb


Some of the Interested Spectators


With the Officials at the Starting Line

of the day in any class except the free-for-all and was better by 3-5 seconds than Strang's remarkable time of last season.

In the free-for-all there was never much doubt but that Ed Inman's Simplex would prove the winner, for it outclassed the rest of the field in power; and won in handy style. A. R. Almand, winner of the free-for-all two years ago, was at the helm.

A 40-horsepower Knox, the identical one that cost a life last year at Indianapolis, was a neat second, making the climb in 50 1-5 seconds, with John F. Toole, winner of the first local free-for-all, at the wheel. A National was third and a Pope-Hartford fourth. The summary follows:

The summary follows:

CLASS 1—Cars Costing $800 and Under.

Pos.—Car	Entrant	Driver	Time
1 Krit	Kelly-Knight Co.	C. F. Woolfe	1:25
2 Hupmobile	E. D. Crane & Co.	K. T. McKinstry	1:31
3 Metz	Dixie Auto Co.	D. R. Miller	3:43

CLASS 2—Cars Costing $801 to $1,200

1 Buick "10"	Buick Motor Co.	L. E. Fain	1:07
2 Warren-Detroit	Carmichael Co.	J. E. Darby	1:15 1-5
3 Ford "T"	Carolina Cement Co.	M. W. Venable	1:19
4 Mitchell "R"	Howard Co.	R. C. Howard	1:26 3-5
5 Cameron "16"	Dixie Auto Co.	G. F. Hardy	1:31
6 Cameron "15"	Dixie Auto Co.	J. B. Wall	2:16

CLASS 3—Cars Costing $1,201 to $1,600

1 White Star	Atlanta Car Co.	C. E. Jones	1:15 3-5
2 Buick "19"	Buick Motor Co.	P. O. Parmalee	1:18 2-5
3 Parry "35"	Capers Car Co.	P. C. Shultz	1:28 3-5
E-M-F "30"	Georgia Car Co.	H. L. Cohen	disqualified

CLASS 4—Cars Costing $1,601 to $2,000

1 Buick "16"	Wm. Oldknow	Wm. Oldknow	:57 2-5
2 Buick "17"	Buick Motor Co.	P. O. Parmalee	1:02
3 Buick "16"	Buick Motor Co.	L. E. Fain	1:03 2-5
4 Pullman "O"	Pullman Co.	R. T. Peckham	1:13
5 Buick "17"	W. E. Wimpy	T. B. Dial	1:15
6 Inter-State	Inter-State Co.	A. R. Brown	1:15 3-5

CLASS 5—Cars Costing $2,001 to $3,000

1 National	W. J. Stoddard.	W. J. Stoddard	:58
2 Knox "M"	J. F. Gatins, Jr.	L. W. LaBlanche	1:07 1-5
3 Marmon	W. T. Candler	W. T. Candler	1:09 2-5
4 Pope-Hartford	A. W. Kirk	A. W. Kirk	1:13
5 Selden	R. F. Ingram	Roy G. Young	1:20 2-5

CLASS 6 and CLASS 7—Cars Costing $3,001 and Over

1 Packard	J. D. Rhodes	C. C. Rooney	1:04 4-5
2 Stearns	W. T. Dunn	W. T. Dunn	1:05 3-5

FREE-FOR-ALL

1 Simplex	E. H. Inman	A. R. Almand	:47 4-5
2 Knox	Georgia Knox Co.	John F. Toole	:50 1-5
3 National	W. J. Stoddard	W. J. Stoddard	:55 1-5
4 Pope-Hartford	Steinhauer & Wight	A. R. Almand	1:03 1-5

SAVANNAH ENDURANCE RUN POSTPONED

SAVANNAH, GA., Mar. 28—The endurance run of the Savannah Automobile Club, which was scheduled to take place on March 28 and 29 has been postponed to April 5 and 6. This run, which will be from this city to Jacksonville, Fla., is already attracting attention in all parts of the country. The run to Jacksonville will take two days and will, when complete, form the last link in the great highway route between New York and Florida.


National Which Won First in Class Five


Roades, in Packard 30, Made Very Fast Time


Simplex, Almand Cleaned Up in the Free For All

AMONG THE GARAGES

Correja 35-horsepower runabout, which makes its initial appearance in New York City under the management of J. Mora Boyle, at 1851 Broadway. It is made in Elizabeth, N. J.

George M. Schebler, of Wheeler & Schebler, Indianapolis

Baack, Reed & Gage Company, a new garage and agency concern at Janesville, Wis., has absorbed the Roy Pierson garage. The Pierson garage on South Main street, Janesville, will be abolished and all business will be done from the large new building owned by the Baack, Reed & Gage Co. on North Main street. The building has dimensions of 45 by 125 feet, three stories high, strictly fireproof and is one of the best of its kind in southern Wisconsin. Roy Pierson is retained as sales manager.

Thomas J. Northway, 92-94 Exchange street, Rochester, N. Y., where he is selling Fords and Oldsmobiles, is building a three-story structure at 100-2-4 Exchange street which he hopes to occupy this summer. The new building is 54 by 140 feet with three stories and basement. It will be of fireproof brick construction with a big show room in the front half of the main floor. The back half will be a garage. The second floor will be a paint and repair shop, and the third, a machine shop.

The Waynesboro Garage Company, of Waynesboro, Pa., has voted to increase its capital stock from $10,000 to $20,000 and to apply for a Pennsylvania charter. The money will be used to equip the old market house as an up-to-date garage. Dr. D. B. Sniveley, Dr. P. D. Hoover, Dr. C. W. Baerd, D. L. Miller and W. H. Smith constitute the building committee. The Garage Company now has a membership of over fifty.

The Central Automobile Company has leased the garage at 6112 Broad street, East End, Pittsburg, and will use it for a distributing station. P. W. Newell is president and A. E. Corns is secretary and treasurer of a new company which has established a central garage on South Gallitzin avenue, Uniontown, Pa. They will handle the Elmore car.

The Reimers Motor Car Company, of Louisville, Ky., has assumed the agency of the Babcock Electric Company. A garage, which will cost $15,000, and which is to be equipped with facilities to handle electrics as well as gasoline cars, is being built for the company, and the expectation is that it will be completed in April.

The Roe-Halverson Auto Co., of Stoughton, Wis., has leased part of the Peterson blacksmith shop on Main and Fifth streets, Stoughton, and this is now being converted into a garage. In addition to this, the company has a large warehouse two blocks away. The new quarters will be used for offices and repair shop.

Judge Dodge, of the Elkhart, Indiana, County Circuit Court, has appointed Milo W. Stark receiver for the Elkhart Garage Company. The complaint declares the company owes $7,000, and has $3,000 in assets. The receiver was granted permission to continue business for thirty days.

Extensive additions are being made to the sales rooms and garage of the Central Ohio Motor Car Company, 61 East Spring street, Columbus. The office has been moved to the second floor, giving more space for showing automobiles. The repair shop is also being enlarged.

At Clarkville, Ohio, the Kilpatrick French Automobile Company has purchased a lot at Broadway and South street, where a $12,000 garage and salesroom will be erected. The building will be two stories high and will have a large repair department in the basement.

The Taylor-Prior Company of Eau Claire, Wis., representing the Stevens-Duryea, has commenced work on its new garage on South Barstow street. It will be of cement block construction, strictly fireproof and will include a repair department.

Instead of remodeling the former Cary livery stable for the agency of C. J. Edwards at Appleton, Wis., the Cary estate has started work on a large new building especially for garage purposes. It will be completed about May 1.

The Homestead Automobile Company has completed its garage at 209 Seventh avenue, Homestead, Pa., and will handle the Franklin and Rambler cars. M. W. Coulter is president and manager.

The Hopkins Motor Car Company, of Clinton, Ia., will open a garage in the Shoecraft Building, at First street and Fifth avenue, that city. The company handles the Jackson and Fuller.

The City Motor Car Company, recently organized in Houston, Tex., has let the contract for the erection of a two-story brick garage at Caroline street and Texas avenue, to cost $15,000.

Cliff Garrison and Peter Young have opened an auto livery at Kent, Ohio, with several cars in service.

Men Prominent in the Trade

Fred Haumerson, of Fort Atkinson, Wis., for several years associated with the Mitchell-Lewis Motor Company, of Racine, Wis., has been appointed field expert of that company.

Frank L. Black, recently connected with the Diamond Rubber Company as salesman in Boston and vicinity, has joined the sales force of the Boston branch of Morgan & Wright.

E. L. Moore, for seven years in the advertising department of the Cleveland *Plain Dealer*, has succeeded W. S. Gilbert as automobile editor of that publication.

Webb Jay has joined the forces of the United States Motor Company and will act as assistant district manager at Chicago.

Carl Van Seiver, Cleveland agent for the Randolph truck, has moved to new quarters in automobile row at 1526 Euclid avenue.

J. S. Bretz, of J. S. Bretz Company, importers, is in Europe on a tour in which pleasure is combined with business.

WITH THE AGENCIES

Marmon "Yellow Jacket," built to compete at Los Angeles and other meets during the coming season. It has a six-cylinder motor. Ray Harroun, the successful Marmon driver, is the pilot

Alvan Macauley, general manager of the Packard Company, Detroit

The Keller Manufacturing Company, of Philadelphia, has purchased the business of the W. P. Pressinger Company, of New York, its general eastern distributor and distributor for Michigan, and this territory will hereafter be handled direct by the Keller Manufacturing Company. J. J. Swan, secretary of the W. P. Pressinger Company, will be associated with the Keller Manufacturing Company.

The Firestone Tire & Rubber Company has opened a branch at 442 Van Ness avenue, San Francisco. The company has also established two more general distributing agencies. One is the Fort Wayne Vulcanizing Works, 215 West Main street, Ft. Wayne, Ind., and the other is the Burwell-Smith Auto Supply Company, 416 North Broadway, Oklahoma City, Okla.

The Curtis Automobile Company, Milwaukee, Wis., State representatives of the Reo, which recently took on the Corbin, has been appointed representative of the Hupmobile. A new garage is being built for the Curtis concern on Eighth street, near Grand avenue, opposite the large garage of the McDuffie Automobile Company.

The Euclid Automobile Company, of Cleveland, has been appointed distributor of the 60-horsepower Atlas. The company is already agent for the Firestone-Columbus, Columbus electric and Frayer-Miller truck. Recently the company occupied a large new garage and sales building in the heart of automobile row.

The Toledo Regal Sales Company, of Toledo, Ohio, was incorporated recently, with capital stock of $5,000, to act as agent for the Regal in Northwestern Ohio. The incorporators were William S. MacMurray, H. J. Chittenden, A. L. Trautmeier, William Rather and Charles Rather.

The Anderson Motor Car Company, of Fond du Lac, Wis., is district agent for the Mitchell and Maxwell in a large territory of central Wisconsin. M. M. Anderson is manager. The garage and salesrooms are located at 34-38 West Second street, Fond du Lac.

The Vestal Motor Car Company has secured the Pittsburg agency for the Auto Car, manufactured by the Auto Gas Engine Works, of Philadelphia, Pa., and will exhibit it shortly in the Rittenhouse Building in the East End.

W. A. Eckles has taken the Cleveland agency for the Anhut Six and has opened temporary headquarters in the Citizens Building. A large sales and garage building will be occupied later in the downtown district.

The Tanberg Auto Company, of Eau Claire, Wis., has opened a branch in Chippewa Falls, Wis., at 203 Bridge street. The company represents the Peerless, Winton, Oldsmobile, Buick, Oakland and Waverly electric.

The Asheville (N. C.) Cycle & Automobile Company has shortened its title by eliminating the "Cycle." In future it will be known as the Asheville Automobile Company. There has been no change in ownership.

The Forbes Motor Car Company has secured the Pittsburg agency for the Krit runabout and roadster and also the Abbott-Detroit 30-horsepower, five-passenger car. H. N. Munhall is manager.

The L. J. Gilmer Company of Salt Lake City, Utah, agent for the Empire Tire Company, will hereafter be known as the Utah Motor Car Company. The change went into effect March 10.

Geo. E. Loveland has been appointed Pennsylvania representative for the Kilgore shock absorbers, a Boston-made product, with headquarters at 107 Reily street, Harrisburg.

At Toledo the Atwood Automobile Company has leased the building formerly used by the Dollar Savings Bank, and it is being fitted up as a downtown show room.

The Everitt "30" has opened quarters in Pittsburg, with Edward Bald as manager, and the concern will be known as the Eddy Bald Motor Car Company.

Chas. Strader has been placed in charge of Western agencies of the Keller Manufacturing Company, with offices at Chicago and Lincoln, Nebraska.

J. C. Donahue has secured the Pittsburg agency for the Whiting and is opening a new garage on South Beatty street, East End.

The Tedford Auto Company, of Little Rock, Ark., has been appointed State agent in Arkansas for the Moon Motor Car Company.

The Muhle-Louis Automobile Company, of Cincinnati, was incorporated with a capital stock of $7,500 by H. M. Muhle and others.

The Ideal Electric Company has secured the Chicago agency for the Federal Motor Car Company, of New York, a new concern.

New Packard Company Executive

Alvan Macauley has resigned as general manager of the Burroughs Adding Machine Company to become general manager of the Packard Motor Car Company, of Detroit, succeeding S. D. Waldon, who has been elected vice-president of the Packard Company.

Mr. Macauley has been general manager of the adding machine company for eight and one-half years, and was one of the men responsible for bringing the Burroughs plant to Detroit.

He first obtained prominence in the commercial world as a patent attorney, practising in Washington, but gave up that practice to become associated with the National Cash Register Company, at Dayton, Ohio, which position he occupied for years.

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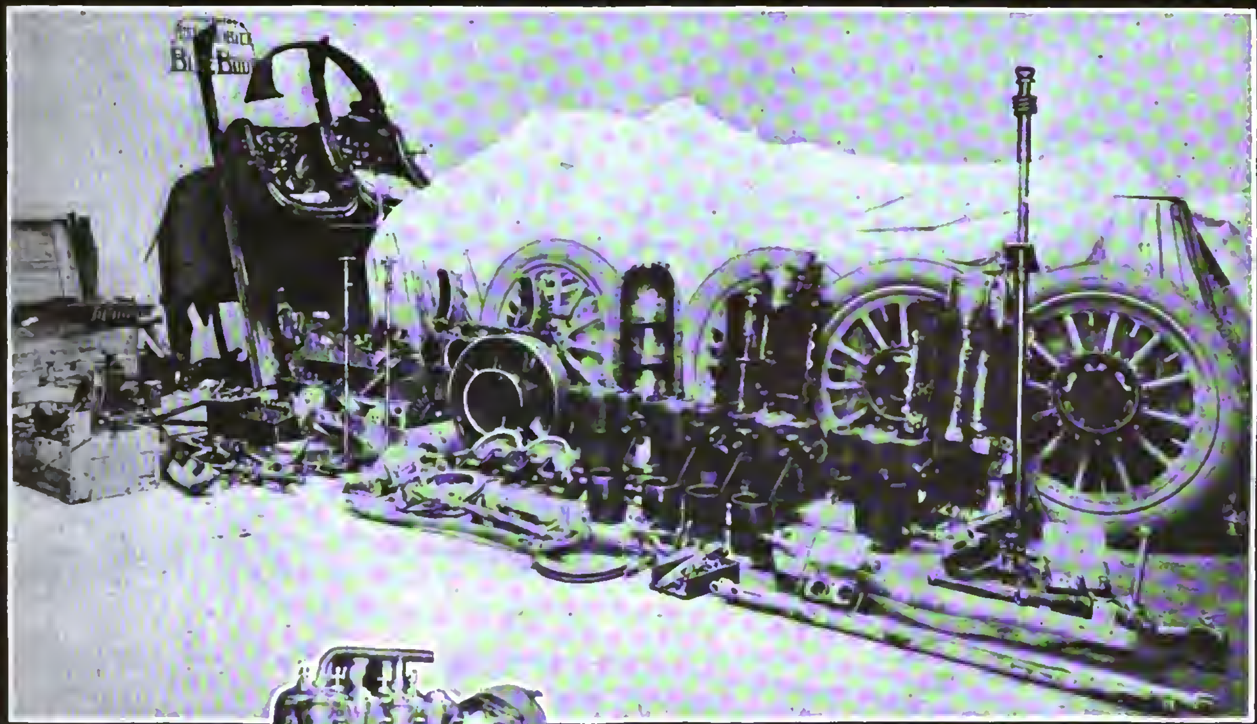
THE AUTOMOBILE



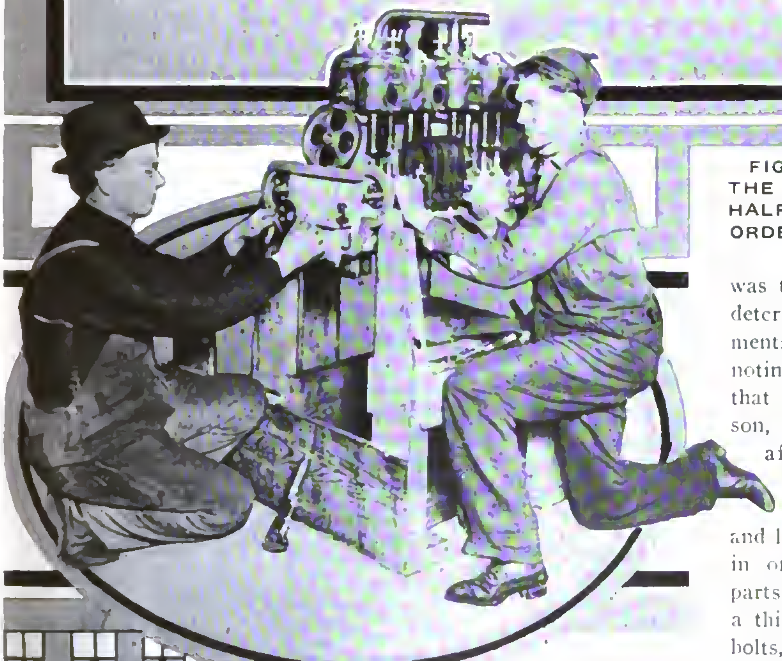


FIG. 1—ORDERLY GROUPING OF THE COMPONENTS OF THE DISSEMBLED AUTOMOBILE. FIG. 2—MARKING THE HALFTIME GEARS AS THEY ARE TAKEN DOWN IN ORDER TO FACILITATE CORRECT REPLACEMENT.

SYSTEMATIC methods produce the best results in a repair undertaking, as well as they do in the manufacture of automobiles. The title illustration of this article shows a 1906 model of a well known make of automobile, after fairly continuous service up to this time, with the exception of a somewhat extended overhauling to which it was subjected last year. In the present undertaking, it was the idea to inspect each part very carefully in order to determine, not only the extent to which repairs and replacements would have to be made, but with a view to carefully noting deformation, or evidences of fracture, and to be sure that the parts should either be abandoned for a definite reason, on suspicion, or be used in the reassembling process after passing a rigid inspection.

It was considered of the first importance to dissemble the car systematically, clean every part thoroughly, and lay them down in proper groups (a) all the motor parts in one group; (b) the transmission gearset and relating parts in another; (c) the members of the control system in a third; (d) the multiplicity of relating members, including bolts, nuts, keys, etc., laid out in systematic groupings, according to their several uses.

In the process of dissembling the car, all the parts were properly marked or so tagged that they were readily identified in the subsequent assembling process, and the halftime gears were spotted and identified so that they were readily put back into place, as shown in the lower figure of the title illustration, thus eliminating unnecessary labor, and the chances of future trouble. It is believed that this careful process of taking the car apart, cleaning all the pieces, and laying them down in a light and accessible place, is likely to have a wider influence on the quality of the work, and the

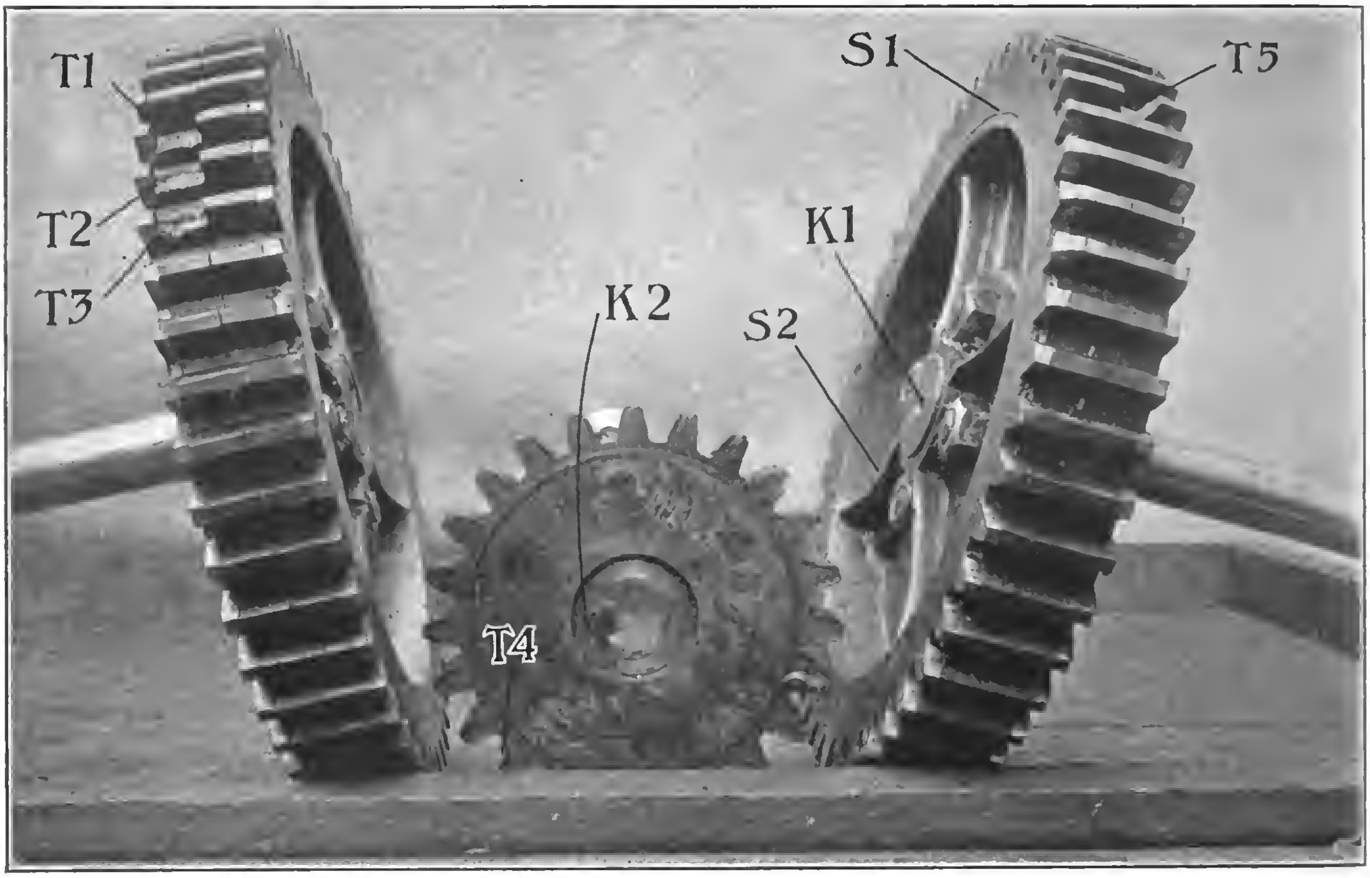


Fig. 3—Halftime gears of shrouded fiber, and pinion of steel, showing condition of the fiber, and the wearing away of the teeth of the pinion

cost thereof, than anyone would readily realize. It costs a considerable amount of money to have skilled workmen searching for lost parts every time they make a move, and obviously in the absence of a system of this sort, all the parts are lost all the time, because if they are not in a definite known place, they have to be searched for when they are wanted.

The average repair man, if he makes a jumble of the parts, is enough of a machinist to reproduce them readily, and it is much more of a pleasant task for him to reproduce a part than it is to make a diligent search in a disorderly arranged pile of parts. Everything in connection with repair work indicates that an orderly array of the members after they are properly cleaned and inspected, is one of the best investments that can be made, and the first principle of good repairing lies buried in this one idea.

SOUND JUDGMENT IS OFFERED A WIDE OPPORTUNITY

Many autoists have complained bitterly of the extent to which they were lead into repair work, which extended beyond their reasonable expectations, and which proved to be unprofitable in every way. When a used car is taken apart and strewed about haphazard, it has a most discouraging look, and the repair man of small skill is likely to reach the conclusion that the parts are substantially worn out, and that new ones will be necessary in order to produce the desired result.

Under such conditions, if the bent of the repair man is to guide the owner of a car, he will have for his pains a new automobile, but he will have purchased it drib drab fashion at an enormous cost. A new car, direct from the maker, will have many advantages under such conditions. Obviously, a good repair man will be an optimist under such conditions, and instead of running off to the maker of the car for enough new parts to satisfy the situation, he will interject a fair measure of ingenuity and avoid in every possible way, the purchase of new parts.

If replacements must be made, it is far cheaper to order them directly from the maker of the car, than it is to reproduce them in a repair shop. The workman is paid by the hour; he will not be able to reproduce the parts until the material is procured, and whether or not he goes after the material, or sits around waiting for it is to be brought to him, is a matter which results in cost, the amount of which will most likely exceed the price of the replacements from the maker of the car.

That a repairman will be able to produce parts which will be better than those to be had from the maker, is scarcely to be believed. The repairman works under the greatest possible disadvantages; he is not in a position to select intelligently the materials, and he is without the working drawings from which the arts were originally made, so that "rule of thumb" and methods involving surmise will represent the boundaries of such efforts.

SOME PERPLEXING PROBLEMS CONFRONTED THE REPAIRMAN

In this particular undertaking, there were some perplexing problems to be solved, among which the overhauling and timing of the valves will be mentioned. The valves were in excellent order, but owing to repeated grinding, the seats were very wide, and it was believed that it would be difficult to maintain them tight against leakage. It was decided therefore, to bore out the passageways sufficiently to reduce the face of the valve seat, with a view to inducing a better condition.

The valve stems battered the ends of the tappet rods so much that timing was quite impossible of realization, and the cams were worn so that in the absence of any adjustment, provided by the maker, it was decided to do one of three things as follows:

(a) Purchase new camshafts, lifts and valves.

(b) Improvise a means of adjustment on the lifts.

(c) Purchase new valves with stems long enough to make up for the difference.

In a further examination of the system, and considering the work which would have to be put upon the valve seats to render them fit, it was decided that the adjustment difference could be made up by grinding the valves on their seats, so that the stems would extend down towards the lifts, a part of the total distance to be made up, and it was further decided that the valve seats could be machined down for the rest. In this way the repair undertaking was completed satisfactorily and without the purchase of any new material at all, and it is believed that the timing will be quite in keeping with the best expectation, considering the ability of the car in the first place.

HALFTIME GEARS RENDERED EXCELLENT SERVICE

Referring to Fig. 2 it will be observed that the halftime gears were of the shrouded fiber type, meshing with a steel pinion. The fiber lasted for a considerable time, but in the long run it rotted out and the teeth broke off as shown at T1, T2 and T3 in one case, and T5 on the other gear. The shrouds S1 were of phosphor bronze, and were riveted into secure relation after the pressure was put on in the process of manufacture. The fiber gears were built up onto a spider S2, and were keyed onto the shaft by means of regular key stock as shown in key K1.

The pinion was keyed on its shaft, and the key K2 was rather loosely fitted, with a considerable radial appearance, which may be noted in the illustration. The teeth of the pinion T4 were badly ground, and were therefore much deformed, which grinding process is due to rubbing contact with the fiber of the halftime gears. It is a well understood fact that fiber has this grindstone property, and in the machining process, because of it, the tools are dulled very quickly.

Fiber is used in halftime gears because it is not a noise producer, although the grinding process, as above mentioned, is likely to produce a perceptible hum or grating noise. If it is desired to get away from whatever ills there are attached to the use of fiber, it will be necessary to "lead" steel gears, in order to cause them to perform without noise. In the leading process the flange under the teeth is cut back to form a recess, and Babbitt metal is poured in all around the inner periphery, after which it is machined down to a uniform thickness. This process eliminates noise, under the conditions named, and the ability of steel gears may then be taken advantage of. The steel, if it is rendered extremely hard by heat treatment, will be more likely to produce noise than if it is left in the normal state. Following out the same line of reasoning, cast gray iron halftime gears, properly cut, will make less noise than steel gears. Bronze, on the other hand, has excellent "bell" properties which are extremely difficult to deaden.

In dissembling the motor, it is necessary to "spot" the meshing gear teeth, in order that the same teeth will be reengaged during assembling; otherwise the timing of the valves will be thrown out, and the motor will have to be retimed, which, to a novice, may not be an easy problem to solve. Even with skilled men it is better to spot the gears, so that they may be quickly replaced, thus saving the necessity of going over the timing, and this foresight will react in favor of a lower cost of the undertaking.

CHASSIS SIDE BARS PROVED TOO LIGHT FOR SERVICE

The best indication of the lack of suitable strength of the chassis frame is presented in Fig. 4. The frame broke at a point about 5 inches back of the rear arm forming the motor support, and in line with the center of the flywheel, thus showing that the work transmitted to the side member at a point opposite the flywheel was greatly in excess of the ability of the side member to sustain. Cross-bracing was depended upon entirely through the motor frame, and the nearest lateral back of the motor arm was found to be far enough away to be of no value in restraining the twisting movements induced by the motor in service.

The motor vibrates considerably at the higher speeds, and a close examination of the same would lead to the conclusion that the clutch, which is a weighted contracting band type, is not in good kinetic balance. No doubt the clutch was statically well balanced, but the considerable vibration set up in the motor at

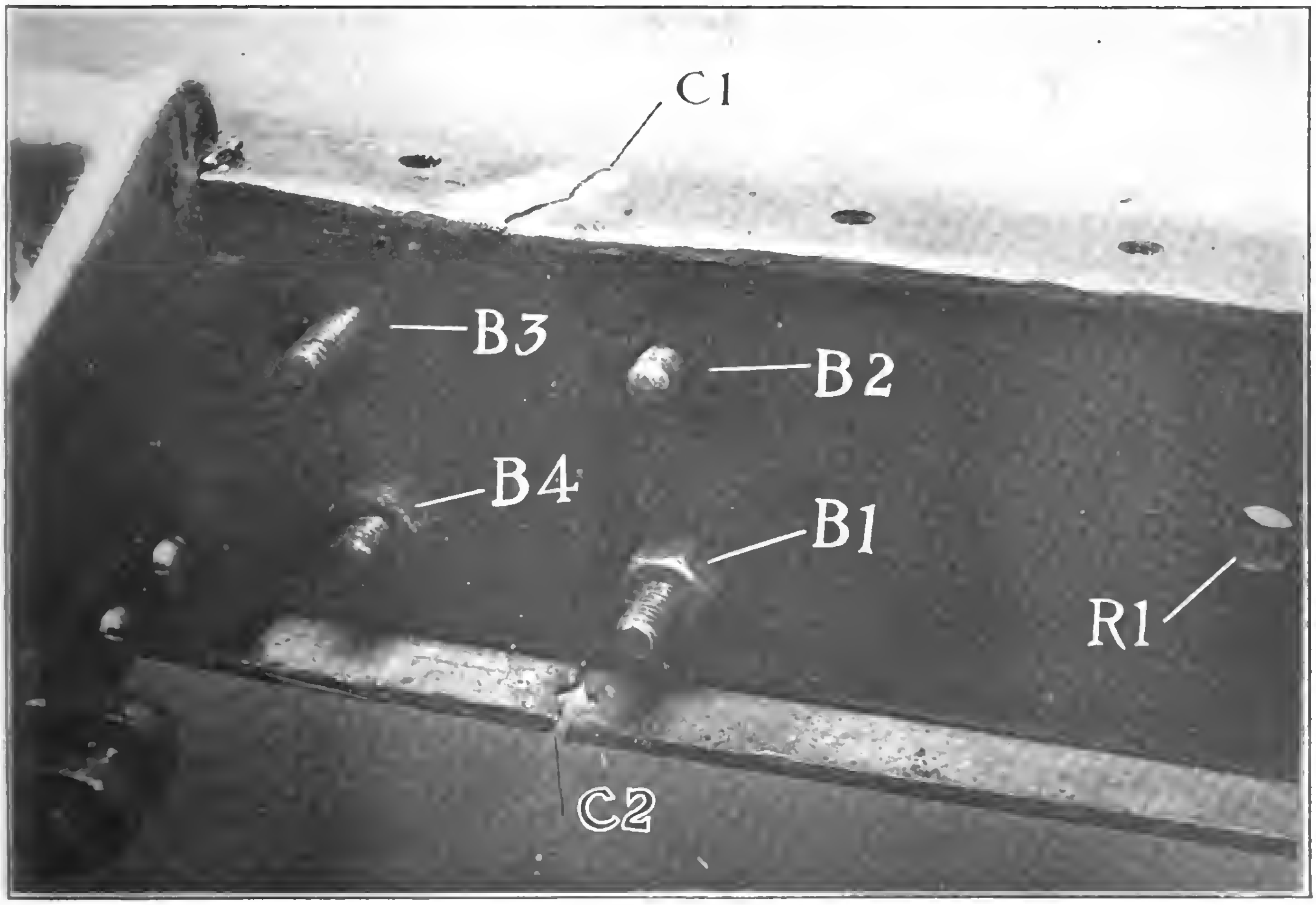


Fig. 4—Broken side bar showing evidence of lack of strength and the repair plate bolted and ready to rivet into place

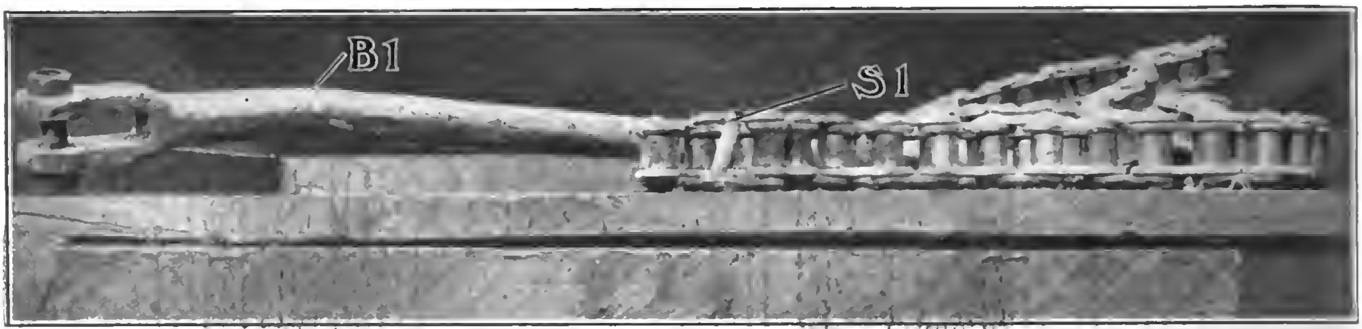


Fig. 5—Presenting the bent radius rod showing lack of due strength, and the sprocket chain with evidences of much wear

the higher speeds cannot be accounted for in any other way than that due to the absence of kinetic balance which is an impossible condition in practice, if a counterweight is employed, provided the same lacks in symmetry, comparing it with the mass which has to be counterpoised. Referring again to the figure, the fracture C1, is irregular, and in the plane slightly out of the vertical, which will be noted by observing the location of the fracture C2 at the bottom flange. The trouble started at a bolt hole in the bottom flange, and a further examination of the metal indicates a crystalline condition, which might have been due to vibration, although it is possible that the metal employed was of a basic character, rather high in the metalloids.

In the repair of this chassis frame a plate, substantially a quarter of an inch thick, without flanging, was laid up against the webb on the inside and riveted to the side bar. One of the rivet holes, R1, is shown in the neutral metal, and this is obviously a valueless situation. The rivets should be placed at points near the top and bottom flanging, in order that they might support the repair plate in its relation to the damaged side bar, in the zones of extreme fiber strain. The bolts B1, B2, B3 and B4 are placed on the two sides of the fracture, and bolts are employed in this location in order that they may be utilized in attaching other members of the car makeup to the frame. Riveting is better, and hot riveting is better than cold, because as the rivets cool off they will draw the plate tightly against the broken side frame, thus making them more efficient.

DISTANCE ROD NOT PROPERLY PROPORTIONED

These members, considering them structurally, belong to the two pin strut family, and, unfortunately, the work comes on diagonally, and the amount of the loading varies over the broadest ranges. Fig. 5 shows that this rod was round in section, and that it deformed at B1. Since the rod was of uniform section it is reasonable to suppose that the point at which deformation took place is that of greatest concentration of the load, and one way to maintain the minimum of weight would be to make the section greatest at the point of greatest strain, and taper off in both directions therefrom. The formula used for proportioning struts and columns, while it is of excellent value, is nevertheless involved in uncertainty, and a practical example such as this offers many advantages to the car builder, and shows the repair man what to do if he wishes to make a permanent repair.

The same illustration presents one of the sprocket chains, and the rivet S1, which is attached to the repair link, is loose in the link hole, which is an undesirable condition, but it is the method by which it is possible to prove that riveting should be very properly done throughout chains, in order that the life thereof will be long and satisfactory. A further examination of the chain will tell that the rollers were considerably worn, and this is an indication of the fact that the sprocket teeth are much deformed, due to wear, so that a severe wedging action takes place every time each link settles into the sprocket teeth.

In making a repair it is a common practice to absolutely disregard the condition of the sprockets, and to attempt to apply new chains to them. The result is bound to be costly and unsatisfactory, because the new chains will be destroyed, due to the wedging action of the worn teeth of the sprockets, and it will be the heighth of economy to place new sprockets on the car with the new chains, thus bringing this important portion of the automobile up to its original high standard, and in this way reduce the greatest noise producer to a condition of substantial silence.

PISTONS AND RINGS SHOW CONSIDERABLE DEPRECIATION

The four pistons as they were taken from the motor were grouped as shown in Fig. 7 and enlarged in order to bring out the information desired in relation to depreciation. Each piston has five rings with overlapping joints with parallel faces, and the greatest trouble seems to be due to fracture of the metal of the rings at the joints. R1 shows a joint with one of the overlapping projections broken off, and a very small portion of the face still in contact with the uninjured extension of the joint. R2 presents an accentuated case with the same character of fracture. R3 is different in that the ring broke off at a point in the full section back of the joint. R4 shows a ring with both ends broken back of the joint, and the other rings on the same piston are in practically the same shape. There are two serious phases to this character of trouble; the broken joints suggest that the disjointed portions of the metal will remain in the groove, for a time at any rate, and it will be a most fortunate circumstance if they do not score the surfaces of the bore of the cylinder and do other damage besides.

The rings, in addition to showing that they were rendered "rotten" in service, lost their temper and slunk away into the grooves, so that they were incapable of rendering the service for which they were originally placed. The compression must have been very poor in these cylinders for a considerable time before the motor was dissembled, and this is an excellent illustration of the futility of running a motor after the compression falls down, and not only on account of the poor service it will render, but in view of the damage which will be done by the disjointed

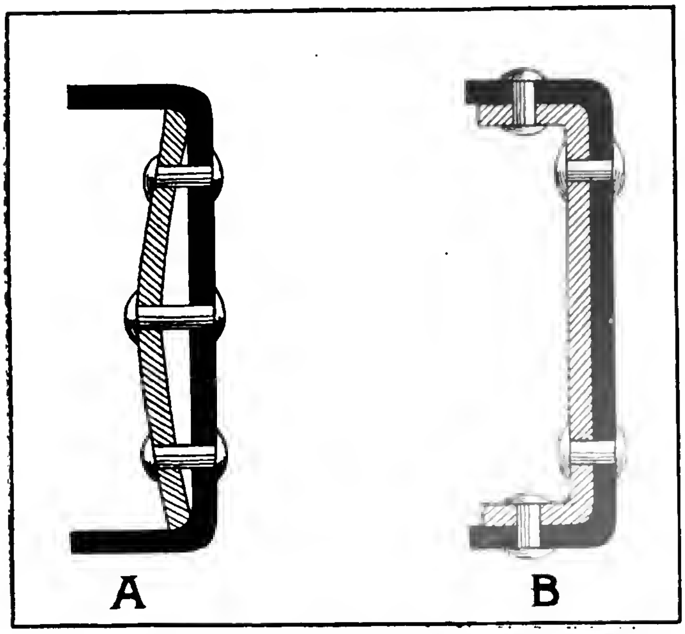


Fig. 6—Two methods of reinforcing side frames: A depicts the one selected; B portrays the more substantial way

portions of broken rings. The right procedure is to ascertain why the compression falls below a reasonable standard, and it is always necessary to dissemble the motor sufficiently to permit the inspection to be made with certainty. The pistons should be removed from the cylinders, the rings should be carefully inspected, foreign substances scraped off, and the rings should be examined to see if they float freely in the grooves. They should also be observed with a view to showing that they are of the right diameter to serve as packing rings, and if they prove to be too limber and do not press firmly against the cylinder walls with a certain uniformity all around the diameter, nothing remains but to resort to one of two choices as follows:

(A) Purchase a new set of rings of the right dimensions and insert them in the grooves to replace the inefficient rings.

(B) Remove the rings from the grooves in the pistons, and pein them out to a new uniform diameter, which should be slightly greater than the bores of the respective cylinders.

(*Continued on page 694.*)

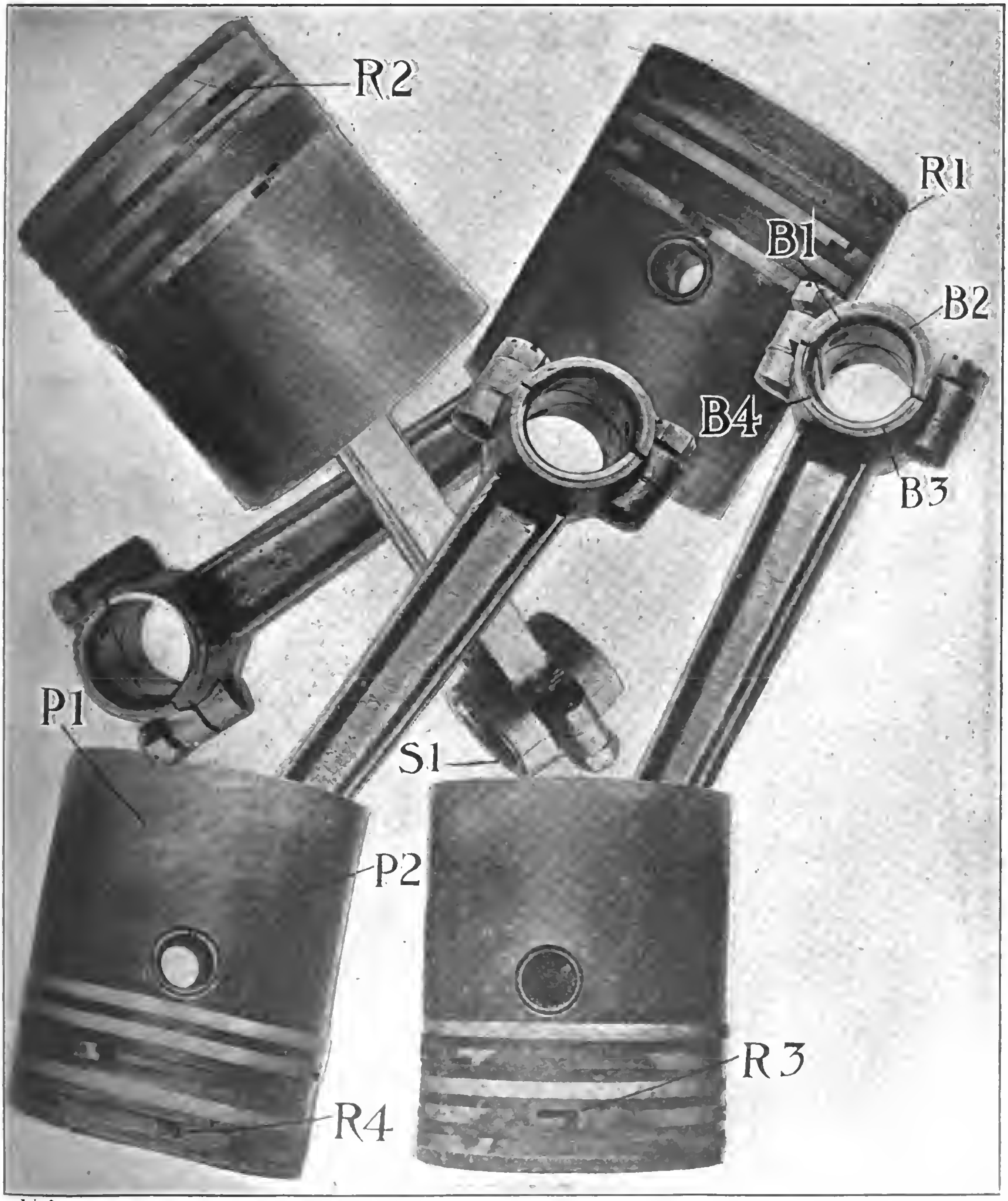
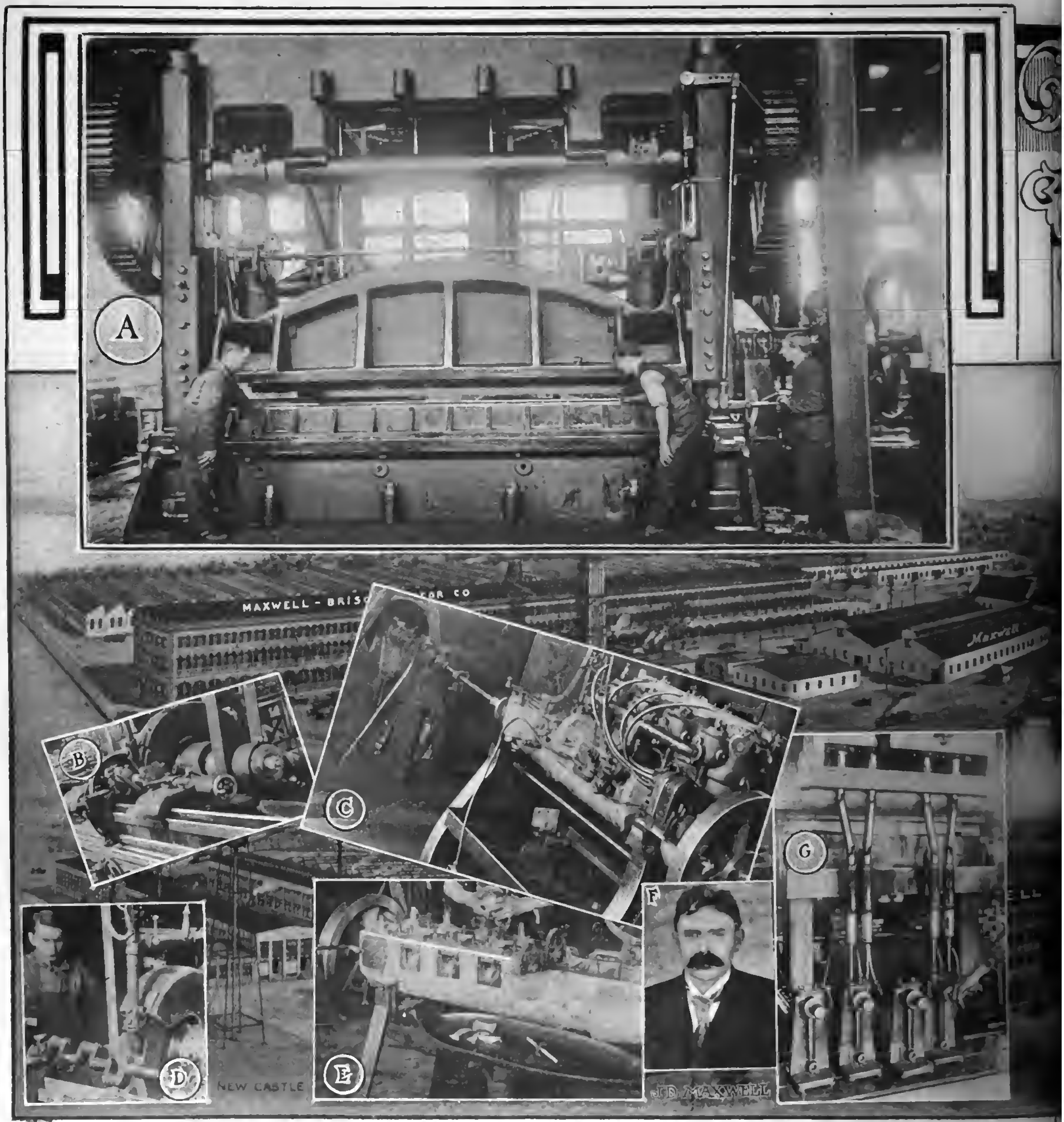


Fig. 7—The four pistons and connecting rods as removed from th: motor showing broken packing rings and uneven wearing



Laying the Foundation of the

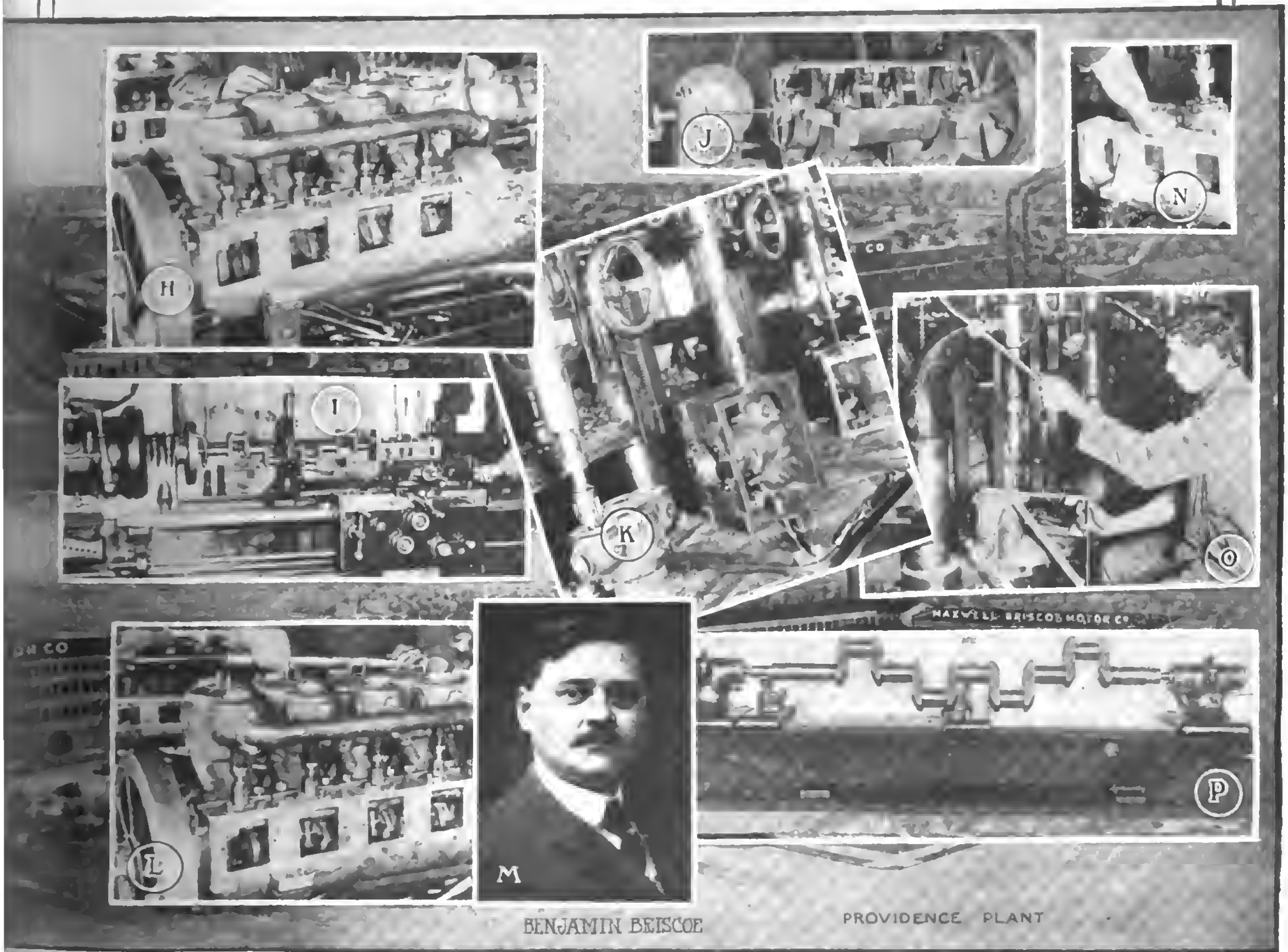
BY THOS. J. FAY

INDUSTRIAL success, if the modern tendency portrays the right idea, is based upon the concentration of effort. In defining concentration care must be exercised in order to discriminate between the character of the undertakings which will result in a healthy expansion and the shrinking process which is bound to result when attempts at combining individual plant efforts result in a diminished output. The master mind must control the movements of the helm, steer clear of snags in the course ahead, and judge properly the license which it is safe to take in every emergency.

There are divers reasons why a series of manufacturing plants, located at different industrial centers, but under one management, will go a long way toward solving intricate problems. In individual, independent plants it is extremely difficult to induce a condition of "give and take." The lack of flexibility is prone to inequalities of the effort, resulting in a rush condition during a part of the year and idleness for a time. The skilled labor is barely brought to a condition of "good teaming" when the work runs out, and the effort at harmony of organization is dissipated when the workmen depart from the plant and search for new fields to conquer.

In the association of a series of plants, if each one is devoted to the manufacture of a separate character of the automobile, the respective plants will be free to produce the wares for which they are best designed, but they will be in a position to co-operate, because their respective idle periods will not synchronize with each other; when one plant is suffering from lack of regular work, the other will be in a state of congestion. There being a certain similarity of the machinery equipment used in the several plants, there is nothing to prevent the interchange of work.

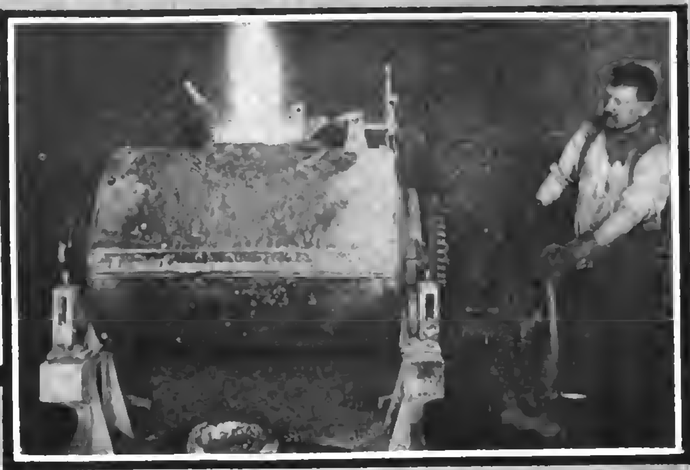
Some time prior to June 21, 1904, J. D. Maxwell, of the Maxwell-Briscoe Motor Company, completed the first design of what is now well known as the Maxwell car, and Benjamin Briscoe undertook the organization of the Maxwell-Briscoe Motor Company, the preliminaries of which were completed on the above date. What is now known as plant No. 1, at Tarrytown, was acquired on October 1 of the same year, and 250 workmen were organized into a compact force and directed in the production of Maxwell cars.



United States Motor Company

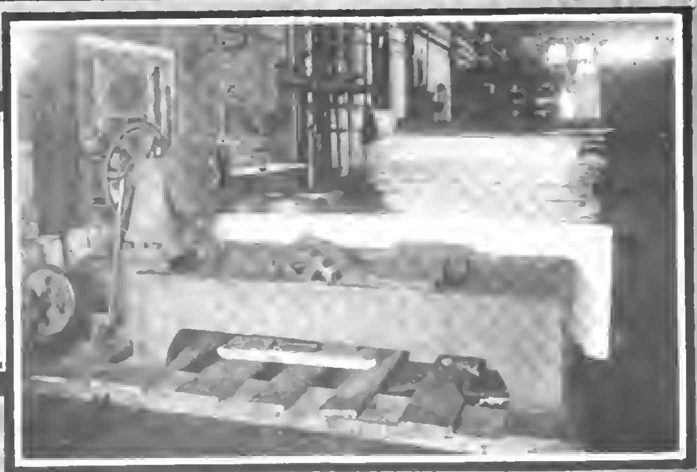
A—Monster Toledo press which is used to form sidebars
B—Crankshaft grinding machinery from the battery of grinders, by means of which accuracy is induced
C—Final test of motors, by means of a calibrated fan
D—Grinder used for accurately finishing the crankpins of Maxwell crankshafts, of which there is a complete battery
E—Making the run-in test of a partly assembled motor in conformity with the Maxwell progressive system
F—J. D. Maxwell, designer of the Maxwell, vice-president of the Maxwell-Briscoe Company, in general charge of factory
G—A unit in the multiple spindle drill equipment, of which there are numerous types in use in the various plants
H—Run-in test of motor after cylinders are in place
I—In the process of finishing crankshafts on a lathe
J—Crankshaft run-in test made before the crankshafts are mounted in the motors, in order to determine accuracy
K—Cylinder in a fixture on the platen of a radial drill
L—Assembled motor ready to go to the fan-dynamometer
M—Benjamin Briscoe, now president of the United States Motor Company. Originator of the progressive method of manufacturing automobiles, taking advantage of the possibilities of reciprocity between a series of dissimilar plants, to make the output continuous throughout the whole year
N—Cat-head in drill press facing off aluminum crankcases
O—Example of the utility of special fixtures
P—Instrument of precision. In this example the crankshafts are measured for accuracy; pins must be round and true to pass—an error of 0.0015 inch will be noted on the extensometer

Many Enormous Presses Turn Out Great Quantities of Pressed Steel



Rotary Furnace About to Discharge Molten Metal

One Day's Foundry Output of Aluminum Crank-cases.



New Rotary Field Testing Machine for Torsion Tests.

Ten cars were produced during the first year, and the progress made from that day to this will best be appreciated by observing the growing output, as follows:

MAXWELL-BRISCOE PRODUCTION FROM 1904 TO DATE

Year	Automobiles Shipped
1904	10
1905	823
1907	3,785
1908	4,455
1909	9,460
1910 to March 31	4,677
1910 for balance of year (estimated)	18,000

Note.—The estimate of the balance of the cars which it is expected will be produced before the end of this year is reflected in the present rate of production, which figures out 2,300 automobiles per month.

Prior to the merger which was at the bottom of the organization of the United States Motor Company, the Maxwell-Briscoe organization advanced to the point where the plants, as follows, were put into substantially full swing.

PLANTS DEVOTED TO MANUFACTURE OF MAXWELL AUTOMOBILES

Location of Plant	Square Feet of Floor Space
Tarrytown (plant No. 1)	149,000
Tarrytown (plant No. 2)	160,000
Providence (Rhode Island)	125,000
New Castle (Indiana)	507,000
Total	941,000

After the formation of the United States Motor Company, the Columbia plant, at Hartford, was taken over, and in this way the floor space, as above set down, was augmented by 350,000 square feet.

DIVERSIFIED MECHANICAL EQUIPMENT

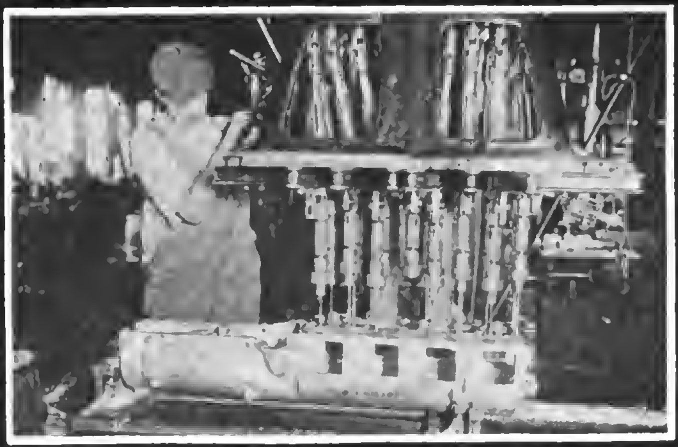
Not considering the Columbia plant for the present, it will be the purpose to indicate in a general way a few of the Briscoe ideas as they are actually carried out at the Maxwell-Briscoe plants under the direction of J. D. Maxwell. It is estimated that the workmen in the Tarrytown plant have substantially $100,000 worth of material undergoing operations at any moment in the day. The illustrations, with their explanatory captions, are but a few of the many which adequately indicate the advanced nature of the work and the wide variety of special machine tools employed in the process.

It would be difficult to describe the process as it is controlled by the system employed, without following it out step by step, at a considerable expense of time, study and space, but it will be possible to indicate in a general way the primal objects. To begin with, time and experience have adequately shown that a manufacturing concern, if the work is to be done with certainty on a large scale, must be on a self-contained basis. To answer this requirement plant No. 2, at Tarrytown, is fitted out with every possible facility, from the enormous presses which form the side bars, cross-members, brake drums and other parts of pressed steel, including pneumatic riveting machines, revolving jigs, and a diversity of miscellaneous equipment, to the forming system and facilities by means of which the metal bodies are quickly and accurately produced.

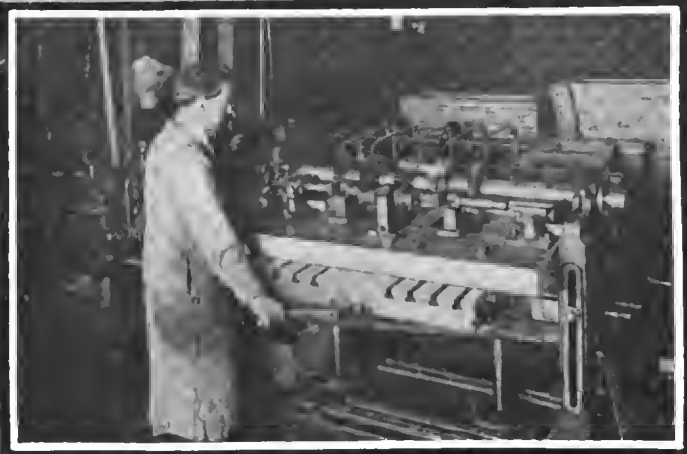
As an intermediate detail, the side bars, cross-members and small parts which go to make the chassis frame complete are dipped in an anti-rust solution and kept therein submerged until the material smears over and penetrates into every little crevice all over the surfaces, and this solution thus quickly applied also serves as the priming coat over which the finish is ultimately applied. In this relatively small detail will be found an illustration of the very method by which quality and a high rate of production are made to survive in unison.

In the same plant the foundry building occupies an extremely important level. It is a well-lighted structure, commodious in size, and the tilting furnaces, with oil burners, are of the most modern make, with a sufficiently numerous battery to turn out all the castings required, in view of the fact that pressed steel and drop forgings take precedence over other forms of material at every possible point in the makeup of the automobiles. The foundry has a considerable undertaking in turning out the castings as used in the carbureters, and in thus manufacturing its own carbureters, starting with the "pig" and ending in the nearby plant with its quota of automatic tools, the company presents the same absolute front that it does all along the line.

A famine of material, or the congested condition of parts makers, can have no bearing on the operations of this company; its sole outside source of trouble is centered in the purchase of raw material and this policy is carried to such a limit that Maxwell-Briscoe patrons are offered the advantages which come from a manufactured stock of repair parts, to whatever extent they may be in reasonable demand. A building in plant No. 2 is devoted exclusively to the systematic and proper storage of a reasonable number of the parts which go into cars of this make, and a system of accounting which has been worked out to a successful issue permits the parts storekeeper to quickly and accurately fill such orders for repair parts as may come in from time to time. The reserve building in which these repair parts are stored is fireproof, and was erected at quite a considerable distance from the surrounding buildings. From time to time the machine tools, if they run out of shop order work, are permitted to fill in on live repair parts, with the understanding that even if they are not used in repair work, they will ultimately find a place in regular cars, but in order to be able to do work of this character on a stock basis it has been necessary to standardize the automobiles and the component parts thereof, so that the risk of ultimately acmulating stale stock would be minimized.



Indication of the Extent to Which Multiple Drills Are Used



Four-Cylinder Crankshaft Cheeks Are Machined in One Operation

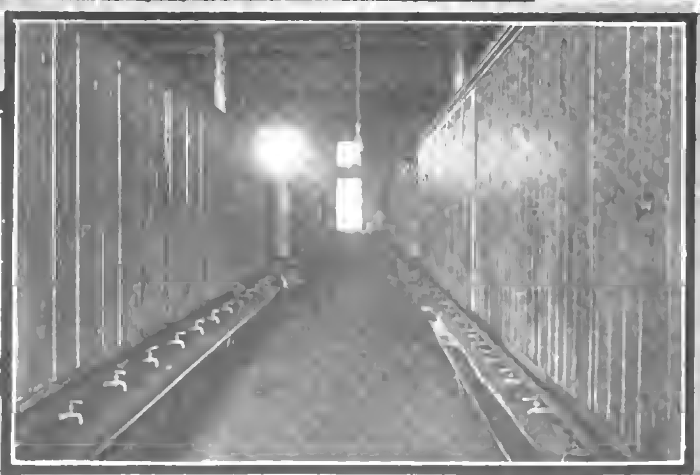
Part of a Day's Work of One of the Huge Presses

A Very Large Crane Handles Loads of Titanic Proportions

Front View Gives Scant Idea of Columbia Plant's Size

After Assembling, All Engines Are Thoroughly Run In

Paint Shop Showing One-Half of Assembled Cars



Satisfied Employees Are Made by Properly Caring for Them

STANDARDIZATION PROBLEM SOLVED

In a large undertaking such as this it was one of the original Briscoe ideas to so cope with the problems of standardization that it would be safe to prepare for the quick and accurate production of parts on a large scale. In order to thus proceed it was necessary to definitely establish the exact design of all the parts, and then make jigs, tools, and fixtures which, together with special machine tools, would eliminate the personal equation and permit workmen to specialize for the best result. The enormous cost of the special tools, jigs, fixtures, etc., which were found to be necessary in this venture is the best guarantee anyone can have that immature designs would have been fatal to the project, and the growth and expansion of this industry lends a substance to the belief that forethought governed the divers acts which led to the methods of manufacture in vogue.

ARTISANS SPECIALIZE ON PRODUCTION

The old idea among machinists was that it took seven years to learn the trade, and that every workman should be capable of doing every possible operation involved in machining processes. The time was when "one-man power" obtained in manufacturing establishments, and each workman was called upon to know how to do every operation, thus making it possible for one man to direct everything. In these days, especially with plants in almost every industrial center in the country, the aggregate output of all combined, reaching into almost unreadable figures, the one-man power is centered in the great organizer, in this case Benjamin Briscoe, who depends upon a corps of trained executives, and they in turn place reliance upon an equally essential corps of departmental heads, who in turn engage the workmen and employ them in the capacity of specialists, so that the work is done day after day, and oftentimes year after year, in such a way that one man learns how to do some one thing, with never a thought or reason for wanting to do anything else.

The work is so grouped in the several plants that it transverses in the direction of the finished product from the source of supply as it is represented by raw material, and while inspection facilities are utilized as a checker against errors at important points in the process, the fact remains that errors do not accumulate because through the methods worked out a mistake cannot get beyond the man who makes it further than to the man who performs the succeeding operation.

Crankshafts will serve as an illustration of the automatic method of discovering errors. After they are cut off, centered, the cheeks milled and the pins ground, they go to the inspection department, and are there centered in a testing machine which will develop any variation in excess of 0.0015 of an inch of a pin out of round. Notwithstanding the accuracy of this test, the crankshafts go to a run-in machine, where they are mounted in place, the bearings clamped down, and the shafts are given a run-in test for a sufficient time to ascertain as to their respective qualities.

Cylinders, after they are roughed, ground and tested for tightness, are set up in a fixture and placed upon the platen of a multiple spindle machine where they are completed in three separate operations by as many men. The work is done progressively, and should one of the men fail to perform with the exactness which is demanded, the next man in picking up the work would be likely to discover the discrepancy, but should he be so blind as to overlook a fault, the error will be for discovery by the third man in the series. The point uppermost in this progressive shop system is that no man completes a job.

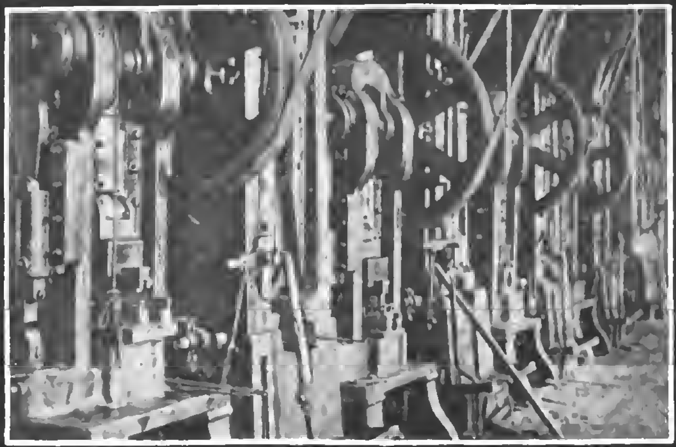
The component parts of the power plants, after they pass through the progressive method of manufacture, go to the assembling department, and, there, placed upon a "block" and the crankshaft is mounted into place; thereafter the clutch, flywheel and relating members are inserted, and if the rotating parts are free, and apparently in the right relation, the workman who performs this part of the work passes it along to the next man, who puts a belt over the flywheel, and from power, which is available, gives the assembly, in this incomplete state, a run-in test. After a sufficient time, if all goes well, the incomplete power plant is passed on to the workmen who apply the cylinders, insert the valves, and do such other work as may be necessary to advance the motors to a near state of completion. The substantially completed motors are then given a preliminary run-in test, and if they prove to be sufficiently promising they are then forwarded to the regular testing department, where, by means of calibrated fans, they are given their rated load and run for a sufficient time to assure that they will be in fettle to make it worth while to mount them into the chassis, there to receive tuning-up treatment, to be followed by a road test.

Columbia Plant Was Merged

FACILITIES, far beyond the present and prospective future output of the Columbia Motor Car Company, at Hartford, Conn., formerly the Electric Vehicle Company, and now a component part of the United States Motor Company, are afforded by the factory as it stands to-day, both as to space, equipment, system of handling materials, and men.

(*Continued on page* 693.)

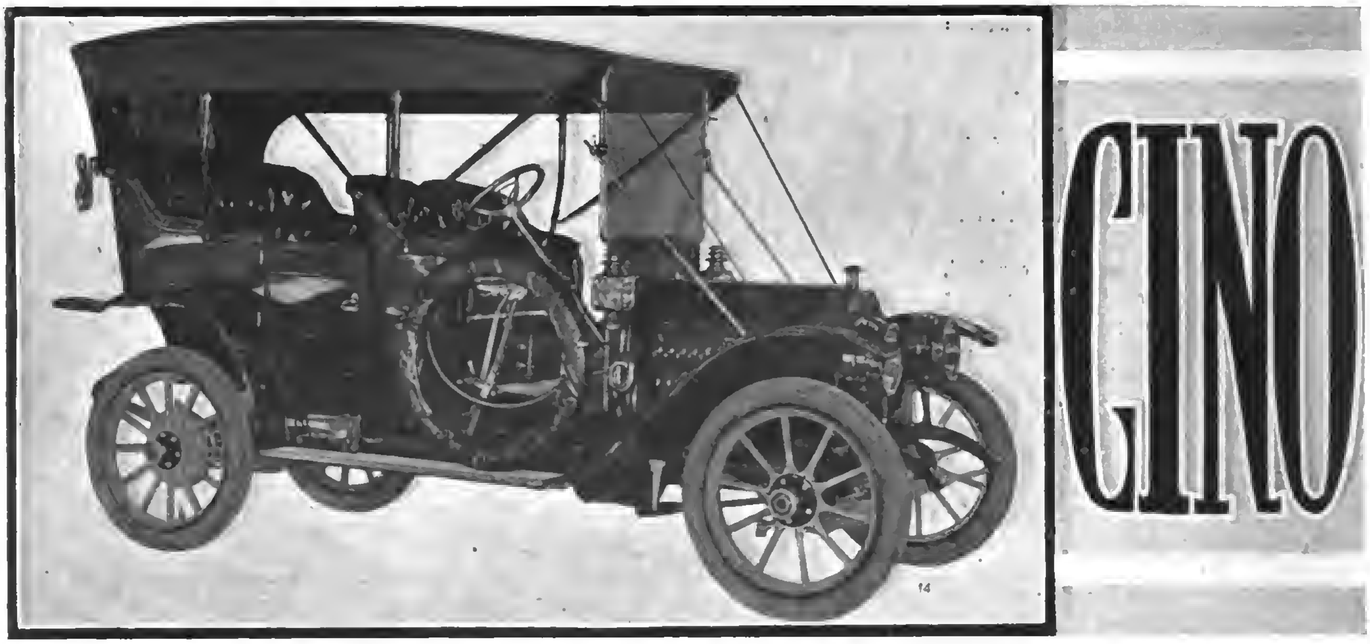
Rear Showing Room to Grow and Own R. R. Siding



Part of Forging Equipment, Which is Unusually Complete.

Stock of Crankcases Finished and Waiting for Assembly.

Row of Tested Cars Awaiting Painting and Body



As a Touring Car the Cino, from Cincinnati, Displays a Number of Attractive and Meritorious Features

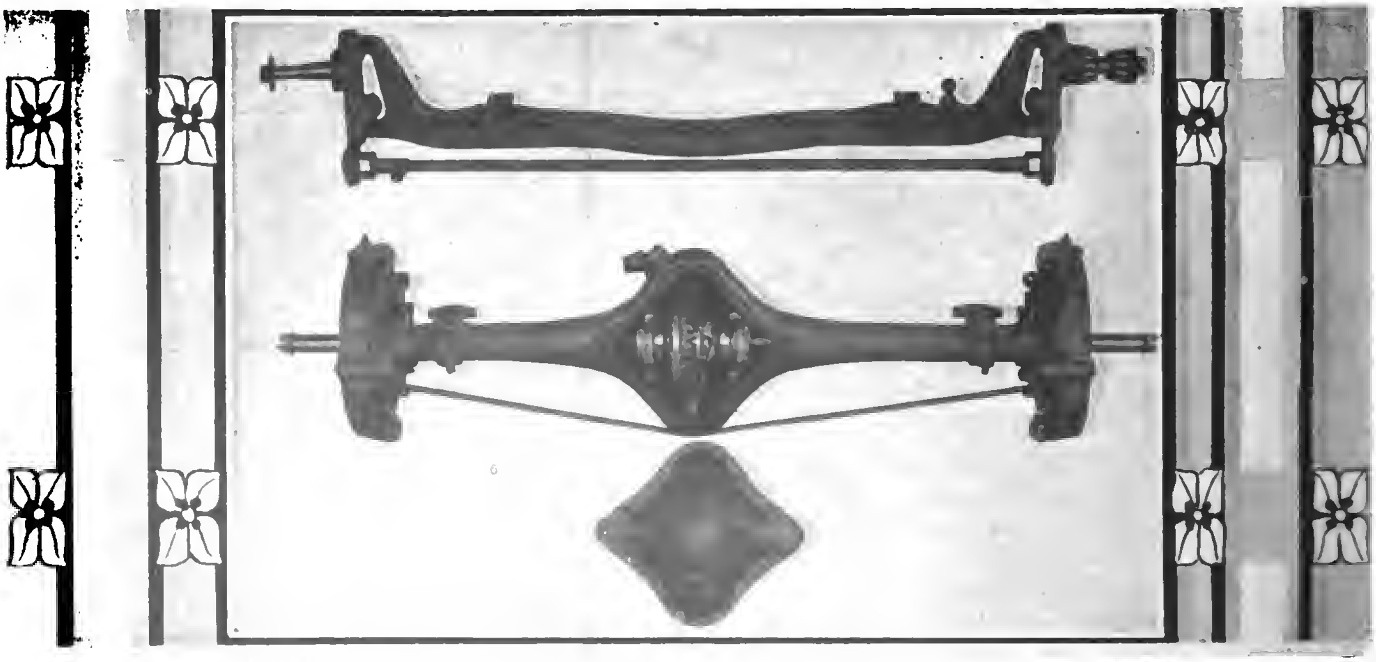
Haberer & Company, Offices and Factory at Cincinnati, O.

Motor, four cylinder, 4 3-8 by 5 inches; cylinders cast in pairs, with all valves in the head.
Crankshaft drop-forged and heat-treated; three bearings of Parson's white brass.
Ignition by Remy magneto, with dry cells as auxiliary.
Carbureter, Stromberg.
Lubrication by three-feed pump, maintaining a constant level in the crankcase.
Vertical tube radiator radiator with six-bladed belt-driven fan and centrifugal pump.
Multiple-disc clutch; 25 steel discs and nine springs, located in change-gear case.
Three-speed selective change-gear, carried on subframe.
Drive through shaft with two Spicer universal joints.
Rear axle full floating, with pressed steel housing; Timken roller bearings.
Internal and external brakes on rear hubs, former the emergency and latter the foot brake; bands faced with Thermoid.
Front axle made by Timken; weldless drop-forging, I-section.
Worm-and-sector steering gear with 18-inch hand wheel.
Wheels 34 inches in diameter, 10 spokes front and 12 rear; 34 by 4-inch Diamond tires standard.
Front springs semi-elliptic, 36 inches long; rear springs three-quarters elliptic, 46 inches long.
Pressed steel frame with four cross-members and subframe.
Wheelbase 113 inches; weight about 2,550 pounds; price with touring body, $2,250, including five lamps and gas generator.

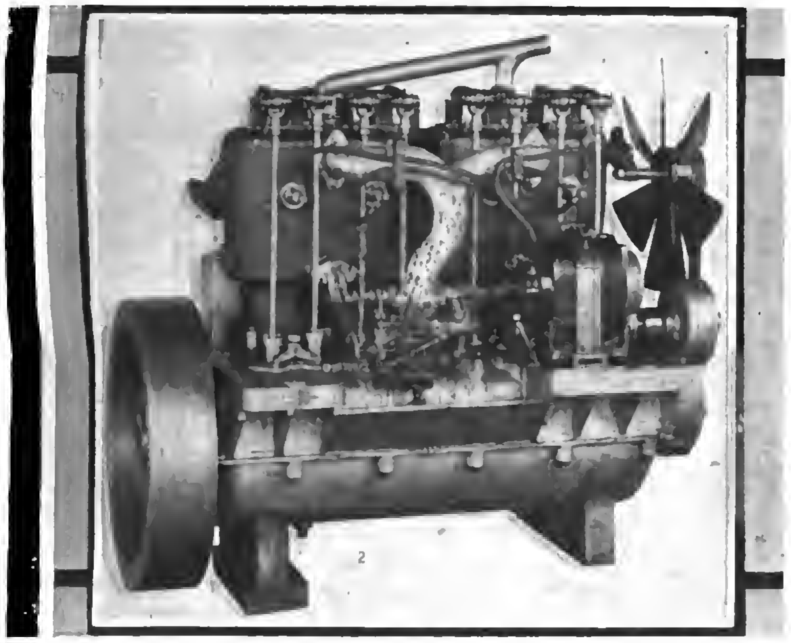
CINCINNATI'S reputation as a manufacturing city, especially in the line of machine tools, at least equals that of any other city in the country. Until quite recently, however, the Queen City's part in the automobile industry has been only to make the tools with which other cities made the cars. For the 1910 season an even half-dozen makes of automobiles will bear the Cincinnati impress, and of these one of the most important is the Cino, the product of Haberer & Company.

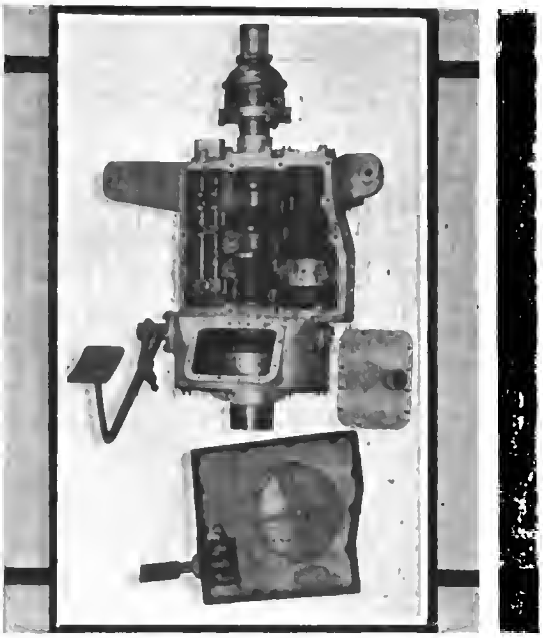
In most respects this car follows conventional lines of design. The motor, rated at 40-horsepower, the multiple-disc clutch and the three-speed selective change gear are made in Haberer & Company's factory on the designs of the company's engineer. The axles are of Timken construction, of well-known excellence.

Four cylinders, 4 3-8 by 5 inches, cast in pairs, and a three-bearing drop-forged crankshaft form the basis of the motor design. All valves are in the cylinder heads, in a single row, and



Cino Axles Afford the Solidity Necessary to Support a 2,500-pound Car with Its Full Passenger Load





Motor and Change-Gear Are Both Products of the Haberer Factory; the Latter Includes the Clutch

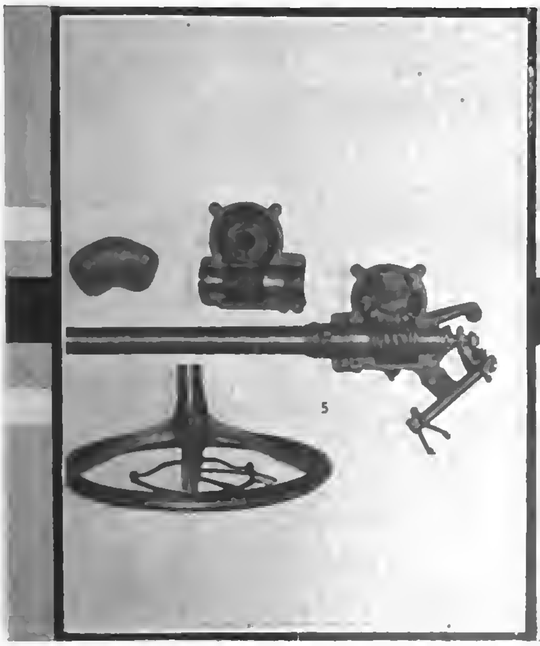
are actuated through rockers and push-rods from a camshaft enclosed in the crankcase on the right-hand side of the motor. They are unusually large in size, with heads of nickel steel, and vanadium steel springs, the latter being subjected to a treatment which gives them long life. The valves and their cages are easily removable for cleaning and grinding. The camshaft is a drop-forging with cams integral, and cams, push-rods and rollers are all hardened and ground.

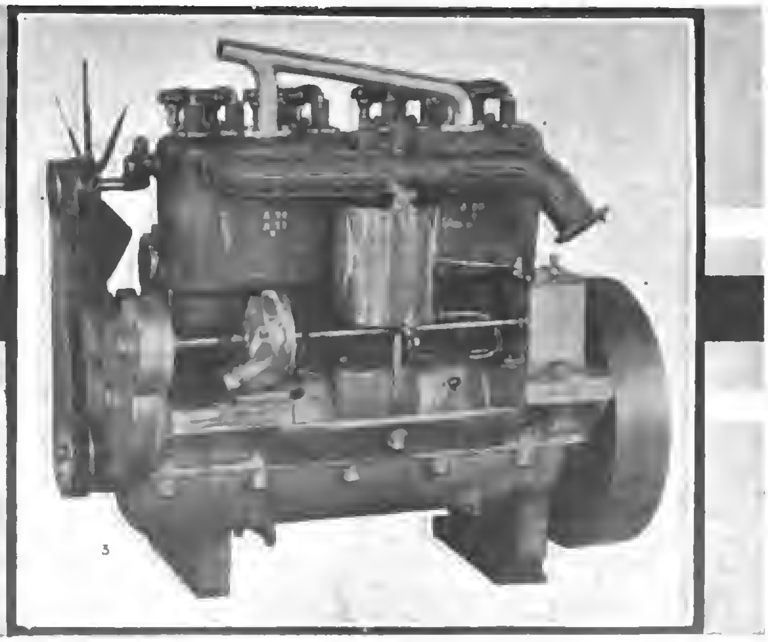
The crankshaft is a drop-forging, of liberal size, heat-treated for toughness and strength, and journals are ground to size. Die-casting of the bearings, of Parson's white brass, insures an even texture and wearing qualities. Castings of an aluminum alloy form the two halves of the crankcase, which has integral four arms by which the motor is supported on the subframe.

The arrangement of the motor accessories shows careful thought. The inlet piping is carried over to the right side, and with it, of course, the carbureter. The magneto is also located on this side, at the extreme front of the motor. The exhaust manifold is on the left side, and with it the water and oil pumps. These are on a common shaft, which passes through the pump and extends to the oiler mounted on the rear lug of the crankcase. Oil is carried in a large cylindrical tank set in close between the cylinder pairs, and is fed from the pump through sight feeds on the dash leading to the crankcase and clutch. A constant level is maintained in the former, and the cylinders are kept lubricated by the splash.

Clutch and change-gear are united in a single case, with connection to the motor through an Oldham coupling of good size. The clutch has 25 all-steel discs, under the pressure of nine springs of the same vanadium steel used for the valve springs. The shafts and gears of the change-gear are of substantial design and run on plain bearings. The sliding-gear shaft has milled splines, a commendable feature. The lay shaft has one bearing between the constant-mesh gear and the second-speed gear, the former being overhung; this is believed to give a better distribution of the stresses. Drive is through a shaft with two Spicer joints, the angle of the joints not exceeding three degrees.

The rear axle is live and with floating shafts; the axle body is pressed steel, and the differential and bevel gears are carried in an easily removable cage.





Cylinders Cast in Pairs, with Overhead Valves, Distinguish the Motor; Steering through Worm Gear

Showing Tubular Axle with Connections Well Protected

Sales Agents, Meixell-Downing Company, Indianapolis. Made by Clark Motor Car Company, Shelbyville, Ind.

Motor, four-cylinder, 4 by 4 inches.
Cylinders cast separately.
All valves on the left side.
Crankshaft drop-forged with five plain bearings.
Ignition dual; Remy magneto with separate coil.
Dry batteries on same set of plugs.
Carbureter, Schebler.
Gasoline tank under front seat, gravity feed, capacity 14 gallons.
Constant level splash lubrication.
Cooling by vertical-tube radiator with pump and belt-driven fan.
Leather-faced cone clutch, 15 3-4 inches diameter, 2 1-2 inches face.
Drive by shaft enclosed in torsion tube.
Single universal joint.
Change-gear on the rear axle, selective type.
Three speeds forward and reverse.
Annular ball bearings in change-gear.
Semi-floating rear axle; bevel gear ratio 3 1-2 to 1.

AMONG the additions of the past season to the automobile plants in the vicinity of Indianapolis, and adding to the prestige of that city as a center of the automobile industry, is that of the Clark Motor Car Company, at Shelbyville. This company has put on the 1910 market two models, of 30 and 40 horsepower, and selling at $1,400 and $1,750, respectively, for which the Meixell-Downing Company, of Indianapolis, acts as general sales agent. The two models resemble each other in most essential features, but the present article will treat of the Clark "30" exclusively.

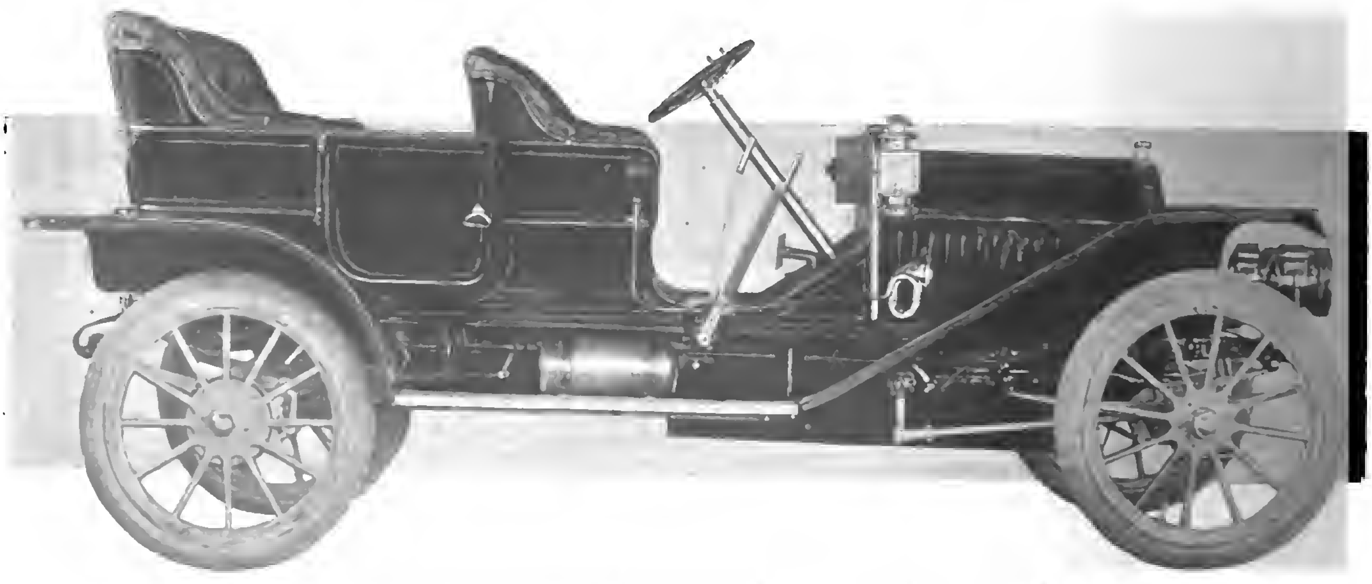
As in any form of engineering work, a substantial foundation is the first requisite of a successful automobile. The designer of the Clark seems to have given especial attention to the chassis of his car. The frame is of pressed steel of the conventional channel section, 1 1-2-inch flange, and 3 1-2 inches deep for the middle half of its length; it has three cross members, the front and middle ones carrying between them a subframe for the support of the motor. The comparatively long wheelbase—112 inches—allows a minimum of overhang, the frame extending but 6 inches back of the center of the rear axle.

Rear-seat passengers will appreciate not only the lack of excessive overhang, but also the policy which caused the rear end of the frame to be hung on full elliptic springs of the double-scroll type 40 inches long. The front springs, as usual, are semi-elliptic, and the leaves of both are 2 inches wide, a generous figure for a 2,000-pound car.

The semi-floating type rear axle carries the gear case, according to the fashion which is steadily gaining in popularity. The axle is built up of tubular sleeves and a central case for the bevels and differential; the live shafts are 1 1-4 inch in diameter, and run on annular ball and Hyatt roller bearings. The bevel gear ratio is 3 1-2 to 1, which is figured to give a maximum speed of 50 miles an hour. The change-gear gives three speeds forward and reverse, controlled selectively; the gears are a special grade steel, and the shafts run on annular ball-bearings throughout.

Torsional strains are taken up by a stout tube enclosing the drive shaft and bearing on its forward end a wide yoke, the arms of which are hinged to the subframe. Thus the drive shaft and its universal joint have only to transmit the power of the motor to the rear axle, instead of carrying these strains, as in some designs they are called upon to do. The clutch is a leather-faced cone, 15 3-4 inches in diameter and 2 1-2 inches face, and so arranged that its engagement is cushioned not only by springs under the leather, but also by the air entrapped between it and the flywheel.

For the motor recourse has been taken to one of the oldest and most reliable of the stock products, the Rutenber. The features of this motor are familiar to every automobilist. The one used in the Clark "30" has four cylinders 4 by 4 inches, cast separately, of course, and with a five-bearing crankshaft. One of the more recent details is the provision of a vertical shaft at the front of the motor, driven from the crankshaft by skew gears, which carries the timer on its upper and the oil pump on its lower end, and drives the magneto through another pair of skew gears. The magneto is a Remy, three-magnet type, and dry batteries are provided for starting.


Clark "30" Has a Well-Balanced Appearance, Due to Location of Body and Hood on a Long Wheelbase

Live shaft 1 1-4-inch diameter; annular ball and Hyatt roller bearings.
Internal and external brakes on rear hubs.
Foot brake external, emergency brake internal and equalized.
Brake bands faced with Raybestos.
Front axle tubular ball bearing.
Steering gear, worm-and-sector.
Hand wheel 16 inches diameter.
Wheels 34 inches diameter, 12 spokes.
Standard tire equipment 34 by 3 1-2-inch Fisk.
Front springs semi-elliptic 38 by 2 inches, 5 leaves.
Rear springs full elliptic, double scroll, 40 by 2 inches, 6 leaves.
Pressed steel frame, channel section.
Greatest depth of frame, 3 1-2 inches, 1 1-2-inch flange.
Three cross members with subframe to carry motor.
Wheelbase, 112 inches.
Road clearance, 11 inches.
Weight, 2,050 pounds with full tanks.
Price with touring body, $1,400, including five lamps and gas tank.
Standard color, Russian blue.

Rear View Discloses a Substantial Axle and Springs

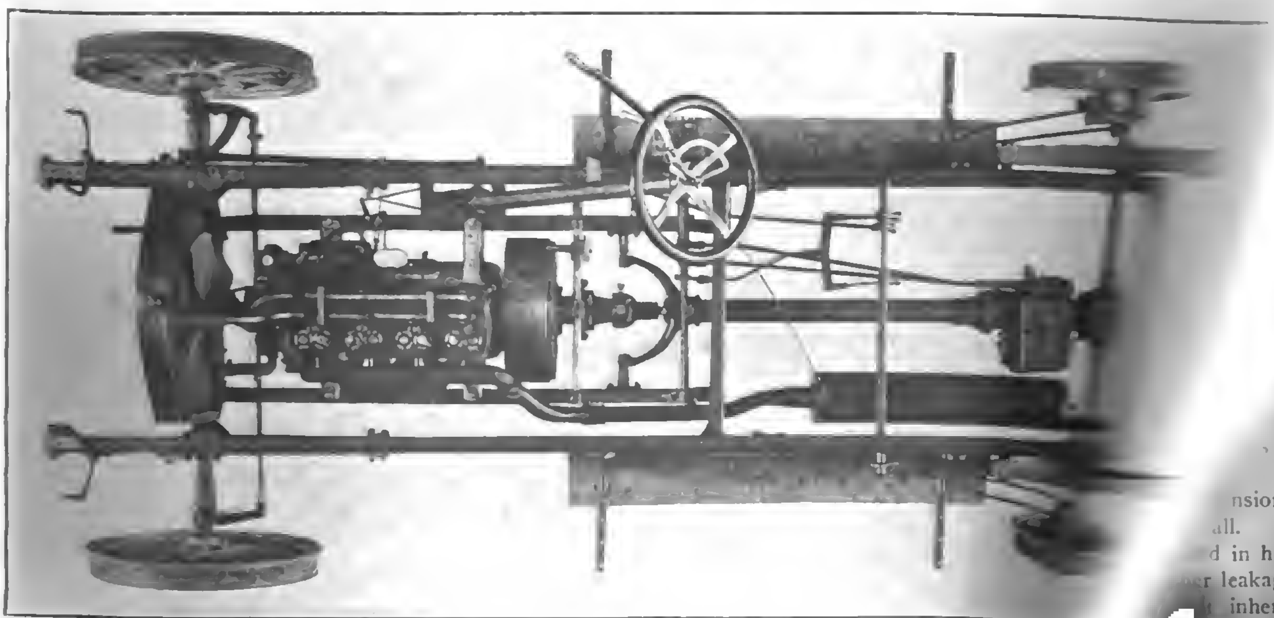
Control methods follow the accepted standard. Spark and throttle levers are mounted on top of the steering wheel, and an accelerator pedal is also provided. The worm-and-sector steering gear has a 16-inch wheel mounted on a brass column 1 7-8 inch diameter. The change-gear lever, working on an H-shaped quadrant, and the emergency brake lever are side by side; the latter pulls back to apply the brakes, and has a button release. The left foot pedal releases the clutch, and the right pedal applies the service brakes, in the accepted fashion. Both sets of brakes are on the rear hubs, the emergency set being the internal and the service the external one. The emergency brakes are equalized by a balancing bar introduced in the connections. The bands are lined with Raybestos, the wearing parts are protected from dirt, and the adjustments are readily accessible.

A good degree of noiselessness in operation has been secured by enclosing the moving parts which are responsible for most of the usual noise, and by providing a large muffler, of a capacity to take care of the exhaust gases without setting up undue back pressure. A cut-out, operated by a foot pedal, is provided for speeding.

Thorough provision is made for lubrication of all wearing parts. The motor has its own lubricating system built integral; a pump, driven by a vertical shaft at the front of the motor, as mentioned above, keeps a constant stream of oil flowing to the crankshaft bearings, and maintains a constant level in the four crank pits, from which the oil is splashed into the cylinders. The motor has a large filling cap on the right-hand side of the crankcase. All bearing points on the chassis are provided either with grease cups or with Winkley oilers. Oil holes are believed to be worse than useless for automobile service, as they only catch grit, which is then carried directly into the bearing surfaces. The gearcase is filled with oil, and the ... of the rear axle is packed with hard grease. ... but occasional attention.

The standard five-passenger touring body ... commodation for its rated number of passengers ... the length of the wheelbase the rear seat ... much less than usual, thus adding to its ... The rear seat is 47 inches wide and 20 ... height from the floor to the top of the cushion ... and the leg room is 22 1-2 inches. The ... is 39 1-2 inches, and its depth 19 inches ... inches, and the leg room 27 1-2 inches. The ... ironed for top, with dash and molding in ...

Russian blue with narrow gold striping ... for body and chassis, with wheels of ... pleasing combination. The upholstering is ... quality leather, hair and springs. Mudguards ... with sheet metal aprons between the frame and ... insure against annoyance from dust and ... inch wheelbase and 34 by 3 1-2-inch tires, ... equipment offered, the Clark "30" seems ...



In this View May Be Observed the Yoke on the Torsion Tube Which Relieves the U...

A. A. A. GIVES OUT 1910 GLIDDEN TOUR RULES

RULES governing the 1910 National reliability tour of the American Automobile Association for the Glidden and Chicago trophies are as follows:

The seventh annual reliability tour for the Glidden trophy for touring cars and the Chicago trophy for runabouts and miniature tonneaus will start at Cincinnati on June 15, 1910, and end at Chicago June 29, 1910, including Louisville, Nashville, Memphis, Little Rock, Texarkana, Dallas, Fort Worth, Oklahoma City, Wichita, Topeka, Atchison, St. Joseph, Des Moines, Cedar Rapids, Davenport, Rock Island and Moline.

TROPHY AWARDS

The trophy in each class shall be awarded to the entrant whose car completes the contest with the least number of points to its debit. See general rule 526.

In case of a tied score for the Glidden trophy or for Chicago trophy, the trophy will not be awarded, but suitable medals will be issued to the cars so tied, certifying that they have qualified as winners, and their names shall be properly inscribed upon the respective trophies.

Cars completing the contest with 97 per cent. of the winning score shall be awarded Glidden certificates setting forth in detail the performance of the car on the road and its condition upon final examination. Rule 525.

CLASSIFICATIONS AND ELIGIBLE COMPETITORS

Each entrant shall be a member of the A. A. A. or of an affiliated club.

Stock cars only shall be eligible to compete and shall be divided into two classes according to body equipment: 1—Touring car class; 2—runabout class, including runabouts, miniature tonneaus, surreys and double or single rumbles. Rule 403.

Any stock touring car, a complete description of which has been filed by the manufacturer with the contest board of the American Automobile Association, at least 30 days prior to the date of the tour, as provided in rule 32, shall be eligible to compete for the Glidden trophy.

Any stock runabout, miniature tonneau, surrey, double or single rumble, a complete description of which has been filed by the manufacturer with the contest board of the American Automobile Association at least 30 days prior to the date of the tour, as provided in rule 32, shall be eligible to compete for the Chicago trophy.

CAR EQUIPMENT

404—Each competing car shall be delivered into the custody of the promoter's technical committee for official examination before the start of the contest, at the date required by the committee, which shall be specified upon the entry blank to determine if it is a stock car and regularly equipped.

405—Each car must carry at all times during the contest its catalogued equipment of lamps, tools, tire tools, body, fenders, sod pan, running boards, muffler and body parts; and, in addition, may or may not use windshield, top, extra tires, baggage rack, lamp bumpers and supplementary tonneau seats.

406—Special mud aprons may be used in front of the radiator or bonnet screens between the side members of the frame, same to be attached before the start of the contest in a manner satisfactory to the technical committee.

407—Rubber bumpers for springs and rebound straps may be used without penalization for trouble with them.

408—Tire-inflating tanks of any nature may be used.

409—Cars are not permitted to use searchlights unless same are part of regular equipment, but may affix two ordinary gas or electric lights with generator or gas tank.

410—Covers over coil boxes on the dash, or wherever located, not permitted unless regularly provided.

411—Leather or other covers over magnetos not permitted unless supplied regularly with stock cars. This applies to any other part of mechanism as well.

412—Screenings or shields of any construction around carbureter not permitted unless regularly fitted to stock cars.

413—The cotter-pinning, or lock-nutting of nuts or riveting of bolts or studs, other than is regularly done on stock cars at the factory, not permitted.

414—The use of special springs or spring windings not permitted.

415—Shock absorbers will not be permitted unless listed under regular, optional or special equipment.

PASSENGER LOAD

416—A touring car shall carry four or more persons.

A miniature tonneau, surrey, or runabout shall carry two or more persons.

Passenger load in all body types must average 125 pounds per person or a like amount in ballast.

RESPONSIBILITY OF ENTRANTS

1—Each entrant by his signature to the entry blank shall agree that he is familiar with the rules, that he will abide thereby and accept the official records, and authorize the American Automobile Association to publish them in such manner as it shall determine.

2—Each entrant shall hold the American Automobile Association harmless and indemnify it against all loss or damage resulting directly or indirectly from or growing out of the operation, management or control of the car entered by him.

3—The American Automobile Association shall not be responsible for any damage that may be done to any car, its passengers or contents during the tour, nor for the theft of any car or any of its accessories or contents, the same being at all times subsequent to such entry, and until the close of the tour, at the risk in all respects of persons entering same.

4—Each entrant or his official representative shall be responsible for the acts of passengers in his car.

5—Each competing car must be delivered into the custody of the committee before 9 o'clock on the morning of Monday, June 13, for official examination and to check the inventories of parts carried as hereinafter provided for.

6—Each entrant shall name an official representative for each of his entries, on or before June 1, 1910, failing which the driver of the car shall be considered the official representative. Rule 426.

7—The official representative of the entrant shall be subject to all rules and penalties prescribed for the entrant, and shall be considered as the entrant in fact. Rule 427.

ENTRIES

1—The time for receiving entries shall expire on June 1, 1910, at 12 o'clock midnight, at the office of S. M. Butler, chairman contest board, 437 Fifth avenue, New York. Each entry must be accompanied by the entrance fee. Rule 432.

2—Each entrant shall give all details asked for in the entry blank and such additional information as the contest committee may from time to time require.

3—The contest committee of the American Automobile Association reserves the right to refuse any entry.

4—Entries shall be numbered in the order of their receipt. Rule 428.

428—Upon making an entry, each entrant shall appoint one observer for each car entered. See Rule 465.

429—No more than three cars of any one make may be entered in either of the body equipment classes provided in Rule 403.

430—The entry fee will not be refunded in case a car fails to start or is disqualified during the contest, or in any case, unless the contest is for any reason abandoned.

433—Any attempt at fraud in the evasion of the stock car definition or status of the car on the part of an entrant shall disqualify the car, the driver and the entrant.

TOOLS

417—All tools for the car will be carried in a special tool bag furnished by the promoter, which shall be sealed and handed over to the observer, and the use of tools other than those carried in the bag is prohibited. The number of tools is not limited to the supply sold with the car. When tools are needed the driver or mechanic will obtain them from the observer, who will keep a strict account of the number of tools used and see that they are returned to him at completion of work. Tire tools may be carried in the regular tool compartment of the car, but must not be placed in the official tool bag.

INVENTORY OF PARTS

418—Each entrant shall furnish prior to the start an inventory of all parts carried in his car, and these shall be officially checked, sealed and a record made of same.

TIRES

419—Each entrant may carry as many tires, demountable rims and tire chains and the parts which secure them in place as desired, or purchase or obtain them en route without penalty.

TIRE REPAIRS

420—There shall be no penalty for tire repairs, provided the engine be kept running while the repairs are being made and no other work is done. The time consumed in making the repairs while the engine is running, shall be added to the day's running time.

420A—The rule applied to tire repairs also applies to removal repairs, also anti-skid.

LUBRICATION EQUIPMENT

423—No additional lubrication equipment, such as pumps for forcing oil direct into crank case, will be allowed, unless cars are regularly sold with such equipment.

THE ROUTE

434—The route shall be exactly marked by one or more of the following methods:

A—By throwing confetti on the right side of the road 100 yards before and 100 yards after any turn. On long stretches, without turns, occasional throwings, especially at points 100 yards after passing any corner where a turn has not been made.

B—By providing each contestant with a description of the route, giving explicit directions of all right and left turns and right and left forks, and with occasional references to some conspicuous object. Mileage distance shall be placed to the left of each of these points noted in the route descriptions.

C—By marking the course with arrows and disks, the arrows to be placed 100 yards before a turn and the disks 100 yards after a turn. Disks shall also be placed 100 yards after passing any corner where a turn has not been made.

PRELIMINARY INSPECTION

435—Contesting cars shall be given a preliminary inspection preceding the start of the contest. At this inspection one representative of the entrant will be present with the technical committee of the promoter. An inspection card showing the condition of wheels, springs, frame, front and rear axles, steering pivots, steering gear, body, motor, ignition parts, lubricating parts, cooling parts, carburetion parts, exhaust parts, clutch parts, transmission and control parts, brakes and brake-operating parts, etc., will be filled out and any noticeable points about each that might later occasion dispute, recorded. This card must be attested by the entrant's representative.

SEALS

436—Metal and wire seals will be affixed by the technical committee as follows:

Gasoline Cars—Bonnet, coil box, transmission case, differential case, mud pan or apron and parts of ignition not beneath bonnet or protected by bonnet seals, and any other parts at the option of the promoter's technical committee. Where motors are under the body of the car, the floor, seat and deck boards must be suitably sealed.

437—Steam Cars—Bonnet, mud pan or apron, pilot light, thermostat, flow motor regulator and parts of steam system not beneath the bonnet and not protected by bonnet seals, and any other parts at the option of the promoters' technical committee.

(Continued on page 691.)

THE CARBURETER, ITS ADJUSTMENT, AND THE NOVICE

By HERBERT L. TOWLE

WATER-JACKETING of carbureters is resorted to for the opposite reason which makes it desirable on the motor cylinders, that is, to replace the heat lost in vaporizing the fuel, a small stream of hot water being by-passed around them from the cooling system of the engine. Carbureters not so provided take a portion of their air from a heater, connected usually to the exhaust manifold. The proportion of hot air can be regulated to suit the season. It follows that in winter when starting from cold much of the gasoline spray is not evaporated, or if evaporated is not properly mixed with air, and, therefore, passes through the engine unburned. For this reason it is usually necessary in cold weather to increase temporarily the gasoline supply till the engine warms up. This is sometimes facilitated by putting one of the carbureter adjustments under the driver's control by connecting it to a lever on the back of the dashboard.

The same fact, i.e., that cold gasoline does not evaporate freely, explains the need of flooding the carbureter to start in cold weather. Sometimes it is even necessary to warm the carbureter by pouring hot water over it or wrapping it in hot wet cloths. A good modern carbureter requires little or no priming in warm weather, as the suction due to cranking is sufficient to draw gasoline from the spray nozzle. If, however, "priming" is necessary, the user must learn by trial about how much to prime for different conditions. If the engine is warm, none is required. If it has stood over night or longer, the carbureter can usually be flooded until gasoline drips from the overflow outlet provided for that purpose. Too much gasoline, however, is as bad as too little. A strong spark will help matters considerably. If the user has a magneto he may count on a very weak spark when cranking with the spark lever retarded. The common dual ignition provision, i.e., a magneto for regular service and a battery and outside coil for starting, is intended for just this condition.

Incidentally the reader is cautioned to make a practice of shutting the main gasoline valve after every run. Carbureter float valves are notoriously prone to leak. While the engine runs, the gasoline consumption takes care of the leakage, but over night the leakage may not only flood the carbureter so as to render starting difficult, but waste gasoline seriously as well. If the engine balks owing to flooding, shut the main gasoline valve and turn the crank vigorously several turns to pump out the saturated air; when the engine starts, turn on the gasoline. In extreme cases it may be well to open the float chamber drip cock and draw off some gasoline to lower the level. This, however, is seldom necessary except with puddle type carbureters, of which mention will be made in the next article.

New let us consider carbureter derangements and their symptoms. Of these the following are most common: Clogged gasoline pipe or passage, dirt in spray nozzle, water in gasoline, leaky float valve, loosening of threaded adjustment in float valve, gasoline-filled float, sticking air valve.

Occasionally the gasoline pipe or strainer will be clogged by fluff which comes through the pipe and lodges in or near the union connecting the pipe to the carbureter. The symptom is misfiring followed by total "dying" of the engine. If the stoppage is only partial, enough gasoline may get through to permit restarting, followed presently by the same performance. If gasoline does not flow freely when the float is depressed, first open the sediment plug. If gasoline comes out freely the trouble is higher up, possibly in the float valve orifice. If careful poking with a wire does not bring the obstruction down, take out the float valve and poke down from above. In some cases it may be necessary to disconnect and remove the carbureter to get at the obstruction. If the latter is lodged in the gasoline pipe or union, gasoline will escape, after opening the sediment plug, only till the float chamber is empty. Disconnect the union, and if still no gasoline comes, disconnect the pipe at the tank end after first closing the main valve next to the tank. If the pipe is clear the obstruction may be located in the main valve itself, or in the entrance to the pipe from the tank. Usually the latter can be reached and poked out either from inside the tank through the filler opening, or from beneath. Before embarking on the above hunt, be sure that the tank itself is not empty.

The symptoms of dirt in the spray nozzle are quite similar to the foregoing, except that gasoline issues freely at all points except from the nozzle when the float is depressed. A fine wire will locate the trouble, but the nozzle should be flushed clean.

Water in the gasoline will cause the motor to stop absolutely dead. Open the sediment plug and float chamber, drain plug, and see whether gasoline or water issues. Be sure that the water is thoroughly expelled from carbureter and pipe. If the gasoline is strained through a chamois skin or through several layers of cheesecloth, any water will be separated out.

The sign of a leaky float valve is dripping. Pressing the float valve shut does not stop the leakage; this will distinguish leakage from faulty adjustment. The remedy is to grind in the float valve with pumice stone, taking care to keep the stem central.

Occasionally the threaded adjustment of the float valve may work loose, allowing the needle portion of the valve to settle downward and shut off the gasoline, regardless of the position of that portion of the valve against which the float lever operates. The symptoms resemble those due to an obstructed gasoline pipe, except that gasoline flows freely from the drip cock.

A cork float is apt to absorb gasoline gradually, making it heavier, so that it fails to close the float valve when the normal gasoline level is reached. This results in leaking easily mistaken for that due to imperfect seating of the float valve, except that it is stopped at once by pressing the float valve against its seat. A temporary remedy is to readjust the float. For a permanent remedy the float must be taken out, baked to expel the gasoline, and given two coats of shellac. A hollow metal float sometimes receives an invisible puncture, which causes it to fill gradually with gasoline and act like a saturated cork float. By warming it the gasoline will be expelled as vapor. Plunging the cold float into warm water will cause bubbles to issue, showing the location of the leak. When dried out and cold the leak should be carefully soldered up, using no more solder than necessary in order not to increase the weight of the float.

Dirt may cause the auxiliary valve to stick—a point easily tested with the finger. The valve seat, if not of metal, may leak, causing a weak mixture at low speeds.

While on the subject of float valves it may be noted that there are five methods of controlling these valves, as follows:

1. By direct attachment of the needle to the float itself, so that closure is accomplished by the upward movement and pressure of the float.

2. By indirect action through a lever, which multiplies the pressure available to hold the valve shut.

3. The valve may be loaded, so that it shuts off the gasoline by its own weight. The float in that case operates to open the valve when the gasoline level falls, rather than to force it shut when the level rises. This device has the advantage over the preceding, that vibration of the float is not so likely to be communicated to the valve, and the latter is more likely to hold tight.

4. The valve may be closed by spring pressure instead of simply by its own weight. This makes it still more secure against opening from vibration. The float acts as a counterbalance as in case 3.

5. The valve may be weighted and spring tension added to steady it. This is perhaps the best system of all.

By noting which of the above devices is used in his own carbureter the reader will be able to judge whether leakage is due to imperfect seating of the valve or to a fault inherent in the valve's design.

DO WE SEE OURSELVES AS OTHERS SEE US?

By JAMES S. MADISON

WHEN the average motorist, like you and me, has returned from a trip of 100 miles, or one of greater or less distance, in talking it over with his friends or family, he devotes, consciously or unconsciously, a certain proportion of his remarks to the "other fellow."

It is clear that the other fellow does many things he ought not to do and leaves undone many things he ought to have done, and in the slightly modified words of the prayer-book, there is no health in him. Whether the proportion of the remarks devoted to this subject is large or small, depends upon the mental attitude of the speaker and upon the behavior of the other fellow.

It is undoubtedly true that many of us have ample cause for annoyance, just as there are many of us who are quick to take offense and quick to resent real or supposed violations of our rights. There are also many of us who are thoughtless and inconsiderate and who undoubtedly give cause to the non-motoring public for condemning automobiles and their drivers in general.

Judging from a somewhat extended acquaintance among motorists, I do not believe that as a class they are more selfish, or less courteous or considerate of others, than any other class of persons. But as in other cases, the whole membership suffers for the acts of a few. No sane person thinks of condemning the whole legal fraternity because he knows of a few unprincipled lawyers; or the whole medical profession because he is aware of the existence of incompetent doctors. There is equally good reason for not condemning the motoring world in its entirety, because of the acts of a small portion of it.

DUTY OF ALL MOTORISTS TO HELP

Each member of this world, every person who sits behind the steering wheel, no matter what his color or how humble his station, has it in his power to do a real kindness to many people —autoists and non-autoists—every time he goes out on the road. He has it in his power to increase or lessen the prejudice existing in many localities against the automobilist. Every time he drives through crowded streets, he has the opportunity of showing whether he is a thoroughbred or a scrub; of making friends or enemies.

If we could all decide before starting on a trip, that we would not only avoid injuring any animal, property or person, but that we would not interfere with any creature's rights, pleasure, or comfort, we would all be happier. Our cars would run more smoothly, more sweetly, for courtesy is the best lubricant on the market and the "other fellow" would soon disappear.

I have been impressed with the fact that motorists are often thoughtless when passing other cars, horse-drawn vehicles or pedestrians on a dusty road. If one is going along at any speed above 16 or 17 miles, he is leaving a dense cloud of dust behind him and if he meets another automobile coming from the opposite direction, he may feel absolutely sure that the occupants will get the full benefit of it. If he has any doubt about this, let him turn around the next time he passes anyone on a dusty road and see for himself. It may be that owing to the size of the tires, shape of the car's body, etc., his car may not raise much dust at the speed mentioned. If it does not, so much the better, but should he increase his speed to 20 or 25 miles, he will bring into existence a cloud of dust that will fill eyes, nostrils and lungs and cover entirely the person of any one unfortunate enough to encounter it.

PRACTICABILITY OF THE GOLDEN RULE

To the occupants of automobiles it is bad enough, although they are exposed to it only for a few moments, but to those of our fellows who are on foot, or are riding behind horses it must be maddening. By far the worst of it could be avoided by slowing down to a non-dust raising speed. Every driver ought to know at what speed his car raises dust. If he does not, he ought to find out the next time he encounters a dusty road. If he will make a few simple observations on his car's ability to raise dust, he will probably get a new conception of what a pest he may be under certain conditions.

I never feel like blaming the farmer, driving horses which are drawing a heavy load, for not showing any great enthusiasm or alacrity in turning out at the sharp honk of the horn. It may be that he has already turned out two or three times in a mile and if the distance is five miles to his home, probably he has been honked at ten or fifteen times. If the road is dusty and the day windless, he has been enveloped in ten or fifteen clouds of irritating dust. Is it any wonder, then, that when he reaches home he is in a belligerent frame of mind? My plea is that each of us should remember him and contribute as little as possible to his discomfort.

Personally, I think it is courteous and therefore good policy to give some sign of appreciation when passing the man who has turned out for me. A friendly nod, informal salute or a simple wave of the hand creates good feeling. While it is true that the law requires him to turn out, that is no reason for unwillingness to acknowledge the fact that he is obliging us at some inconvenience to himself.

Another factor in bringing us ill-will is the warning signal with which the cars are equipped. This is due to the kind of signal, our manner of using it, or both. In order to demonstrate that the signalling devices possess the property of rousing one's ire, let a car owner select any road much traveled by automobiles and run his car over it for several miles at a low speed. He will find that the metbods used by his brother motorists when they wish to pass him, vary widely.

VARYING MESSAGES OF THE HORNS

Some signal in loud peremptory tones; some will toot the horn a dozen times; some only once or twice. Some will seem to say: "Will you please turn out for me?" Others, "Turn out," while still others seem to say, "Get out." I favor a musical, deep-toned horn and I am sure that a much larger proportion of the public will heed it willingly and promptly than they would the rude demands of some other kinds of signals. Many of us use our horns too much. We could get the same results with greater satisfaction to all concerned, by a little more thought and a little less rapid driving. We should follow the example of the careful expert who uses his horn sparingly. Much tooting is the prerogative of the beginner or the fussy driver.

Have you ever seen a two-ton touring car with six or seven passengers driven by a big muscular chauffeur, bearing down a decrepit old man or woman or a frightened child, tooting his horn like a fiend? What do you think of it?

Some of us also use the muffler cut-out too frequently. It has of course, a legitimate use, but it should be employed only rarely. Many drivers will open the cut-out in preference to opening the throttle, not fully appreciating the fact that it is a device that produces a highly objectionable sound. We should all realize that the cut-out, so used, is a nuisance. In some instances the driver probably thinks it is an evidence of smart driving to cause his car to gain rapid headway by opening the muffler. It is much cleverer to attain the same result by an almost imperceptible touch of the throttle lever or accelerator, unless indeed the car begins to slow up on a hill and the driver wishes to avoid changing gears.

The responsibility of helping to remove the prejudice against automobilists and of doing something definite to render the highways of the country safe and comfortable to all users, is a personal one and should be so considered by each of us.

The application of the Golden Rule in motordom will produce golden results.

PAINTING AND FINISHING THE AUTOMOBILE

By M. C. HILLICK

APART from the propelling mechanism of the automobile and the lines upon which it is built, no feature connected with its appointments contributes more directly to the comfort, pride and happiness of its user than the painting and finishing of the vehicle. While good painting and finishing do not rectify mechanical defects, nor in the least way conceal them, they do relieve angularity of lines and design and very often confer upon an unfortunate sample of designing a distinction to which, apart from the selection of color and the luxury of finish applied, is quite undeserving.

In other words, the painting and finishing of the automobile to-day has resolved itself into one of the most essential and important features of the work involved in the manufacturing and marketing of the horseless carriage and in maintaining its appearance in active service.

In painting and finishing the automobile, there are at least three highly important—well-nigh indispensable—factors to be considered. First, durability; second, choice and distribution of color upon the surface; third, quality of finish.

It is important, admittedly, that the structure of paint and varnish, built up with such an infinite capacity for taking pains, should prove durable. Even the man with wealth to "tear down his barns and build greater," is looking for the paint and varnish for his automobile that will stand out with tenacity in the face of the most rigorous service.

In the matter of appearance, color brilliancy and disposition of color upon the surface with reference to developing all its possible charms, are advantages which even the most calloused user of the automobile will be quick to admit. An individual pride has developed along the line of creature comforts and satisfaction, as a part of automobile experience, that is creating an increased demand for all that is finest and best in color, harmony and contrast.

Apparently, it is a case in the most part, of the owner trying to outdo his neighbor in getting all the color possibilities which the painter is capable of showing and the late New York shows are in evidence to prove that the painter is developing some wonderful color effects.

Without the right quality of finish, however, all these things —quality, color magnificence and striping combinations—must prove only transitory and of small moment. With this clear knowledge of the fact, automobile buyers are daily becoming more critical, more exacting and more insistent in their conclusions as to the character of the finish belonging to the surface of the car.

No more delicate or sensitive medium is employed in connection with the construction and completion of the automobile than the varnish—the protector and beautifier of all the materials entering into what may be termed, the paint structure. That this material should be of rare quality, of a worth beyond the mere measure of dollars and cents, goes without saying. Hence it is not a question of price, but one of quality that must be taken into account in making a final estimate of the elements entering into and making up the finished product, to-day accepted as an example of the painter's art.

Of systems employed in painting and finishing the automobile there are many, although in the opinion of experts, the chief varieties may be counted upon the fingers of one hand. In point of service, as in degree of importance, the oil and lead system, with modifications making it conformable to latter day requirements, is decisively a leader. Since the ancient days, linseed oil in its absolute purity has been considered to be the life of paint, no less than it is the life of varnish. White lead, the pigment with which it serves to furnish a combination of unsurpassed merit in developing a surface upon which to lay the fields of color, is in itself a pigment in density of atoms, in fineness of body and capacity for laying close and firm and surfacing to a satiny finish, that is without a rival.

However, in response to a demand for a surfacing medium quicker in its action, harder and if anything, more economical in its surfacing qualities, there has come into the markets and into large use, patent surfacers worthy of confidence and strictly eligible in every way.

The reader may be assured therefore, that no hard and fast rule exists to govern either the car owner or the painter in making a choice of systems with which to build up the pigment structures. The main thing is to employ materials that are above suspicion and qualified to furnish a service of wear and good looks, satisfactory to all parties concerned.

The automobile with a wood body, for first class work will receive as a rule, at least fourteen coats of material to carry it through to a finish. For a finish of lesser quality, there is a system of correspondingly fewer operations, graduating down to as few as half a dozen coats, for what might be regarded as a "cheap" finish.

There is, of course, a certain class of car and a certain type of man, each of which demands cheapness, and the system referred to is designed to meet such a demand.

Of the metal bodies, aluminum, sheet steel, etc., the painter is having his full share and while the paint structure over such surface is built up from fewer coats than required upon wood, such painting must be most carefully adjusted and balanced out to a nicety and made to fit the negative surface upon which it is applied. There is a lack of receptiveness in metal, either aluminum or steel and a lack of the porous qualities of wood, both of which conditions the painter must study to counteract by special methods of mixing and application in order to realize satisfactory results in his work.

The art of painting and finishing, is one demanding the utmost attention to detail as well as general basic principle. Imperfect work in this respect has a distinct negative effect.

AUTOMOBILING AND BICYCLING COMPARED

That persistent question of whether the automobile industry will be forced to cut down its production like the bicycle makers receives a new and sensible treatment in an editorial in the March issue of *Machinery*.

"A good many manufacturers of machine tools and supplies who are selling from fifty per cent to one hundred per cent of their product to the automobile trade are asking themselves how long the demand will continue, and if it will drop off as suddenly as the bicycle trade did. We think not.

"Bicycle riding was a craze that went through a family like the measles. There were five members of the writer's family and we had five wheels. That was ten years ago, and since then a new generation of children has grown up, but they don't ride wheels. The industry is now reduced to a commercial basis, and not one rider in a hundred uses his wheel for pleasure.

"Bicycling as a fad began to expire when it became commercialized, and all sorts of people took to wheeling. The future of the automobile industry, as we all agree, lies in the adaptation or development of cars to commercial uses—not accomplished yet because manufacturers so far have been unable to supply the demand for pleasure cars, and also doubtless because of the smaller margin of profit between a luxury and a strictly commercial proposition.

"After the existing and projected automobile works are equipped, we shall have some let-up in the demand for machine tools for that purpose, but the skill of our mechanics probably will develop the automobile industry gradually and conservatively until it becomes as safe and permanent as any other."

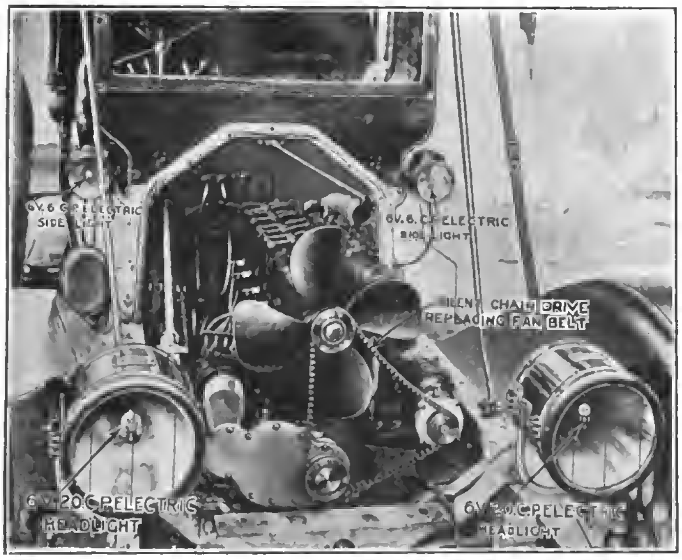


Fig. 1—Dynamo and fan driven by a silent chain taking power from a pinion which extends out on the half-time gear shaft

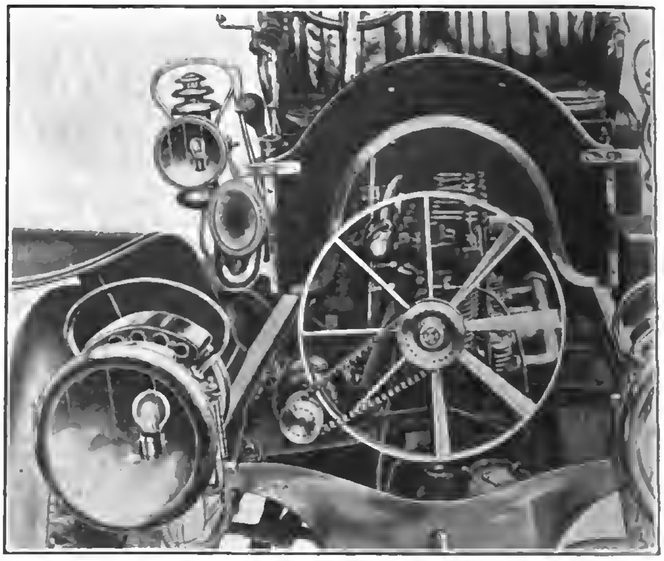


Fig. 2—Lighting dynamo driven by a silent chain taking power from a pinion which is fixed upon the fan spindle

APPLICATION OF THE APPLE ELECTRIC LIGHTING SYSTEM

TUNGSTEN lamps in view of their high watt efficiency, are the means at hand which overcome the formidable difficulties involved in the process of utilizing electric lighting in automobile work. Despite the high economy of the tungsten lamps, it is considered distinctly advantageous to float the battery on an electrical circuit which takes its energy from a charging dynamo. The dynamo is driven by the automobile motor, and is so designed and installed that the variable speed, which is essentially a feature in conjunction with the motor which drives the automobile, is compensated for with a view to delivering a substantially constant voltage of the dynamo, thus rendering it potent, either for charging the battery, or for furnishing the electric energy to the lamps direct, utilizing the battery however, as a form of stability inducer.

In the Apple system, as it is being employed at the present time, a new form of load regulator offers certain specific advantages, which is tersely described by the Apple Electric Company as follows: "As soon as the dynamo generates sufficient voltage, an automatic cut-out connects the dynamo circuit through the voltammeter to a large capacity storage battery which acts as a reservoir to accumulate the surplus current, and it supplies automatically the current for either the ignition or lighting." This arrangement permits of utilizing the energy from the battery when the dynamo is shut down.

The various methods of driving the lighting dynamo are extremely interesting, and the illustrations here afforded offer four methods in vogue, in which Fig. 1 shows the dynamo resting on an arm of the motor, and the driving chain of the silent type, meshes with a driving pinion, which is on a stub spindle, projecting out from the half-time gearcase.

In Fig. 2 it is shown that the dynamo is driven from a chain pinion which is fastened onto the fan spindle. The fan in this case takes its power from a separate source.

Fig. 3 shows the lighting dynamo driven by a silent chain, which engages a chain pinion fastened onto the shaft, which is placed to drive the magneto.

Fig. 4 shows another and very excellent variation. The lighting dynamo is driven by a silent chain, and the driving chain pinion is on the crankshaft extension which leads out to the starting crank.

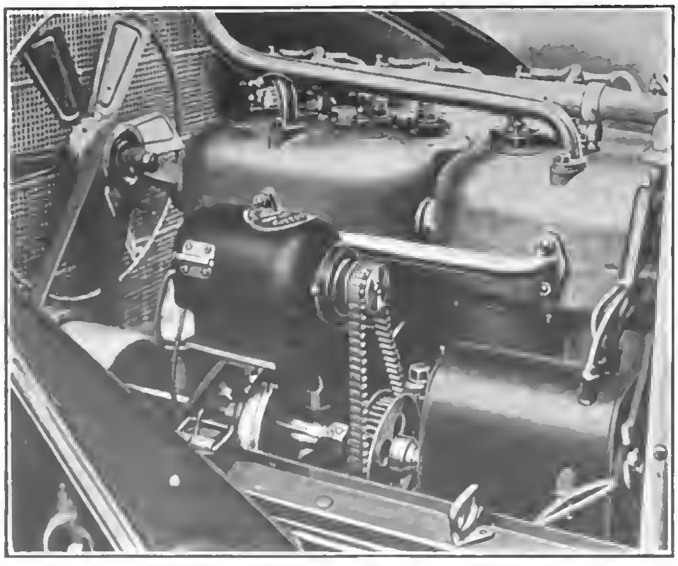
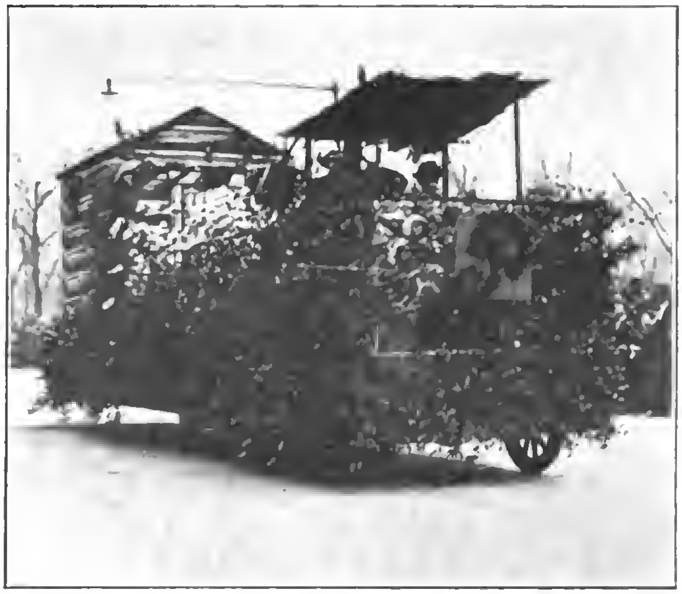


Fig. 3—Lighting dynamo driven by a silent chain taking power from a pinion which is fastened to the shaft which drives the magneto


Fig. 4—Lighting dynamo driven by a silent chain which in turn engages a pinion taking power from the crankshaft direct

First Prize Car, a Chalmers Entered by Louis G. Deschler



One Premier Entry as It Appeared in the Floral Parade

HOOSIER OPENING WEEK EXCELS ITS RECORD

INDIANAPOLIS, Apr. 2—Surpassing its former efforts in the line of making its annual motor car opening week an event of importance, the Indianapolis Automobile Trade Association eclipsed its record this week. The floral parade which took place last Wednesday was one of the most striking features of the opening and the artistically decorated cars showed to great advantage.

The Packard truck and the Premier exhibits were unusual in their finery. The truck was arranged like a white battleship, armed with American Beauty roses and carrying a full brass band. The Premier car was the groundwork of a plantation scene. The Hupmobile represented a locomotive.

Each year it has been the custom for local members of the motor car trade to set aside a week for a formal opening, each concern exhibiting in its own salesroom or factory, but participating in various public events. These individual exhibitions are necessary by reason of the fact that there is no building large enough to accommodate such a combined exhibition as there would be, if all should decide to show together.

The extent of the local industry may be seen readily from the fact that more than 90 concerns are identified with the trade. There are 45 agencies representing 80 different makes of cars. There are also an even dozen factories for the manufacture of cars, and numerous concerns for the manufacture of parts and accessories, besides branch tire houses, etc.

Each year the practice of awaiting opening week before purchasing is growing in popularity and as a result the public interest in the event this year was greater than ever before. It has been estimated that 200 cars were sold.

Monday and Tuesday were devoted exclusively to the display of cars in the respective salesrooms and factories.

There were a number of gymkhana contests at the Indianapolis Motor Speedway Thursday afternoon, the speedway management having donated the grounds and no admission fee was charged. Contests were limited to stock gasoline cars with full catalog equipment. The event was in six sections.

Another event of considerable interest and importance was the review, or parade of 1910 models.

The opening concluded Saturday evening with a banquet at the Denison Hotel.

Packard, Prize Winner, Entered by Willies Holcomb Company

L. G. Deschler's Rapid Delivery Wagon in the Flower Event

Pittsburgh Show Proves An Eye-Opener

PITTSBURGH, Mar. 26—The fourth annual Pittsburgh automobile show opened in the spacious Duquesne Garden to-night. More than 4,500 persons viewed the $1,000,000 display. It was in sharp contrast to the scattering exhibitors who "made" the first show four years ago.

Instead of a "baker's dozen" cars on exhibit there were actually 125 models shown on the floor of Duquesne Garden, varying in cost from $450 to $7,000 and in size from the 10-horsepower runabout to the magnificent 70-horsepower touring car. Where four years ago there was not a truck shown, to-night the enterprising merchant and manufacturer had the pleasure of viewing 11 different types of commercial delivery wagons, which are fast revolutionizing the transportation methods in this hilly city. Fifty firms were on the floor with splendid exhibits of accessories, where at the first show hardly a booth was devoted to this purpose. Progress in automobiledom was evident.

Quite as striking was the wonderful advancement made in the show settings. This year the committee, composed of F. D. Saupp, chairman, G. P. Moore, James R. Newell and W. N. Murray, was diligent to make the 1910 exhibit far ahead of any other automobile show ever held in the Keystone State. Profiting by past experience they first arranged for the making over of certain parts of Duquesne Garden so as to afford more space for exhibits. As a result 40 more booths were provided than last year and even with this number nearly 60 prospective exhibitors were refused space this week. Money and pains without stint were spent on the decorations of the big Garden. Thousands of yards of gold, canary and white draperies and hundreds of bay trees and palms and monster hanging baskets of flowers gave the place a splendid Eastern appearance. High above the multitude that promenaded between the lines of costly machines hung the famous Curtiss aeroplane. In front of every exhibit hung an art glass, bronze electric light dome, suspended by massive wrought-iron chains and having emblazoned on it the name of the exhibitor.

The 1910 committee has acquitted itself most creditably in another particular. This show has been advertised. Instead of a few scattering meager notices which were easily overlooked by readers of daily papers, a campaign of publicity has been successfully waged for a month. News features were devised which made advance notices attractive reading. Every paper in Western Pennsylvania was asked to help along in the work of bringing to the notice of the general public the tremendous growth of automobile-sentiment west of the Alleghanies. As a direct result many exhibitors from the big and wealthy country towns applied for space. Dozens of dealers from these places were present the opening night and assurances received from them show that during the coming week thousands of half dollars will be turned into the show till, by automobile owners and prospective buyers who are eager to grasp this chance to inspect at a small outlay of time and money the great variety of 1911 models shown, for the majority of the cars on exhibit are next year's types.

The Standard Automobile Company had on exhibit a car, the usual brass parts of which were gold plated, giving the visitor a glimpse of dazzling automobile beauty. Racing cars were frequent in the exhibit and the latest wonders of mechanism stood alongside battle-scarred veterans which boasted of many a hard victory on the race track.

Away above all other features in the way of comparison is the exhibit of trucks at this show. The motor truck until last year never found a place at Duquesne Garden. The 1909 show boasted of two or three exhibits, which were well received, but were not strong enough to force any large measure of attention from the crowds. This year it is different. A variety of trucks is shown which rivals the exhibit of cars although the number is of course smaller. The entire front of the big hall is taken up with these exhibits, which include 11 different models.

The largest exhibit is that of the H. Lange Wagon Company, of Pittsburgh, which has the following trucks, all the property of well-known firms of Greater Pittsburgh, on show: Thirty-five-horsepower two-ton truck, $2,750, used by E. M. Diebold Lumber Company; 60-horsepower four-ton truck, $4,500, used by W. A. Hoeveler Storage Company; 45-horsepower four-ton truck, $4,500, used by Ohio & Pittsburgh Milk Company; 50-horsepower three-ton truck, $3,700, used by Edward E. Rieck Company; 35-horsepower 1,500-pound truck, $2,200, used by Edward E. Rieck Company; 30-horsepower one-ton truck, $2,100, used by Charles

Montreal Coliseum during the Recent Show, with Four Prominent American Makes Represented in the Foreground

P. Mungle & Sons; 30-horsepower, one-ton truck, $2,200, used by Wenzel, the caterer, of Braddock.

On the other side of the front entrance the Standard Auto Company shows the big Packard truck now in use by the wholesale firm of Arbuckle & Company. It is a 24-horsepower three-ton truck with a bed especially built for the Arbuckles by A. McClinton, of Pittsburgh. The Packards put their first truck into use in Pittsburgh last March. Now they have 11 in use here and are building four more to contract.

Adjoining the Packard display are two types of the White truck, the agency for which has just been established here. They are a $3,000, ton and a half, gasoline truck, which may be fitted with a wide range of styles of body and their three-ton gasoline truck with standard platfrom body, selling for $3,850. At the other end of the hall near the orchestra, the Overland 25-horsepower truck, seating two and selling for $1,100, is shown by the Keystone Automobile Company, of Pittsburgh.

Increasing interest in automobile matters is shown not only in the attendance at the show but also in the number of agencies which have been placed within the past week and most of which were making their initial bow to the Pittsburgh public to-night. Some of the most important of these are the following: Reliance truck, which will be handled by a new company composed of H. C. McMasters and P. K. Soffel, of the Wabash-Pittsburgh Terminal Railroad Company, and others; the Overland truck, with the Keystone Automobile Company; the White Company's truck agency; the new Whiting-Pittsburgh agency; the Abbott-Detroit, which will be handled by the Forbes Motor Car Company; the Sebring-Pittsburgh agency; the Krit car, to be sold by the Forbes Motor Car Company, and the Hygay electric outfit.

Following is the list of cars exhibited:

Abbott-Detroit, Atlas, Autocar, Baker Electric, Brush, Buick, Chalmers, Columbia, Corbin, Courier, Croxton-Keeton, Elmore, E-M-F, Flanders, Ford, Franklin, Hudson, Hupmobile, Enger, Inter-State, Jackson, Kline, Knox, Krit, Locomobile, Marmon, Maxwell, Mitchell, National, Otto, Overland, Parry, Paterson, Packard, Peerless, Pierce-Arrow, Pittsburgh Six, Pope-Hartford, Premier, Pullman, Rambler, Rauch & Lang Electric, Regal, Reo, Sebring Six, Speedwell, Stearns, Stevens-Duryea, Studebaker, Studebaker Electric, Thomas Flyer, Waverley Electric, White, White Steamer, Whiting, Winton and Woods Electric.

List of accessory exhibitors: Ætna Insurance Company, Airtight Steel Tank Company, Atlantic Refining Company, Automobile Accessories Company, Banker Wind Shield Company, Brictson Manufacturing Company, Buick Motor Company, Pittsburgh Branch; Cleveland Chain and Manufacturing Company, Doubleday-Hill Electric Company, Ernst Flentje, Gasoline Motor Efficiency Company, James L. Gibney & Brother, L. Giesenkamp, Sons & Company, Hydraulic Oil Storage Company, Greater Pittsburg Auto School, Kent-Bell Company, Kerr-Griffin Vulcanizing Company, Kilgore Manufacturing Company, Motor, Miller Rubber Company, Mutual Manufacturing Company, Petroleum Products Company, Pittsburgh Auto Tire and Equipment Company, Pittsburgh Rubber Company, Reinforced Brazing and Machine Company, Rogers Printz & Company, J. A. Salman, Standard Auto Company, Star Rubber Company, E. J. Thompson Company, Westinghouse Electric and Manufacturing Company, Joseph Woodwell Company, Wright Wrench Company and N. H. Wishart.

List of truck exhibitors: H. Lange Wagon Company, Standard Auto Company (Packard truck), White Company (Pittsburg agency), and the Keystone Automobile Company (Overland truck).

Canadian National Show Held in Montreal

MONTREAL, Apr. 2—The Automobile and Boat Show of the Automobile Club of Canada closed to-night after a week during which former attendance records received a severe shock. No attempt has been made to give the Coliseum the appearance of an apple orchard or rose garden; the decorations were simple and businesslike. Draped bunting concealed the roof beams and was festooned along the sides of the hall, and three rows of signs of the severest uniformity traversed its length.

The exhibits were more international in character than usually seen. Of course American makers were in the majority, both those imported from across the line and those made in Canadian factories to escape the duty. Among the latter the McLaughlin-Buick and the Canadian Regal were prominent. Packard, Knox, Franklin, Maxwell, Oldsmobile, Simplex, National and Hupmobile all were extensively represented by their agents.

The native Canadian industry was represented by the Russell and the Comet, both cars of creditable workmanship, and following European lines to a considerable extent in their design. Charron and Renault represented the French industry, and several English makers turned out to seek the colonial trade. Along the sides of the hall, where the accessory dealers exhibited their wares, one might have thought himself in the New York or Chicago shows, so completely had the American makers monopolized the spaces. The show is regarded as a complete success from the financial and commercial points of view, and the show committee and E. M. Wilcox, the energetic manager, are receiving many congratulations.

Another View of the Montreal Show; Renault, Packard, the Canadian Buick, and Russell, a Home Product, Appear

SHARP FIGHT ON AUTOMOBILE CLUB OF FRANCE

By W. F. BRADLEY

PARIS, Mar. 28—After having had undisputed control of the automobile industry of France and also possessing a powerful influence over the national clubs of Europe, the Automobile Club of France has now to fight for its existence. For eleven consecutive years it has organized the brilliant exhibitions in the Grand Palais, looked upon by other nations with respectful awe; it has had complete control of the racing situation, has decided under what conditions races should be held, and merely by its decree has brought all racing to a stop throughout Europe. In France it was impossible for any move to be made or any scheme of importance to be put on foot without the approval of the Automobile Club.

Now its authority is being disputed everywhere, and curiously, the manufacturers who formed its committees and are still among its members, are the most active in fighting the oldest established automobile organization in the world. After a very severe fight the club has had to abandon the annual show held in the Grand Palais to a joint committee of manufacturers. The club announced an exhibition as usual, but the makers banded themselves together and refused to take part in any exhibition other than one held entirely under their own management. After a long fight the club has to agree to withdraw with the meagre satisfaction of patronizing the makers' show and appointing the honorary president. It will have nothing to do with the management and will have no share whatever in the profits of the undertaking.

The Automobile Club of France is now being attacked by the aeronautical manufacturers, who accuse it of a policy of grabbing after aeronautical control. In a letter just sent by Robert Esnault-Pelterie, president of the Aeronautical Manufacturers' Association, an ultimatum is presented to the club to cease to occupy itself in any way whatever with aerial navigation. In very vigorous language Esnault-Pelterie declares that the Automobile Club of France added an aero section to its Salon in 1908 merely to get control of the field, that in 1909 it did its best to oust the aeronautical manufacturers, and that this year it has just been baffled in an attempt to run an aeronautical show.

Before the Automobile Club was defeated in its recent fight with the manufacturers, the latter had entered into an agreement with the aeronautical men to join them in a joint aero-automobile show in the Grand Palais, as a rival to the one promised by the club. The club having withdrawn its show, and given its patronage to the constructors' exhibition, these latter asked to be freed from their contract with the aero men. Esnault-Pelterie replied that he was quite willing to set them free from their contract, but only on condition that the Automobile Club of France should cease to have any further connection with the aeronautical industry. "You are an automobile club; stick to your automobiles," he declares, "and leave us, who know something about flying machines, for we risked our lives in them while you sneered at us, to develop aerial navigation according to our own views."

An immediate reply has been asked for, but up to the present the club has not taken any official notice of the letter.

AERO ACTIVITIES INCREASING IN GERMANY

BERLIN, March 28—In response to a general demand, the German Wright Company has begun to fit wheels to its aeroplanes, as it is far easier for a novice to learn on an apparatus with wheels than without. The principal drawback of the earlier method was the necessity of taking the first flights with an instructor, and as the number of experienced teachers is very small compared with that of the pupils, many of the latter were forced to wait an undue time for their turns.

German aeronautics have suffered a great loss in the death of Lieutenant-Colonel Moedebeck, who on retiring from the army nearly fifteen years ago started the first aeronautic magazine in Germany, which he edited to the time of his death. He was the writer of various valuable handbooks and treatises, and it is largely due to his unflagging activity that aeronautics of all kinds have spread so generally throughout Germany. Colonel Moedebeck was a member of several international commissions.

Two resolutions have been unanimously accepted in the German parliament concerning the erection of an Imperial Institute for Aeronautics and Aero Technic at Friedrichshafen. Although this city is the scene of the Zeppelin activities, the institute will naturally be open to all makes and types of aeronautic apparatus. An imperial commission is to be called by the Government to debate on ways and means. Count Zeppelin has declined the presidency owing to pressure of business.

FARMAN PUPILS OUTSTRIP THEIR MASTER

RHEIMS, FRANCE, Mar. 28—Van den Born, formerly racing cyclist, later aviation pupil, now instructor at the Farman school, has surprised his master by making a cross-country flight from Mourmelon to Rheims and return, a total distance of nearly 40 miles. The outward trip passed without incident, and when the suburbs of the champagne city were reached the military quarters were selected as the most suitable place for a descent. After lunch the return journey was commenced, but it was not long before the pilot discovered he had hopelessly lost his bearings. A landing had to be made near a village which proved to be the name of Prosnes; villagers assisted in the unusual task of starting the Gnome motor, and with directions as to his route a safe return was made to the aviation ground.

Georges Chavez, another Farman pupil, with only six lessons to his credit, has succeeded in creating a record of 1,670 feet in height over the Mourmelon aerodrome. The height was recorded by a registering barometer. Chavez, who is a young athlete of Peruvian origin, declares that he will go after the records for altitude now held by Paulhan and Latham. He has already made a cross-country flight of 1 hour 47 minutes in duration.

ROUGIER'S FLIGHTS STARTLE RIVIERA

Monaco, Mar. 28—Henri Rougier, one of the most brilliant of automobile race drivers of the Gordon Bennett and Grand Prix period has startled the Riviera by flights over the Mediterranean and the mountainous coast of Monaco, Monte Carlo and district. A year ago valuable prizes were offered to the aviators who would fly across Monaco Bay and return, a distance of less than five miles. Although about 30 entries were received not a single machine ventured forth, owing to the exceptional difficulty of making a start and coming back to earth. Monaco nestles on the edge of the Mediterranean at the base of a cliff rising almost vertically to a height of 3,000 feet; Monte Carlo adjoining it, rises tier upon tier on a picturesque mountain side. In the whole district there is not an acre of level ground, and the only level street is the *quai* about 300 yards in length, with the castle promontory rising up perpendicularly on one side and a well filled harbor on the other. It is necessary to make a start on this, with the certainty that if the machine runs to the left it will drop into the harbor, if it deviates to the right it will smash itself to pieces against the granite walls of the castle, and if it does not rise rapidly it will collide with the sea wall forming a barrier across the end of the jetty.

Rougier believed that with his Voisin biplane and Gnome motor he could rise from this ledge and fly over this mountainous coast. He proved it. His machine was brought from Heliopolis, where strong winds had made flights over the desert a difficult matter. It was erected, the motor tested, and there being no place available for a trial flight, sent away for a trip across the sea. After a run of less than 200 yards the machine was in the air, had cleared the sea wall 30 feet high with a safe margin, and was directly over the Mediterannean at a height of 300 feet. In a few minutes he had reached Cape Martin, on the opposite side of the bay, rounded it, returned and flown over the town of Monte Carlo, steered out to sea, described a curve in order to get in line with the jetty, and descended on the ledge at the door of his shed with remarkable ease. On the two following days a strong wind prevailed, making flights impossible. During this interval, and while testing the motor, the mechanic lost the tips of two fingers, chopped off by the whirling blades of the propeller. On three successive days flights were made across the bay under practically the same conditions as on the first occasion.

Then Rougier prepared for a more sensational exploit. He got away from the *quai* side, flew over the bay in an easterly direction and began describing wide circles until he had attained a height of almost 3000 feet. He was then but a speck against the bold outline of the mountain range and from below appeared to be almost level with the top of Mount Agel, 4,000 feet above sea. Following the range of hills dominating the bay he continued eastward, passing over the Turbie, up which he had many a time raced in hill-climbing competitions, then reached the French fort on the top of the Tête de Chien, a mass of rock rising almost vertically from the sea to a height of 2000 feet. By the aid of field glasses it was possible to see the soldiers standing on the fort waving their hats to the aeronaut passing over their heads. By reason of the wild nature of the country it is a matter of two hours to travel by automobile from Monaco to the fort, only 2,000 feet away; by horses the journey occupying four or five hours. Rougier, on his Voisin biplane, flew over the fort within twenty minutes.

The descent was a matter of a few minutes. the aeroplane sweeping down over the town, passing out to sea again, flying over the Prince of Monaco's palace as it did so, then coming inwards in a line with the jetty. On the next occasion a trip was made along the coast in the direction of Italy, the aeroplane flying over the sea until the port of Mentone was reached. This was rounded, the return trip commenced and when near Monte Carlo the aeroplane swept to the right to pass directly over the casino and gardens. While in this position the motor was stopped for a few seconds, to the consternation of the spectators, who believed that a serious accident had happened. But the current was switched on again before the aeroplane had dropped far, and five minutes later Rougier had landed with the remark that he had just been taking a little trip for the sake of his health. These flights are regarded as the more remarkable for the reason that the Voisin biplane has neither *ailerons* or plane-warping to secure stability, and has always been considered a fair-weather machine.

LENGTHENS LIFE OF OLD TIRE COVERS

Paris, Mar. 28.—Since the day when the Davies Brothers put the Stepney emergency wheel on the English market there have been numerous copyists in various parts of the world. Most of these have merely sought to produce a spokeless wheel which, as in the case of the Stepney, would allow the car to be run home without work on the tires, after a puncture. The Houdaille, just produced by a French firm, claims to have a wider field of usefulness, for as it is secured to the outside of the rim, and not hooked to the inside, it can be attached whether an inflated or a deflated tire is in position. This allows it to be used temporarily where a non-skid is required on a car, the four wheels of which are shod with smooth tires.

It allows of twin tires for the rear, when a temporary. heavy load, has to be carried, and it further allows old covers to be used up in pairs for town work, which would certainly burst if run singly over country roads. The makers attach considerable importance to the device as a commercial accessory, for on delivery vans it frequently happens that a car has to be overloaded in a manner that is apt to be injurious to its tires. If the Houdaille wheel is added with the extra load, the weight is carried better and the covers do not suffer.

As in all other devices of this nature, the Houdaille consists of a steel rim, without spokes, on which a fully inflated tire is mounted ready for use in case of emergency. Its individuality lies in the method of attachment. There are no permanent lugs to the rim, with jaws for clamping to the road wheel, but in its place a steel tube triangle, at each angle of which is a forged steel wedge of special shape. Two of the wedges are pivoted to the angle of the triangle, while the third is secured by a strong bolt screwing through the body of the frame, and entering into the wedge.

The shape adopted for the wedges is such that one half presses against the inner face of the movable rim, and the opposite half against the corresponding portion of the fixed steel rim.

It is shaped in such a way that it enters between the spokes of the wheel and surrounds the wooden felloe. When in position and screwed up by means of an ordinary spanner, pressure is applied to the two rims at three different points on their circumference. A couple of studs project from the face of the spokeless rim and thus act as an additional guard against the wedges slipping.

In reality the rim becomes a wheel with three spokes, and is almost as solid in construction as one of the car wheels. When once the pressure has been applied it is impossible for the wheel to slip unless the pressure is relaxed, and this is prevented by a suitably shaped plate fitting over the head of the bolt, secured there by two springs, and further held by a thumbscrew. When not in use, the spare wheel can be attached to a special triangular carrier designed for that purpose and secured to the side of the car, or the triangular attachment may be dismounted, and the whole carried in the same way as a dismountable rim.

New Idea in Carbon Removal

Editor THE AUTOMOBILE:

[2,214]—In the February issue of "Motor," under the title of "An Original Carbon Remover," appears an article by A. D. Hard, in which he advises the placing of a small steel ball, about 3/16 inch in diameter, in the cylinder above the piston. He claimed that the bombarding action of this ball would serve continuously and effectively to keep the combustion chamber, the end of the piston, and the exposed surface of the valves completely free from carbon deposits without any further attention. This appeals to me a very simple remedy for the carbon trouble, if no damaging results could come of the loose ball in the combustion chamber. I am the owner of a Maxwell Model E touring car, and would like to give this method a try, if in so doing I would run no risk of damaging the engine. Would you kindly advise me through the columns of "Letters Interesting Answered and Discussed" of your paper? A. R. L.

Bay City, Texas.

Best of all ways to solve this is the method of trying it. There is something in what the writer says about the action of the gases and the position of the ball at the time of valve opening which tend to keep the ball in. The only danger you would be exposed to would be the destruction of your valves through the ball getting to the seats and sticking there. It may be that this cannot happen, as the writer of the article in question says. On the other hand, this would be noisy in a multi-cylinder engine.

Proper and Improper Tire Pressures

Editor THE AUTOMOBILE:

[2,215]—Since January 1st, when I became a subscriber to "The Automobile," you have several times spoken of the advisability of keeping tires pumped up hard, that is, to a uniform and proper pressure, but I have never seen an article which gave the specific tire pressures for different tires, under maximum loads. My car is a Ford Model T, with tires 30 by 3 on front wheels and 30 by 3½ on the rear. The maximum load carried on the tires is about 2,050 pounds. Please let me know through your column of "Letters Interesting Answered and Discussed" the proper pressure for these tires: also, if an extra weight of 150 pounds could be carried without overloading tires as small as these. CHAS. B. FOSTER.

Water Mill, N. Y.

Tables of tire pressures have frequently been published, but the pressure and carrying capacity of this sized tire will be given again. Thus, one maker recommends for 30 by 3 tire 65 pounds pressure and give it 350 pounds carrying capacity. For 3 1-2-inch tires the pressure figure is raised to 80 pounds, while the carrying capacity rises to 450 pounds. This would make the whole carrying capacity of your four tires amount to two times 350 plus two times 450 or 700 plus 900, a total of 1,600, which would then allow you much more than 150 pounds overload.

Wants Address of Runabout Maker

Editor THE AUTOMOBILE:

[2,216]—Will you please inform me through "Letters Interesting Answered and Discussed" where I can secure a complete description of the "Billy Four," or give me the address of the maker or of some agency from which I could get the information?

Lyons, O. F. H. CARPENTER.

The "Billy Four" is made in Atlanta, Ga., and is sold by the American Sales Company, of the same city. You will find a description of it, in tabular form, in the tables of specifications in THE AUTOMOBILE issue of February 3.

Getting Into the Automobile Business

Editor THE AUTOMOBILE:

[2,217]—Will you kindly give me some advice through "Letters Interesting Answered and Discussed"? I have made a careful study of the automobile and am familiar with every bolt or piece of mechanism in one. I am eighteen years old and have a good education; have had some experience at driving and some at repairing and am prepared to do anything of the kind. What would you advise me to do in order to obtain a permanent foothold in the automobile world? READER.

Hudson, Mich.

The automobile industry is large enough for a man to make a success in it in a number of different ways, each requiring talents of a different sort. What you should do to gain a foothold naturally depends on which of these lines you wish to enter. Do you wish to be a designer, a factory manager or superintendent, or a salesman?

For the automobile designer a college education, leading to a degree of M. E., may be regarded as essential. Although automobile design in the past has been largely a matter of rule of thumb, it is rapidly becoming more scientific, and the man who wishes to make a success at it should have the best possible engineering training. Another way of beginning, which would more naturally lead to the position of factory superintendent, would be to start at the bottom as an apprentice or helper in some automobile factory.

The natural way to become a salesman is to sell cars, by securing a position in that capacity with an agency or selling branch. Starting with a position in a small agency, a man of the requisite ability would soon rise to positions in larger cities, in branches controlled directly by the manufacturing company, and from there would graduate into the organization of the company itself.

Presidents of companies come both from the manufacturing and from the selling ends of the business. Sooner or later, the man who possesses the executive ability to handle a large business will get an opportunity to show it, and recognition will follow, whether he be a designer, or a salesman. If he should have the training of both, so much the better.

Formula for Heat-Resisting Paint

Editor THE AUTOMOBILE:

[2,218]—Will you kindly give me through "The Automobile" a formula for a fireproof paint that will resist the heat on the exhaust manifold of my engine? H. L. LANG.

Staunton, Va.

Although there are many formulas which could be used for the purpose, all require a disproportionate outlay for the ingredients, besides the trouble of mixing. The most satisfactory paint for such purposes, all things considered, is ordinary stove polish, such as can be purchased at any hardware store, or can probably be found in your kitchen closet. If the exhaust manifold is badly rusted, the rust should be cleaned off with a stiff-wire brush, or by scraping with the back of an old knife. The polish will also be found to improve the appearance of the whole cylinder castings.

Relation of Power to Speed

Editor THE AUTOMOBILE:

[2,219]—To settle a dispute, will you please state, in "Letters Interesting Answered and Discussed," if an ordinary gasoline motor develops its maximum power at its maximum number of r.p.m., or when running at a lesser speed. H. STEINER.

New Haven, Conn.

The exact answer to this question depends entirely upon the torque curve of the engine, and this curve varies with each and every different engine, so that it would be necessary to have a large number of them in front of one, before even an average answer could be given. Speaking very generally, the maximum power does coincide somewhat closely with maximum speed although there are numerous instances to the contrary.

Estimated 1910 Car Production

Editor THE AUTOMOBILE:

[2,220]—Will you please tell me the six greatest manufacturers of automobiles in the United States, and the production of each per annum? What is the best automobile on the market.

Cleveland. ERNEST VOLGER.

If you have reference to quantity, approximate figures on the 1910 production of some of the largest American producers are as follows:

Ford, 20,000; Buick, 20,000; E-M-F, 18,000; Willys-Overland, 15,000; Maxwell-Briscoe, 22,000; Reo, 12,000; Cadillac, 8,000; Jackson, 6,000, and Mitchell, 6,000.

The above figures are of course approximate, for it is impossible to obtain a correct and exact estimate of the number, as the manufacturers themselves seldom know to within a hundred or so of the number of cars which they will produce.

As to the best car, that depends entirely upon the price, and even knowing the specific price you wished to pay, it would be a very hard matter to determine. Picking the best car is like selecting the best location for a house, or the best kind of a house to put on the location, when the latter is selected, or many other things in which personal prejudice may enter. In short, it is only a relative matter, what would seem best, at any one price and in any one class, would probably not suit your neighbor at all.

Remedy for Trouble with Soot.

Editor THE AUTOMOBILE:

[2,221]—In referring to the December issue of "The Automobile," page 1049, in which F. N. P. is having trouble from soot in his two middle cylinders, I wish to suggest that he is likely using a single carbureter for the four cylinders. The two middle cylinders being nearer to the carbureter than the end ones would get a higher mixture, thus causing carbon deposits. Would suggest using two carbureters. W. H. HARRIS.

Morris, N. Y.

The cure is worse than the disease, that is, there would be more trouble experienced with the adjustment and use of two carbureters than is the case at present. If the above is the true source of trouble, a better and cheaper way would be to design and have cast and machined a new inlet manifold which would not have a differing distance from the carbureter in the four cylinders. For this purpose, the loop shape is much favored, and is being slowly used more and more.

On six-cylinder engines, in particular, the matter of proper charge distribution has been investigated with great thoroughness, makers going so far as to construct and try out all possible shapes which could have a good influence. Some of these had no direct result, while others showed merit by an increase in the amount of power developed, in speed, and otherwise.

Basic Carbureter Patent

Editor THE AUTOMOBILE:

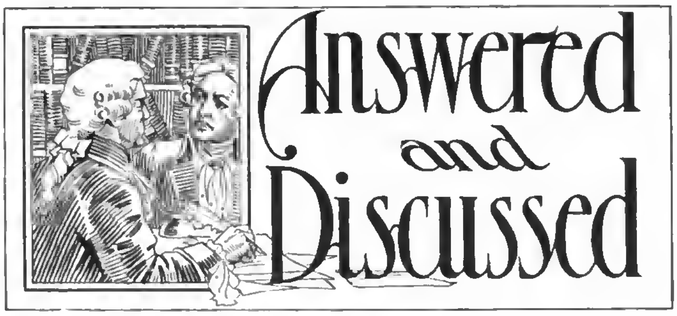
[2,222]—I would like to know if there is a patent still in force which controls in any way the using of floats in carbureters? Would also like to know the name of some firm manufacturing floats. Please answer in your Questions column. R. S. HILL.

Des Moines, Ia.

No, there is no basic patent now in force on the use of a float in a carbureter. This may be reasoned out by inference, from the fact that all carbureters have floats, while nearly all companies making them are competing with one another. Obviously this could not be the case if one held a basic patent on the use of a float.

To secure a basic patent, it is necessary for one to have either a new and decidedly different idea, or else, a new and decidedly different combination of old ideas. Since the first carbureter, that of Maybach in 1884, had a float, it was impossible for anyone to patent its use after that time.

You may obtain cork floats from the Armstrong Cork Company, Pittsburgh, Pa., while nearly any tin shop will make copper floats for you.



Flywheels and Gyroscopic Force

Editor THE AUTOMOBILE:

[2,223]—I will be greatly obliged if you will answer the following questions in "Letters Interesting and Instructive":

1. Would it be possible to run a 60-pound vanadium steel wheel 22 inches in diameter (weight concentrated at the rim as far as possible) between 4,000 and 5,000 r.p.m.? Would it be safe?

In your issue of January 20, 1910, you state that the safe rotative speed is $\frac{6{,}000}{\text{circumference of flywheel in ft.}}$ for cast-iron. My reason for writing is that I have been unable to find out the relative strengths of cast-iron and cast-vanadium steel.

2. If the above wheel is running in a vertical position how much pressure (in pounds) would have to be applied at the end of a lever 15 feet long to move it towards the horizontal plane? If there is a formula for this please state it.

New York City CHARLES E. JONES.

The strain on a flywheel rim due to centrifugal force is expressed by the formula $S = .00005427WRN^2$, in which S is the strain in pounds, W the weight of the wheel in pounds, R the mean radius of the wheel in feet and N the number of revolutions per minute. The formula you quote is derived from this by finding the strain per square inch of sectional area of a cast-iron wheel, which would be $S_1 = .000027V^2$, in which V is the velocity of the rim in feet per minute; it has been found that a tensile strength of 10,000 pounds is all that can be reasonably assumed, and taking a factor of safety of 10, $1{,}000 = .000027V^2$, whence $V^2 = 1{,}000 \div .000027$, and $V = 6{,}085$.

Taking into account the greater weight of steel, the strain per square inch of a steel wheel would be $S_1 = .000029V^2$. The determining quantity is then the tensile strength of the steel which you wish to use, divided by a reasonable factor of safety. Your 22-inch wheel turning at 5,000 revolutions would have a peripheral velocity of 28,800 feet per minute, which by the formula above would give a strain per square inch of 24,000 pounds. Whether this would be safe or not depends of course on the steel. "Vanadium steel" is a rather indefinite term, as vanadium is frequently used in combination with either chromium or nickel, or with both, resulting in considerable differences in the properties. However, you should be able to get a tensile strength of 100,000 pounds.

Your second question is not clear. A gyroscope, for as such you evidently wish to consider the flywheel, tends to keep its axis paralled to its original position; it offers no opposition to any movement which would not have the effect of changing the line of the axis. Thus, when a gyroscope is rigidly fixed in a car or boat with its axis vertical, it resists any swaying movement, but not forward or backward or up and down movement.

Editorial Note.—Many letters intended for use in these columns are received without a signature or anything to show by whom they were written. In the future, such letters will not be answered unless accompanied by the true name of the writer. If desired, this name will not be published, and a nom de plume will be used. Nor can the letters be used in the immediately following issue, for the supply on hand at all times is such as to preclude the possibility of this, unless some were used out of the order in which they were received. Obviously this would not be fair to all those concerned.

Concerning Pending Federal Legislation

By XENOPHON P. HUDDY, LL.B.

A BILL has been introduced in Congress by one of the prominent automobile organizations providing for a Federal automobile license, such as is indicated above, and this bill proceeds on the theory that interstate travel for pleasure by means of an automobile constitutes interstate commerce. Another automobile association has also introduced a Federal bill which does not include the traveler for pleasure. Since most of the interstate automobile travel is for pleasure it would be practically useless to have a Federal law if this class of travel is not taken care of. How can this be done?

Of course, if Congress is to enact legislation of this character the power to do so must be clear, since our national legislative body will not enter upon the business of passing statutes of doubtful validity. It is claimed that since interstate automobile travel for pleasure constitutes interstate commerce, the power of Congress undoubtedly exists. It is agreed that the Supreme Court of the United States has practically established the law to the effect that interstate transit or intercourse or communication comes within the constitutional provision granting to the Federal Government exclusive power over interstate commerce. It is conceded that the telegraph, the telephone, the steamboat, the railroad train and other instrumentalities of communication between the States have been held to constitute means by which interstate commerce is carried on. It has also been decided that persons walking to and from their homes and places of business morning and night over a bridge spanning a river separating two States are engaged in interstate commerce. It is obvious, however, that in all the decisions of the Supreme Court of the United States, the facts in each case had something to do with business or showed something done in pursuance of the execution of something pertaining to commercial activity. Our highest judical tribunal of the land has not gone so far as to say that a mere stroll or ramble across the boundary line of a State constitutes interstate commerce. Moreover, this never will be the law any more so than insurance is interstate commerce. This latter proposition the Supreme Court has decided. So it will be seen that to frame a Federal automobile license law on the theory that interstate touring constitutes interstate commerce is radically a wrong foundation to base such a proposed enactment on. There is another method, however, by which the same end may be gained.

It is conceded that Congress has jurisdiction over the actual interstate commerce carried on over the highways and roads leading from one State into another. That there actually exists such commerce must also be conceded. Trucking is constantly carried on over interstate highways. Stage coaches are being run. Express companies operate their vehicles. Mail wagons carry the mail. Delivery wagons from stores deliver packages. Electric trolley cars carry passengers and freight on many roads which run from one State to another.

It may be asked whether the interstate commerce which concededly is to be found on the ordinary land highways of travel running from one State to another may be protected by the United States Government. Most certainly it can be. Any interstate or foreign commerce, not only may be protected by Congress, but it may be controlled. We need not dig into the law reports to support by authority this proposition. Admitting that we have established the existence of interstate commerce on the public highways and the proposition that Congress may protect it, we will now develop our argument and ascertain further what might be done by Congress in surrounding this commerce with protection. I may add that the mere fact that interstate commerce may be found, or perhaps I would put it a little stronger, might reasonably and probably be found on any interstate way, would give Congress the power to legislate against any other traffic which might injure or affect that commerce coming in contact with it.

The fact that interstate travel for pleasure by means of the automobile does not constitute interstate commerce, prohibits Congress from directly granting a Federal privelege to an automobilist. But the fact that an automobilist runs his motor vehicle on an interstate highway where interstate commerce is actually being carried on, will not prevent Congress from enacting legislation, regulating the automobilist so that he is compelled to drive his vehicle so that interstate commerce will be protected.

We will assume that there is a certain road leading from one State directly into another. We will also assume that on this road a great deal of trucking is being carried on, a trolley road is carrying passengers throughout the day, express wagons are running and store delivery wagons are constantly driving back and forth across the boundary line of the State; at the same time, we will also assume that on this public road motor vehicles pass by the hundreds every day and that the occupants thereof are out for pleasure. It makes no difference whether the vehicles are propelled by power or drawn by animals, if any vehicle on that road which is being driven for pleasure should run into and damage one of the vehicles which is being operated for the purpose of commerce (which is likely to occur) it can readily be seen that Congress would possess the power to regulate a certain class of vehicles which travel for pleasure over interstate highways so as to insure protection to other vehicles which are engaged in interstate commerce.

The present bill of the American Automobile Association permits an automobilist who is duly licensed in his home State to obtain a Federal license. He is not restricted. He obtains an additional privilege. He gets this not because Congress desires to protect interstate commerce, but because the American Automobile Association says that automobilists who are engaged in interstate travel for pleasure are carrying on commerce. If such a proposed law provided that the automobilist must obtain a Federal license and carry a Federal tag, which would identify him in case he committed injury to any vehicle engaged in interstate commerce on an interstate highway, then the law would be valid and constitutional, since it seeks to protect interstate commerce. It is upon this theory alone that a Federal registration bill can be constitutionally enacted. The same results practically would be accomplished as sought in the American Automobile Association's bill. With the mandatory requirements would be conferred the interstate license as an incident.

Great care should be taken in framing a bill of this character. The proposed law should define what constitutes interstate highways or roads. It should be provided that all public highways and roads which directly lead from one State into another are interstate highways for the purposes of the act. The term interstate highways should also include all other streets, roads and highways which lead into any main or direct interstate highway running from one State to the other, and which are necessary or convenient in the use of said main or direct road or highway. Congress once having declared what constitutes interstate highways will then have the power to control travel thereon fully. It must not be forgotten that a person is engaged in interstate commerce if he is traveling wholly within the limits of a State or within a municipality thereof, if he is at the time engaged in a general business which is interstate in its character and his traveling is a necessary part of that business. I will make this assertion and I feel confident that I can back it up by authority, that, if I drive a wagon in the city of New York continually for four days in a week collecting packages which I expect to deliver and sell in the city of Paterson in the State of New Jersey, I am engaged in interstate commerce while I am so driving in New York City and Congress may protect me from injury which might be done to me by automobilists traveling on the city streets, compelling them to take out a Federal license.

Manufacturers' Opportunities the World Over

WASHINGTON, D. C., Apr. 4—The following report covering the market for automobiles and traction cars in Portuguese East Africa, transmitted by Consul George A. Chamberlain, of Lourenço Marquez, contains interesting information concerning the conditions which prevail in that colony and the cause why American cars are not in more general use in foreign markets:

Up to a few years ago the streets of the city of Lourenço Marquez, the capital of Portuguese East Africa, were mere rivers of sand, and transportation by automobile seemed as far off as aerial navigation. The white man was hauled laboriously through the sand in rickshaws, and women went shopping swung from Kaffir-borne poles in hammocks known as *mechillas*. During the last decade, however, wonderful changes have taken place, so that to-day Lourenço Marquez has 40 miles of macadam streets, with promise of more to follow. Sand is the curse of Portuguese East Africa. It blocks the rivers and harbors and stretches in a vast sea toward the interior, effectually cutting off the coast towns from the highlands. Besides, it makes the problem of transportation the bugbear of the planter.

The stone for macadamizing the streets of Lourenço Marquez was brought 50 miles by rail from the borders of the Transvaal, and the hauling from the local station to the place of application cost more than the quarrying, crushing and transportation by rail put together.

The transport problem of the district is further complicated by the diseases that have decimated the cattle and horses all along this coast. He who buys a horse takes an 8 to 1 chance of burying him within a year. Horse sickness defies the most careful nurture, and is still, in every feature, a mystery to science. It is said that only 2 per cent. of the stricken recover. As to cattle, the danger of loss is no less, as the mere fact of the infection of a district condemns a farmer to the disposal of his entire stock. The situation resolves itself into a choice between automobiles and donkeys, and in Lourenço Marquez and vicinity the automobiles are winning. Of the automobiles already here, one is of American make and would cost at home about $750, but so strangely do our manufacturers arrange their export business that the middleman's commissions and duties brought up the cost of the car to the local purchaser to about $1,400. During the present month—November, 1909—four automobiles have made their appearance on the streets of Lourenço Marquez, and a truck of very special construction is on the way to start the battle against the 18-inch sand of the suburbs. The truck was ordered by the local government from a European firm. The contract is most interesting. The purchase price is fixed at about $15,000, to be paid in three installments, as the car succeeds in performing the various feats of the guaranty. This guaranty assures, among other things, a carrying capacity of 4 tons through 18-inch sand at 8 miles an hour, a hauling capacity of 8 tons, and the performing of a trip under test conditions to the suburb of Marraquene, 19 miles out.

DEMAND FOR CHEAP CARS

There is a limited market here for a cheap grade of car suitable for running around town. Four have come in this month, and it is safe to predict that next year will see this number increased by twenty. The market for traction, freight, and agricultural cars, if properly worked, is unlimited. Horse sickness and tick fevers will prove unfailing allies to the manufacturer.

Some American car manufacturers have seen fit to sell their export business to New York commission houses. The manufacturer reasons thus: It costs him $800 to turn out his car. A big commission house agrees to give him $1,000 per car if it be made sole export agent. He thus makes a solid profit and is free from the trouble of studying export and founding an export department. He signs a contract and thinks he has made a successful deal, but that contract is to a large degree the destruction of his export business. The commission house takes over the car at $1,000, and contracts agencies with established firms all over the world, fixing the retail price at $1,500. The agency gets a net sum of $75 per car sold. Charges, insurance, freight, and duties, say, $225. The commission house pockets the difference, $200, just what the manufacturer made on his car.

LIMITED AGENCIES DESIRABLE

Anyone can see the dire effects such a line of procedure will have upon American competition abroad. Our medium-priced cars are wonderfully suited for the capture of new markets if they can be sold as medium-priced cars. The only way to assure this is by the establishment of direct limited agencies and undertaking the local advertising. The latter stipulation is unusual, but most important. In the first place, the American conception of advertising is just sifting into the outer world. In the second place, a foreign agent is interested in American goods solely through his pocket. He is swamped with agencies for things that would sell with a little pushing.

Unlimited agencies are a purely American invention which has entrapped many a careless firm. From a business point of view they are often disastrous. The other day one of our most solid and famous manufacturing firms—not of automobiles—conceded to one man the agency "for territory south of the equator" for a new line of manufacture.

Much Activity in and Around Boston

BOSTON, Apr. 2—In twelve weeks since the new Massachusetts automobile law, which includes a graded horsepower registration fee and an annual operator's license fee, has been in effect the receipts of the State from this source have been nearly equal to the total amount received during the year 1909. The receipts of the automobile department of the Highway Commission from January 1 to March 17 inclusive of this year were $166,681, while for the fiscal year of 1909 the total receipts were $169,973.54. For the corresponding 17 weeks from January 1 to March 17 of last year the receipts were $56,484.

So far there have been registered this year 13,058 cars against 9,100 for the corresponding period last year; 647 motorcycles against 403, and 488 manufacturers and dealers against 380. Original operators' licenses have been granted to 800 persons against 671, and 11,212 licenses have been renewed. Original chauffeurs' licenses have been granted to 493 persons, against 443, and renewed chauffeurs' licenses to 1165, against 851. As there were registered about 24,000 automobiles last year it is confidently expected that the income of the State from the automobile department this year will be considerably in excess of $300,000.

The recent automobile show and the good weather that has prevailed have stimulated the registration of cars, and the past week has been the busiest so far this year at the offices of the automobile department of the Highway Commission. Nearly 1200 cars were registered in six days and about an equal number of operator's licenses were issued. The influence of the show is seen in the registration of thirteen new dealers since the doors of Mechanics' Hall were closed.

THE AUTOMOBILE

Vol. XXII Thursday, April 7, 1910 No. 14

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President

A. B. SWETLAND, General Manager

231-241 West 39th Street, New York City

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THOS. J. FAY, Managing Editor

MORRIS A. HALL, Associate Editor

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ADVERTISING DEPARTMENT

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ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.

FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.

GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.

The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

The old automobile will have to be brought out from its Winter hibernation, and, in order to obtain the best results from it, nothing remains but to give it the thorough overhauling it was promised last year. The temptation will be to trade it in for a new one, and the wisdom of choice will depend upon the condition of the car from a mechanical point of view and the state of the owner from a pecuniary standpoint. In any event, considering cost, it will be necessary to determine whether or not it will be less costly to purchase a new automobile than it will be to repair the old, and, in thus discriminating, good judgment must be fortified by keen perception.

If the car in hand is promising, and it should be unless it is several years of age, it should be held immune from the machinations of the novice who thinks big and does little; many an automobile has been ruined by just this class of the genus novice. The repairing of an automobile, if the work is properly done, is a prosaic undertaking, full of sad experiences, even to the man who is accustomed to this class of work, and it demands a fair display of horse sense, some skill as a mechanic, and the entire absence of anything like a desire to reform the plan of the maker.

The man who thinks he can build a better automobile than the one who may be responsible for the car that is to be repaired, should know better than to hamper his good ideas by planting them in an old automobile; they will shine better if they are contained in a positively new production, and the old automobile will not then be ruined in the undertaking.

System is everything in a repair job; it takes time to hunt for and find the parts after they are cast carelessly about, and it is even a question if the artisan will hunt for them after they are mislaid. Cleanliness is worth much, and after the parts are thoroughly cleaned they may be inspected for the purpose of determining their competence to render fit future service. It is something of an undertaking for a man of no experience to observe with certainty the value of a used part, and it may even be a job for an expert to ascertain if the structure has been rendered crystalline in service.

If the results of service do show on a part, and if the metal has "aged" up to the condition showing a crystalline structure, the best way, perhaps, is to purchase for use a new part. The crystalline structure may be corrected if the facilities for heat treating are available, provided the workman is sufficiently skilled in the art to know what to do.

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Large combinations are suspected of the people, but this attitude is not always justified. The automobile business has had an unusually rapid growth; so rapid, in fact, that there has been no semblance of competition, but, today, it is fast approaching a stage where production is so close to demand, that makers will soon come into competition one with the other. When that time comes, in the near future, as come it must, that manufacturer or group of manufacturers which is best fitted to get out good cars will get the full share of the business, while the makers with less complete or less able equipment will have to take what remains.

Equipment may mean in this connection, not alone factories, supplies on hand and connections which will yield further suitable supplies, but also men, both the men higher up and the workingmen. From the point of view of the buyer, or, as he is usually called, the ultimate consumer, such group of makers is far more satisfactory to do business with, not alone from the fact that the very size and bulk spell permanency, but also from the point of view of ability to supply the desired article, which a less well-equipped firm would not be able to furnish. These two ideas taken together mean satisfaction, first, for the immediate present, and, second, for the more or less remote future.

As to equipment, that factory is best equipped which possesses the largest number of new and suitable tools, which has the best shipping facilities, which has old and seasoned workmen tuned up to that company's class of work through many years of service, which is closest to its market, nearest or most closely connected to its source of supplies, and which is best equipped as to factory and selling organization. In a group of makers, allied for mutual advantage and betterment, it is possible to improve on some of these items, however well they may have been taken care of in the past. Thus, to cite an item, one can buy, not alone more cheaply, but also better in every other way, for 5,000 cars than for the much smaller number of 500. In this and other ways a group of makers in close touch can serve better than the same number of makers acting independently and competing somewhat with one another.

More News Jottings from Motor Center

DETROIT, MICH., Apr. 4—Among the most recent American concerns to invade the Canadian field is the Anhut Motor Car Company, of Detroit, which has purchased the Chatham Motor Car Company, of Chatham, Canada, and will devote the plant to the production of Anhut Six cars. The capital stock of the company has been increased from $150,000 to $300,000 to take care of this expansion.

The Stuart Commercial Car Company has been incorporated at Detroit, with a capital stock of $300,000, of which $65,000 has been paid in. The concern will manufacture power wagons.

There is no better indication of the growth of the automobile business than to watch the increasing output of drop forgings, and the effect this product is having upon the plants devoted to this class of work. The Anderson Forge & Machine Company, of Detroit, Mich., reports that it is now putting out 1,000,000 pounds of steel per month in the form of drop forgings, and that a new plant, which is now under way, will be complete and ready for occupancy by July 15.

The Detroit-Dearborn Motor Car Company has increased its capital stock from $50,000 to $100,000.

The Commercial Motor Car Company, of Detroit, has been incorporated with a capital stock of $30,000.

The capital stock of the Detroit Carriage Company has been increased from $50,000 to $100,000.

Wisconsin State Endurance Run Insured

THE Milwaukee Sentinel has donated a trophy, valued at nearly $1,000 as an award to the winner of a reliability or endurance run, open to Wisconsin owners and dealers. The prize will be held by the winner for a year and will be competed for annually. The winners' names will be inscribed on the cup.

George A. West, treasurer of the Wisconsin S. A. A. has been selected as chairman of the contest committee which will have charge of the annual event upon which the award will be based.

Plans for the run this year have not yet been completed, but it is certain that the tour will cover a large part of the State and may require from three to six days. A tentative plan formulated by President M. C. Moore of the W. S. A. A., contemplates a run of six days, extending from Milwaukee to Madison; Madison to La Crosse; La Crosse to Eau Claire; Eau Claire to Merrill; Merrill to Appleton and back to Milwaukee.

It is probable that the run will be made in July, although a definite date for it has not been set. Wisconsin motordom is highly interested in the event and inquiries from various parts of the State indicate that the entry list will be representative and likely to exceed in point of size anything of its kind ever given in the Northwest.

Coming Events in the Automobiling World

Apr. 6-9..........Watertown, N. Y., Automobile Show, Watertown Automobile Dealers' and Manufacturers' Association, in the State Armory.
Apr. 6-9..........Duluth, Minn., Armory, First Annual Duluth-Superior Automobile Show.
Apr. 7-9..........Kalamazoo, Mich., National Guard Armory, Automobile Show, Kalamazoo and Southern Michigan Automobile Dealers.
Apr. 9-16.........Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.
Apr. 11-16........Harrisburg, Pa., Kelker Bldg., Automobile and Sportsman's Show, Harrisburg Automobile Dealers' Association. B. R. Johnson, Manager.
Apr. 11-16........Erie, Pa., Meyer Block, Automobile and Motorcycle Show.
Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
June 20-July 6....Detroit, Mich., Industrial Exposition, Detroit Board of Commerce.
Jan. 7-14, 1911....New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Apr. 5-6..........Savannah, Ga., Endurance Run to Jacksonville, Fla., Savannah Automobile Club.
Apr. 6-9..........Memphis, Tenn., National Aviation Meet, Aero Club of Memphis (member Aero C. A.).
Apr. 8-10 & 13-17.Los Angeles, Cal., Inaugural Meet, Motordrome.
Apr. 30-May 2....Philadelphia Roadability Run to Atlantic City, Quaker City Motor Club.
May 2............Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.
May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.
May 9-11.........Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.
May 21-22........Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.
May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill, Automobile Club of Bridgeport.
June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.
June.............Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, through the Southwest.
June.............Worcester, Mass., Hill-Climb up Dead Horse Hill, Worcester Automobile Club.

Foreign Shows and Races

Mar. 31-Apr. 8....French Spring Wheel Competition.
Apr. 2-24.........Turin, Italy, Automobile Show.
Apr. 27-28........Brooklands, England, Two-Day Meeting.
May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.
May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.
June 2-8..........Prince Henry (German) Touring Competition.
June 13-18........Scotland, Scottish Reliability Trials.
June 20...........French Voiturette Race.
June 21...........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27...........Speed Trials at Kiev, Russia.
July 12-18........Ostend, Belgium, Automobile Week.
July 20-25........Boulogne, France, Automobile Week.
Aug. 1-15.........Ardennes, France, Meeting.
Aug. 15-Sept. 15..French Industrial Vehicle Trials.
Aug. 21...........Salon, France, One and Five Kilometer Trials.
Aug. 28...........Mont Ventoux, France. Hill-Climb.

A.C.A. RULES FOR CERTIFIED MOTOR TESTS

DETAILED rules to govern certified tests under the jurisdiction of the Automobile Club of America have been formulated by the Technical Committee of which A. L. McMurtry is chairman. The rules have been framed to cover tests of the merits of motor vehicles generally and all their material accessories.

Special stress is laid upon the use of such tests as advertising and publicity matter by the entrants and a definite agreement is insisted upon by the club that the entrant shall accept the official record and agree to the publication of such by the Technical Committee and he is also required to submit proposed publicity and advertising matter based upon the club certificate to the committee, prior to publication.

The rules are as follows:

1—**Object:** The object of the tests is to determine the merits of a motor vehicle as a whole or in part, or an accessory, under various conditions.

2—**Certificates:** The Club will give a Certificate of the actual performance during the test and official representative or representatives are to be provided for the test, by the Committee. The certificate shall be a record of the test, containing such details of the motor vehicle or part thereof, under test, and any observations the Committee may find desirable. A copy of the results shall be published in the Club Journal.

3—**Interpretation of Rules:** The interpretation of these rules shall rest entirely with the Technical Committee which, may, from time to time, alter, add to, or omit from them, and may, in the case of any particular test, modify the rules to suit a particular case.

4—**Postponement:** No test shall be postponed or abandoned without the consent of the Committee, except that on the day of the test the Committee's representative or representatives may order a postponement on account of the weather, road conditions, illness, or contingencies beyond the control of the Committee.

5—**Time of Test:** Unless otherwise specified, a day's test shall consist of eight hours' duty, at the expiration of which time the motor vehicle shall be placed under lock and key and subject only to the inspection of the Committee. Time of starting the test shall be determined at least forty-eight hours previous to the start.

6—**Supervision:** The motor vehicle shall be under the supervision of the Committee, from the time at which it is presented for trial until released by the Committee.

7—**Extension of Test:** The entrant may, at any time before the completion of the test, give notice in writing to the Committee, that he wishes to extend the duration of the test, subject to the approval of the Committee.

8—**Adjustment and Repairs:** All manipulation, adjustment or repairs shall be carried out only by the entrant or his employees.

9—**Entries:** Every entrant shall state the nature of the test and the number of days to be occupied. The entrant shall, with the consent of the Committee, be entitled to alter the duration of the test on paying the additional fees. After receipt of the entry the entrant will be notified of the day fixed for the commencement of the test. The Committee reserves the right to refuse any entrant without giving a reason or to limit the length of any test at its discretion.

10—**Withdrawal:** The entrant may, at any time before completion of the test, give notice to the Committee that he wishes to withdraw from the test, and shall state his reason. In the event of such notification the motor vehicle shall remain under the supervision until the cause thereof has been investigated and the motor vehicle released by the Committee.

11—**Inspection:** The Committee shall notify the entrant when an inspection of the motor vehicle or parts thereof, under test, is to be made, so that the entrant may have a representative present during such inspection.

12—**Foul Practices:** The Committee shall stop immediately a test of a motor vehicle the entrant or employee of which shall be guilty of misbehavior or unfair practice in connection with the test.

13—**Advertising the Test:** The entrant agrees to accept the official records of the Committee and authorize the Committee to publish them in such manner as the Committee thinks fit. The entrant may publish only the full and complete certificate issued by the Club. In the event of his desiring to publish by way of advertisement or otherwise, any other matter relative to the test, he shall submit proof of such matter to the Committee before its publication and he undertakes not to publish any such matter until he has received the written authority of the Committee. In which case he may use the words "Published with the authority of The Automobile Club of America."

14—**Responsibility for Damages:** An entrant shall have no recourse against The Automobile Club of America, the technical committee of the Automobile Club of America or any of its officials, employees or representatives under any circumstances.

15—**Fees:** Fees for the test shall be determined by the Committee in accordance with the nature and duration of the sest, and under ordinary circumstances will not exceed $25 per day.

Application: Every application for a test shall be made upon an official application form of the Committee and shall state the nature of the test, the number of days to be occupied and the name of one member of the Club guaranteeing the account.

Certified Fuel Consumption Tests—Regulations

1—**Object:** These tests are to ascertain and record the fuel consumption of a car.

2—**Rules:** These tests will be held under the Rules for Certified trials.

3—**Certificate:** The Committee reserves the right to add to the Certificate a record of the run, or any other observations concerning the test. (Such as weight and make of car, horsepower of engine, bore and stroke, type of carbureter, i. e., automatic auxiliary air supply, hand-regulated air supply, mechanical fuel feed, etc., method of control of engine power and speed, including whether governed, controlled by accelerator pedal, variable valve lift, or by the independent throttling of one or more cylinders, gear ratio, type of body, wind area, make and size of tires, and average speed of car in miles per hour.)

4—**Running Time Per Day:** A day's Road Test shall not exceed 150 miles, except in the case of a continuous run exceeding twelve hours' duration.

5—**Passengers:** The full complement of passengers or equivalent ballast which shall not consist of spare parts, shall be carried throughout the test, and the total weight thereof shall amount to not less than 132 lbs. per passenger seat. The entrant shall be responsible for filling all the seats except in the case of the representatives of the Club. The representative or representatives shall have the choice of seats. No extra passenger shall be allowed to ride on the floor or step.

6—**Muffler:** An efficient muffler must be fitted, and is defined as follows: Apart from any question of back pressure, an efficient muffler is one which renders the separate impulses of the exhaust gases from an engine indistinguishable under all ordinary running conditions, at the distance of 30 feet from the side of the car in an open road and which is practically gas-tight everywhere except at the proper outlets.

7—**Postponement:** No test shall be postponed or abandoned without the consent of the Committee, except that on the day of the test the Committee's representative or representatives may order a postponement on account of the weather, road conditions, illness, or contingencies beyond the control of the Committee.

8—**Arrangements** must be made to fit any tank or other device which the Club may consider necessary.

9—**Nature and Quality of Fuel:** A sufficient quantity of fuel may be taken from the tank by the representative for such tests as the Club may consider necessary to ascertain its nature and quality.

10—**Speedometer and Odometer:** A reliable speedometer and odometer must be fixed to the car and checked for accuracy on the Club dynamometer.

11—**Makes of Tires:** The car must be fitted with the regular tire equipment as specified in the manufacturers' catalogue. If the tire equipment is optional the Committee will select the make of tire as fitted to the largest number of cars of that make and type.

12—**Tire Pressure:** The air pressure in the tires must not be greater than specified by the tire manufacturer.

Certified Tests of Motors

1—**Object:** The object of the test is to subject a motor to a test of comparatively short duration, representing the equivalent of a considerably longer period in ordinary use.

2—**Rules:** The tests will be held under the Rules for Certified Tests.

3—**Number of Cylinders:** These Regulations shall apply for any motor, irrespective of the number of cylinders.

4—**Fuel and Oil:** The fuel will be supplied by the Committee, the quantity and quality to be noted. Lubricating oil may be supplied by the entrant, the quality to be recorded.

5—**Temperature:** The temperature of the cooling water shall be recorded and the water supply must not be less than 120 degrees Fahrenheit.

6—**Certificate:** The certificate shall show the results of the following tests:

(a) The fuel consumption on the dynamometer.

(b) The output of the motor as specified by the entrant maintained for a period of two hours, or any multiple thereof (at the declared number of revolutions), obtained without interruption of the test.

(c) The minimum B.H.P. which can be obtained for 15 minutes below some limiting speed to be declared by the entrant.

(d) The B.H.P. which can be maintained for the same period at one-half the limiting speed declared by the entrant.

(e) If required by the entrant, the mximum B. H. P. at 5 or more different speeds between and inclusive of the B.H.P., determined at the declared maximum and minimum speeds. These results to be those obtained with no other carbureter regulation or variation than the adjustment of air supply.

(f) A record of all repairs and adjustments which may cause stoppage of the engine.

(g) Bore, stroke, offset of cylinders (if any), weight of motor, normal speed, maximum speed, ignition system and make of carbureter, and any other observations the Committee may find desirable.

ANNUAL ELECTION OF A.C.A. APRIL 12

The Automobile Club of America will hold its annual meeting and election of officers, April 12 at the clubhouse, 247 West Fifty-fourth street. The following candidates have been nominated: President, Henry Sanderson; first vice-president, John E. Borne; second vice-president, Robert Lee Morrell; third vice-president, Edward Shearson; treasurer, Finis E. Marshall; governors (to serve four years, from April, 1910), Dave H. Morris, Albert R. Shattuck and E. H. Gary. Governor (to serve in place of Cornelius Vanderbilt, resigned, until April, 1912), Alfred Ely; governor (to serve in place of Horace Porter, resigned, until April, 1913), George Moore Smith. Widespread interest has been aroused, and an unusually full attendance is expected.

THOMAS B. JEFFERY DIED SUDDENLY IN ITALY

THOMAS B. JEFFERY, president of Thomas B. Jeffery & Company, manufacturers of the Rambler, died suddenly at the Grand Hotel at Pompeii, Italy, Saturday night. Mr. Jeffery was touring Europe with his wife, having left Kenosha, Wis., January 21, planning to spend at least four months abroad for rest and pleasure.

He was born at Stoke, Devonshire, England, February 5, 1845, and came to America when eighteen years of age. He located at Chicago and entered his trade, that of making astronomical and other instruments of precision.

He was the maker of the patent office models of the railway velocipede and later manufactured that device. In 1878 he joined the late R. Phillip Gormully in the manufacture of the Rambler bicycle, under the firm style of Gormully & Jeffery until 1897, when the business was sold to the American Bicycle Company.

Prior to this sale, Mr. Jeffery had been experimenting with the automobile and about ten years ago he purchased the old Sterling bicycle plant at Kenosha and commenced the manufacture of the Rambler automobile. He was the inventor and patentee of the clincher pneumatic tire.

Mr. Jeffery was married to Miss Kate E. Wray, of Chicago, in 1874. Besides his widow, he leaves two daughters and two sons, the latter being Charles T. Jeffery, who will succeed his father as head of the company, and Harold W. Jeffery. Charles T. Jeffery has been manager of the concern for several years.

The remains of Mr. Jeffery will be shipped back to this country and interment will probably be at Kenosha.

Thomas B. Jeffery, Maker of Rambler Automobiles, Who Is Dead

RICH PRIZES FOR ATLANTA WINNERS

ATLANTA, GA., Apr. 4—The card of events is out for the Atlanta Speedway races which will be held May 5, 6 and 7 over the two-mile Atlanta track.

The list contains only two long races, both at 200 miles and both for trophies of an advertised value of $10,000.

One is the "Atlanta Speedway Trophy" and is for cars of 301 to 450 cubic inches displacement. The other is for the 451 to 600 class cars and is called the Atlanta Automobile Association trophy and has added prizes of $1,000 and $500.

The one mile time trials have been made better worth while than ever before, with $150 for the car making the best time, $500 for the car breaking the present track record and making the fastest time, and $150 for every other car breaking the present record. The only other novelty is an Australian pursuit race.

The program includes twenty contests ranging all the way from a single mile dash free-for-all; ten, twelve, twenty, forty, fifty and sixty mile races, to the 200 mile-events. About $6,000 in cash and eleven cups and medals will be distributed.

VANDERBILT CUP RACE OCTOBER 1

Preliminary announcement has been made of the sixth annual competition for the Vanderbilt Cup, which will take place on the Long Island Motor Parkway Saturday, October 1, starting at 9 o'clock a. m. The course will be the same as that used in 1909 and will be 12.64 miles, with four turns, all well banked. Twenty-two rounds will be made, the total mileage being 278.08. The race will be run rain or shine. In addition to the cup, there will be a purse of $2,000 and a bronze placque by Tiffany, awarded the winner. The entry fee is $500 a car.

W. W. WALLACE, ADVERTISING MAN, DEAD

W. W. Wallace, who has been advertising manager of the Berger Manufacturing Company of Canton, Ohio, for many years, died March 29.

SAVANNAH-JACKSONVILLE ROAD RUN

SAVANNAH, GA., Apr. 6.—Twenty-one of the twenty-two entrants in the Savannah-Jacksonville tour completed the run today, a distance of 98.1 miles. No serious accidents marred the sport. The roads were in excellent condition except for three miles south from Darien and at King's Ferry.

Mrs. L. W. Hazard drove her ten-horsepower Maxwell over the course with a perfect score. Besides Mrs. Hazard, those who secured perfect scores were as follows: J. L. Highsmith, Maxwell; Chris Jacobs, Hupmobile; H. B. Flanders, Buick; L. R. Akin, Buick; W. H. Towle, Maxwell; Darwin B. Hull, Buick; The Rev. Francis Alan Brown, Maxwell; Henry A. Brantley, Maxwell; W. C. Thompson, E-M-F; W. C. Adams, Maxwell; R. S. Brown, Cole; Robert Brockett, Maxwell; Harvey Grander, Lancia; Eugene Maner, Acme; N. G. Brown, Packard and A. W. Solomon, Stevens-Duryea.

ART POSTER FROM MAGNETO FIRM

Beautiful just describes the art poster which is now being distributed by the K-W Ignition Company, Cleveland. This poster is 14 1-2 inches wide by 35 inches high and a work of art.

The idea of the spirit of the K-W magneto is carried out by a beautiful female form which rises in vapory outline from the spark-plug cables connected to the magneto. The figure continually grows stronger until it stands out against a starlit sky in all its beauty of line and color, while the red flame which the magneto produces and which is shown jumping between the two forefingers casts a warm glow down on the face and rounded shoulders, the beauty of which is hard to describe.

SALE OF WINTON OFFICIALLY DENIED

The rumor generally circulated last week that the Winton Motor Carriage Company had been sold to the United States Motor Company is officially denied by Alexander Winton, president of the Winton company.

A·L·A·M· OFFICIALS

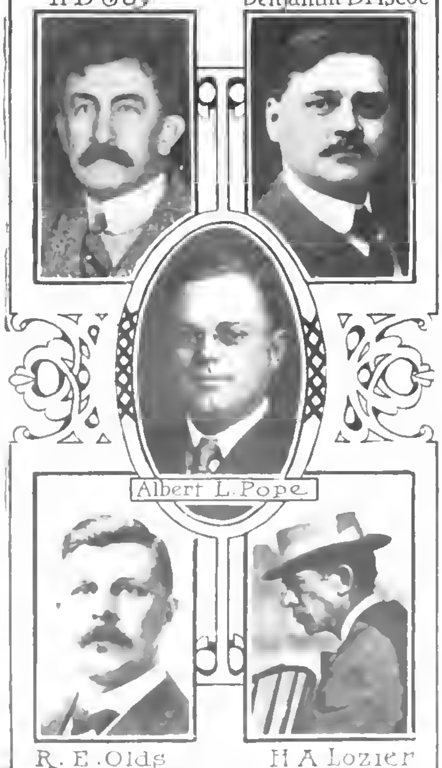
Col. Chas. Clifton Pres — Alfred Reeves Gen Mgr

L.H. Kittredge Sec.

Col. George Pope Treas — Coker F. Clarkson Asst Mgr

COMMITTEE

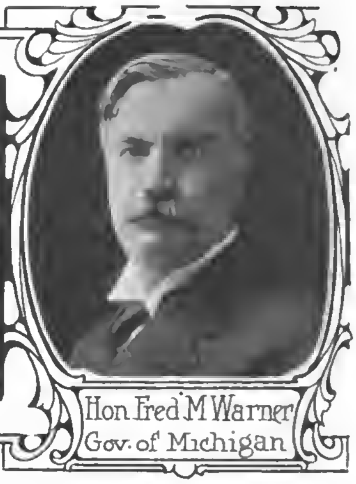
H·B·Joy — Benjamin Briscoe



Albert L. Pope

R. E. Olds — H A Lozier

FIRST ANNUAL BANQUET



Hon Fred M Warner Gov. of Michigan

THE Hon. Fred M. Warner, governor of Michigan and the chief speaker on the list of those who will address the assembly, at the first annual dinner of the Association of Licensed Automobile Manufacturers, Thursday evening at 7 o'clock at the Hotel Astor, was a particularly happy and appropriate choice for that duty.

Governor Warner is the chief executive of the State in which over half of all the motor cars of the country are made. The industry in Michigan, is one of leading lines of endeavor of the citizens of that State. There are thirty-seven manufacturing plants devoted to the making of motor cars in Michigan. The annual product of the State is approximately 150,000 cars, valued at $190,000,000. In addition to this stupendous amount, over half of the accessory product of the country is utilized in the building of Michigan motor cars, thus adding the financial, economic and industrial potentiality of over 150 manufacturing establishments to the grand total.

Thus when Gov. Warner speaks about the automobile, his words will have a peculiar significance. The guest of honor traveled from Detroit in a private car and was received with formal ceremony as well as enthusiastic informal welcome.

The banquet hall of the Hotel Astor was magnificently decorated for the affair and a short time before the lists were closed, it was announced that practically the full number of guests expected, would be present, in all about 200. Acceptances of the invitations had been received from three-quarters of the members. Governor Warner is an optimistic conservative and his address is awaited by the manufacturers with something more than curiosity.

Job Hedges, the toastmaster, is one of the noted wits of New York and is a radical in his treatment of many interesting subjects, including the automobile. William H. Edwards, another of the speakers, head of the street cleaning department of the metropolis, is a forceful talker whose ideas have proved to be notably interesting. Col. Charles Clifton, president of the association is a careful speaker whose words carry much weight and influence and Arthur Brisbane, most widely known for his writing, is unusually brilliant in the field of oratory.

The banquet will undoubtedly become a regular feature of the activities of the A. L. A. M. In one sense such gatherings are diversions, despite the importance and vital interest of the topics discussed. They give the opportunity for social contact and acquaintance under favorable conditions. The tone of such a function as the first annual banquet of the A. L. A. M. is of the highest class, being almost formal and official in its character.

The membership of the association includes eighty-three of the leading motor car companies and under the plans of the committee in charge of the banquet arrangements, only three invitations were sent to each member. The object sought was to make the attendance representative of the whole association, to as large a degree as possible. This plan will have the effect of eliminating anything like a dominating influence, based upon a large local attendance.

The dinner itself has been planned upon the most complete lines of the celebrated hostelry where the function will be held. The menu will be especially elaborate, and all the details set in harmony with it.

The general trend of the addresses will be the past, present and future of the automobile and in that wide scope, the speakers will have an opportunity to touch upon a thousand and one subjects of direct moment to the industry.

Aside from the regular list of speakers there will be several impromptu addresses and discussion of the topics treated in the formal toasts.

The tendency toward centralization, which has been impressively shown by the trend of events recently, will undoubtedly receive a considerable amount of attention. The trade generally is much interested in the gathering on account of the representative character of the men who will be here, particularly in connection with the idea of the reported mergers and rumors of mergers in the industry.

A.A.A. GIVES OUT 1910 GLIDDEN RULES

(Continued from page 672.)

438—A seal broken in the day will be replaced the evening of that day at the garage by the promoter's technical committee.

439—Breaking Seal—There will be no penalty for breaking a seal.

440—Lubrication—At the completion of each day's run—except the final day—after the cars are garaged, ½ hour will be given each contestant for lubricating all parts of the car, such as crankcases, filling and turning of grease cups, motor, transmissions and other parts. This will be done under the supervision of the observer and a member of the promoter's technical or contest committee. Seals will be broken to permit of properly lubricating the car during this half hour.

DRIVERS

441—Drivers may be changed as often as desired, but report of same is required to be made to the referee and the regular and substitute drivers shall be named in the entry blank. In case of illness, emergency drivers may be used. Drivers shall report at the official garage or park ½ hour before the announced starting time for the day and they, together with the observers, will be placed in charge of cars, whereupon they will immediately proceed to the starting line and take their proper places ready for the start. Drivers must not rely upon information obtained from the observers as to the route to be followed or as to any question regarding penalties.

OFFICIAL HEADQUARTERS

442—There shall be an official headquarters where all announcements shall be posted on a bulletin board before and after a contest.

443—Before the start of any contest, all drivers, observers and entrants shall attend a meeting held for the purpose of instruction as to the intent of these rules. This meeting shall be in charge of the referee.

444—When the contest exceeds one day in duration an official bulletin board shall be displayed at a known headquarters each night, giving such additional information as may be required. Failure on the part of drivers, observers or entrants to attend the meeting of instruction and to consult the official bulletin board displayed at the headquarters shall be at their risk.

START

445—The time of starting shall be announced by posting on the bulletin board, or otherwise, the evening previous to each day's start. Cars will be started each morning at the hour announced the evening previous, the different cars starting at one minute intervals.

446—Cars shall start in the order of their presentation at the starting line and without regard to classes or divisions.

OFFICIAL NUMBERS

447—Each car shall have its official number prominently displayed on each side of the hood, painted on the radiator in front, and if possible, on the rear of body.

448—The name of the car in letters 4 inches high may appear upon the sides and upon the front and rear.

PACEMAKER

449—Each day's contest shall be preceded by a pacemaker; and by any entrant or representative thereof who passes the pacemaker shall be disqualified. The referee shall go with the tour in the pacemaker's car in order that he may be accessible to contestants at the end of each day's run. If the pacemaker's car breaks down or is compelled to travel at a rate of speed so slow as to impede the progress of the tour, his flag shall be transferred to the first suitable car overtaking him, which car shall thereafter become the pacemaker's car, subject to the same conditions, until such time as the official pacemaking car can again perform the duties.

CLASS A AND DIVISIONS

Competing cars shall be divided into the seven divisions of class A, as follows: Rule 400.

Division 1A	$ 800	and	under
Division 2A	801	to	$1,200
Division 3A	1,201	to	1,600
Division 4A	1,601	to	2,000
Division 5A	2,001	to	3,000
Division 6A	3,001	to	4,000
Division 7A	4,001	and	over

DAILY RUNNING TIME

450—The following average speeds shall be maintained by the cars in the respective divisions of class A:

Divisions 4, 5, 6 and 7	20 miles per hour
Divisions 2 and 3	18 miles per hour
Division 1	16 miles per hour

451—All cars to avoid penalty will arrive at checking stations as per their schedule, plus additions, if any, to the running time for delays on account of tire troubles. Rule 420.

452—The referee may, if the necessities of the weather or road conditions demand, vary the speed schedules, announcement of any change being made by the starter previous to the start of the day's run to which the change shall apply, or during a day's run at any checking station by the checker at the designated station where the change is made, due notice being given to all contestants who shall acknowledge receipt of such notice by signing the checker's card.

CONTROLS

453—The official station established at the end of each day's run where the cars are officially checked, shall be known as the night control. The official stop for luncheon on each day's run—if there be one—where cars are checked in and out shall be known as the noon control.

454—Each contestant shall be ready each morning to check out at the time announced. Checkers shall be at their stations at that time prepared to start the cars. The time of departure each day shall be entered on the observer's card.

455—Each entrant, or official representative of such entrant, upon starting each day's run, shall sign a statement submitted by an official of the contest fixing the time of his departure, and shall be given a card indicating such time, which card shall bear the signature of said official. Failure to comply shall result in disqualification.

456—Controls and checking stations will be indicated by a flag with a white field and diagonal bar of red.

457—The referee may establish such checking points as he may deem proper. Each car shall be checked upon passing the established checking points and if ahead of time at the noon or night controls may immediately check in.

458—No car will be checked either in or out without its observer.

459—There shall be established at the close of each day's run a parking station, in which all competing cars shall be stored. The station shall be in charge of an official representative of the promoter's technical committee.

460—No work may be done on the cars while in the official garage or parking station, except lubrication during the half-hour allowed at the end of each day's run. See Rule 404.

461—Following the registration at each night control, each car shall be delivered into the custody of the officials of the tour at the official garage or parking station to be by them held at the owner's risk, and kept under direct charge and supervision of such officials or their agents until the time for starting on the following morning. Immediately after registration at night controls and before delivery to the official garage or parking station, the car may deliver the occupants—other than the driver and observer—and baggage at hotel and then must immediately proceed to the parking station. The observer must not leave the car until it is parked.

462—Passengers and baggage may be taken on at the parking station after the car has been delivered to the driver and observer but before checking out in the morning, or at the hotel after checking out when no time shall be allowed.

INTERMEDIATE CHECKING

463—Checking stations shall be established in so far as may be necessary to stop speeding. Each driver shall receive a card when checking out in the morning which shall name the checking stations and the time the car is due at each station, so that he may estimate his running time during the entire day. There shall be no appeal from the time registered by the official watches; drivers and observers shall be required to rectify their watches each morning with the official time.

464—Cars cannot check in ahead of time, except at the noon and night controls.

OBSERVERS

465—Each entrant shall furnish at his own expense one official observer for each car entered by him. All observers shall be acceptable to and subject to the instructions of the promoter.

466—The entrant must arrange for the care and keep of his drivers and observers and pay any expenses connected therewith. He must also carry during the contest the baggage of each observer furnished by him.

467—If the entrant is a motor car manufacturer or dealer, or in any way connected with the manufacture or sale of motor cars, each observer furnished by him shall be:

A—A person who has been regularly and exclusively employed by the entrant by whom he is nominated for a period of not less than 3 months immediately prior to the contest, or

B—The entrant himself or an officer or director of his business, or

C—A dealer in the car made by the entrant, or

D—As owner of a car by the entrant.

468—If the entrant is not a motor car manufacturer or dealer, the observer furnished by him shall be satisfactory to the promoter.

469—Each observer shall be assigned to a car and shall ride each day in a different car and no person shall serve as an observer on any car in which he has any direct or indirect pecuniary interest.

470—Observers shall report each morning at the official garage or park ½ hour before the announced starting time for the day, and take charge of the cars to which they have been assigned.

471—Each observer will be responsible for the tools of each car, as per rule 417.

472—Each observer must note the length of time in minutes and fractions of each stop made; if the motor is stopped or if any work is done, and also record what work was done on the car during the stop, how many persons were working, tools used and how long each person was working. See rules 485 and 521.

473—In case of breaking a seal, the observer will note the seal broken and must report how many times thereafter access was had to the part or parts protected by the said seal.

474—The observer must see that the running car is stamped or marked by the checker at each control or checking station and that his car does not pass a control or checking station before the time marked upon the running card, except at the noon and night controls, and also that the route is followed.

475—The referee shall be empowered to suspend any observer who neglects, is incompetent, or for any other reason fails to fulfill the duties assigned to him, and to provide a suitable substitute at the expense of the entrant by whom the suspended observer was nominated.

476—It shall be the duty of each observer under all conditions and without evasion of this rule for any reason whatsoever to remain with the car until he has been relieved by the chief observer or obtained the driver's signature to a statement that he has withdrawn from the contest and to report every detail of the performance of the car to which he is assigned, and all persons who operate, repair, assist or perform any action connected therewith.

477—If an official observer shall desert a disabled car without first obtaining the driver's signature to a statement that he has withdrawn from the contest, the entrant who appointed such observer shall be disqualified and must either withdraw from the contest altogether or continue as a noncontestant. By desertion is meant leaving the car without taking with him the driver and passengers. This rule will disqualify but one of the cars of an entrant in case of multiplicity of entries.

478—In addition to the surveillance of the cars in which they are riding, observers shall be required in so far as possible to make note of any other car which may be laid up alongside the road and whether the work being done upon it appears to be done on the tires or on the machinery and on what part af the car.

479—At the end of the day's run, the observer must remain with the car throughout the half hour allowed the driver in which to oil his car, rule 440, and when this is done, leave the car at the same time and in company with the driver—and deliver to the chairman of the technical committee or his delegated representative the running card, after obtaining the signature of the driver upon said card and signing same himself. The driver shall in no case be permitted to return to a car without the observer.

480—Should any objection be made by the driver to the record, a report may be immediately made to the chief observer and by him it may be referred if necessary to the referee for settlement. In the event of a dispute as to facts the referee may require the driver to state his objection in writing. The record may also be inspected by any other properly authorized representative of the entrant, who shall also have a right to register an objection and submit proof in support thereof.

481—At a checking station, or at any regular stop, should the observer wish to leave the car he must not do so until relieved by some official of the contest, who, at the same time, must appoint a relief observer, who shall remain with the said car until the regular observer returns to it. After he returns to the car, the regular observer must receive a report, orally or otherwise, from the relief observer as to whether anything was done on the car during his absence.

482—Observers must not interpret rules for entrants or drivers and cannot say what work may or may not be done without danger of penalization, their duties being solely to record what is done and the exact length of time consumed in doing it.

483—In case of a tire repair when the engine is running the observer shall sign and hand to the driver a printed form on which is filled in the time consumed and see that the time is added to the running time, as provided for in rule 420.

484—In the event of sickness or an accident to an observer, which shall make it an impossibility for him to remain with the car, or secure a substitute properly authorized, he shall select one of the passengers of the car as a substitute observer, who shall perform all of the duties pertaining to the position, and shall, in addition thereto, have his record signed by all the occupants of the car during the time he is on duty.

485—When any work whether under penalty or non-penalty conditions is being done on different parts of the car, making it impossible for the observer to properly watch each operation, the observer may compel one of the workmen to stop until such time as he can properly watch him.

ROAD REGULATIONS

486—Entrants and official representatives of entrants shall conform to all laws, ordinances and rules of the road, and any entrant or official representative of such entrant violating any of the provisions of these rules, or who shall fail to show due consideration to the officials or other participants in the tour, or other users of the highways, may be disqualified or penalized, at the discretion of the referee.

487—Any car whose owner or driver shall be arrested for a violation of speed laws, or of any law or ordinance, may be disqualified or penalized, at the discretion of the referee.

488—When road conditions are so bad that a car cannot get sufficient traction to move, or is ditched, and reasonable effort has been made to extricate it, towing or other external means may be used to relieve the immediate distress only, but under no circumstances shall a car enter a night or any other control except under its own power. During such work of extrication the passengers need not necessarily remain in the car and may assist in the work. When towing or assistance from any external source shall have been received by a car its observer shall make a full and complete report to the referee, giving time, place, conditions, distance of tow and any other details. The sense of this rule is not to permit the towing of a car for any considerable distance.

489—All replacements, adjustments and repairs shall be done only during the daily running time.

490—The pacemaking car shall precede the contestants not less than 15 minutes ahead of the first car and with instructions not to exceed the running time of division 7 between any two checking stations. Where local conditions are factors, modifications of this rule may be made by the referee, due notice of same being given to contestants.

491—Contesting cars must not pass the pacemaking car unless it is running behind its schedule. Should a contesting car pass the pacemaking car it takes the pacemaker and his flag and must set a pace not in advance of that which the pacemaking car should have set.

492—Should the contesting car fail to maintain the proper pacemaking pace, it must surrender the pacemaker's flag to the next car that is suitable to take up the pace.

493—The pacemaker's flag shall be a navy blue field.

494—Cars unintentionally leaving the course must return to it at the point whence they left, under penalty of disqualification.

495—Cars intentionally leaving the course to make repairs may be disqualified, at the discretion of the referee.

NON-PENALTY ALLOWANCES

496—At noon or night controls, tanks for lubricating oil, gasoline and water may be filled without penalty.

497—For replenishments of oil, gasoline or water at any other places the penalty is 3 points for each occurrence.

498—Oil or grease may be added to or may be drawn off the various cases when necessary without penalty during the half hour allowed for oiling at the end of each day's run. Rule 440.

499—Recharging of batteries will be allowed at any time, but all work in connection therewith must be done in the presence of the observer.

499A—Brakes may be adjusted without penalty at Memphis, Tenn., and St. Joseph, Mo., under official observation.

499B—Carbureters may be adjusted for air or gasoline at night controls during ½ hour.

499C—Spark plugs may be charged without penalty at night controls during ½ hour allowed for oiling.

TIRES

See rules 419 and 420.

PROTESTS AND DISQUALIFICATION

500—A written protest may be filed with the referee by any participant in the tour, but must be accompanied by the sum of $25. If the protest is not sustained, this sum will be forfeited to the contest board; but if the protest is sustained the protest fee will be reurned to the person making such deposit. No protest not conforming to the above requirements will be considered. Each protest will be acted upon at the earliest practicable moment.

A—Any protests as to unfair rulings, foul driving, routes, etc., shall be made within 12 hours after the occurrence.

B—Any other protests may be made during the tour or within 24 hours after the tour is concluded and before any award is made.

501—No entrant or his official representative shall be disqualified until he shall have been notified of the act complained of, and if the act be denied, he shall be given a hearing, after which a decision shall be rendered. Upon notice of disqualification, the referee may compel him to cease to run in the contest and in that event the official numbers shall be removed from his car, and such entrant shall not receive any certificate, but shall be mentioned in the records as having been disqualified, and no entrant of any car that may be disqualified shall have any claim of any kind or nature whatsoever against the promoter or against the American Automobile Association or any members of any committee or any official of the contest, because of such disqualification, or the publication thereof, or failure to mention the performance of the disqualified car prior to its disqualification.

FINAL OUTDOOR OPERATIVE TESTS

502—The following tests are imperative at the completion of the contest in grades 1 and 2:

503—Brake Test—The car under test approaches a line across the roadway at its competing speed in the contest, one set of brakes is applied and the distance measured in which the car comes to a stop. The other set of brakes are similarly tested.

A perfect brake stops the car in 50 feet or under; a penalty of one point per foot or fraction thereof is imposed for distances above 50 feet.

504—Clutch Test—The front wheels of the car are rested against a vertical 8-inch curb, the low gear is engaged and the clutch let in. Failure to spin rear wheels, stall the motor or climb curb would be a bad clutch, for which a penalty of 5 points is imposed.

505—Transmission Test—Car must be driven on all different forward speeds and reverse. Failure to drive on any one speed incurs a penalty of 25 points.

506—Motor Tests—A—Gasoline cars, driving with open and closed throttle and advanced and normal spark to test firing. Penalty of 5 points is imposed for each cylinder not firing.

B—Steam Cars—Test to see if motor runs with open and closed throttle; if valve slide action is operative; if running temperature and pressure of steam are possible; if engine simples or compounds; and note if various gauges and controls are operating properly. Penalizations are per penalty schedule.

507—Penalization of Accessories—Speedometers, odometers, lamps, horn, clocks, storm fronts, tops and other accessories shall, at the option of the promoter, be penalized for work done upon them and for breaks and lost parts at final examination, which penalties will not count against the car, but against the accessories carried.

PENALTIES

508—All cars shall start with a clean score.

Any car which for any reason discontinues as a contestant shall be penalized 1,000 points in addition to all previous penalizations.

509—Time—At all controls or checking stations a car is given a 3-minute leeway. If due at a station at 10 o'clock, it has until 10.03 to arrive. The head checker must call aloud, or otherwise announce the time, that waiting contestants can check through during their proper 3-minute leeway.

510—Cars cannot check in ahead of the time marked on the running card, except at the noon and night controls, under penalty of disqualification.

511—After the expiration of the 3-minute leeway, each arrival shall be penalized 1 point for each minute or fraction thereof. See Rule 451.

512—Work—In penalizing for work done on a car, by its driver or passengers, a penalty of one point per man per minute, or fraction thereof, shall be imposed.

513—Penalty for Outside Work—Where work is done on a car by anyone other than the driver or passengers, the penalty will be 2 points per man per minute, or fraction thereof, for each of such outside persons.

514—Work in Running Time—Work must not be done on a car between the time it leaves the official garage and crosses the starting line and between the time it crosses the finishing line and enters the garage at the end of the day's run.

515—Replacement—A—Where a replacement is made by the driver or passengers, the penalization is 2 points per man per minute or fraction thereof.

B—Where a replacement is made by workmen other than the driver or passengers, the penalization is 4 points per man per minute or fraction thereof.

FINAL EXAMINATION PENALTY

516—At the close of the contest, each competing car, after being properly washed, shall be delivered to the technical committee, who shall record all adjustments, replacements or repairs necessary to place in car in a safe and satisfactory condition, and penalties therefor shall be imposed in accordance with the fixed penalty schedule as given in detail in "The Automobile" for March 24, 1910. In this list of penalties, the following heads were used under which the penalties were prescribed for many specific accidents: Lubrication, carburetion, brakes, running gear, cooling, ignition, steering, machinery parts, and steam. These penalties vary from 1 point upward to 500, which is the provision for a broken frame side member, a broken cam, or a broken crankshaft.

Parts of cars not enumerated in the schedule, which are discovered to be faulty, impaired, lost or loose, shall be penalized in due proportion to those therein enumerated.

517—Front and Rear Axles—No penalty shall be imposed when the spread between the two front or two rear wheels, measured at the ground, is ¼ inch or less. When the spread exceeds ¼ inch, the penalty shall be 5 points for each ⅛ inch or fraction thereof.

518—Springs—A sag of 1 inch is permitted without penalty. For each additional ⅛ inch or fraction thereof, 5 points.

519—Motor Stops—Motors may be stopped at controls and while gasoline is being taken on. Other stoppages of motors between the starting and finishing of each day's run will result in a penalty of 1 point per minute or fraction thereof for time stopped when no work is done on car.

No penalty, however, shall be charged for a motor stop during the time occupied by a replacement or work on a car for which replacement or work a penalty is imposed.

520—The use by a contestant of any part which may be carried by any other car accompanying the tour as a contestant or otherwise, or which constitutes a part of its make-up or equipment, shall cause the disqualification of the car.

521—In recording time to be penalized, the operator of the car and the observer must mutually agree as to the time when work commences, which shall be immediately recorded on the observer's card, and as to the time when such work ceases, which shall also be likewise immediately recorded.

NON-CONTESTANTS

522—Non-contesting cars must wear a sign or banner, approved by the promoter, bearing the words non-contestant, in letters 4 inches high on the sides and front, and such cars shall be subject to all road rules and regulations of the contest.

523—A car having withdrawn from the contest will be permitted to continue the run, but without the official numbers, and all banners and numbers must be surrendered to the promoter as soon as the car be withdrawn and the words non-contestant displayed as provided in rule 522.

AWARDS

524—At the close of the contest and after receipt of the report from the technical committee of their final examination, the referee shall post on the bulletin board at official headquarters, rule 430, his decisions as to the awards.

528—Summary of Penalties—Time—1 point per minute, or fraction thereof, late in arrival at any control or checking station.

Work—1 point per man per minute, or fraction thereof, for labor by driver or passengers.

2 points per man per minute, or fraction thereof, for labor by workmen other than driver or passengers.

2 points per man per minute, or fraction thereof, for replacement of damaged parts by driver or passengers.

4 points per man per minute, or fraction thereof, for replacement by workmen other than driver or passengers.

3 points per occurrence for replenishing gasoline, oil or water, outside of fuel controls.

Motor Stops—1 point per minute, or fraction thereof, for motor stop when no work is done. No penalty for motor stop during period when work is being done on car, for which work or replacement a penalty is imposed. See rule **519.**

POWERS OF BOARD COMMITTEE

1. The committee of the contest board shall manage the tour, with full power to enforce the rules, render decisions and do anything else that would be within the province of the contest board of the American Automobile Association.
2. The committee or its representatives shall have power at all times to make such examinations of the cars and their contents as may be deemed advisable.
3. The committee shall have power to disqualify any car for traveling at any speed which it may consider excessive under the conditions existing at the time, and without reference to these rules.

GENERAL

Entrants, drivers and observers shall consult the bulletin board at headquarters each night for additional information; failure to do so will be at their risk. All points not covered directly with these rules will be subject to the general 1910 contest rules.

HOTEL ACCOMMODATIONS

Hotel arrangements will be under the management of competent hotel men who have had large experiences in rooming guests at conventions and other gatherings. These men will take complete charge of the rooming at each night's stop. The committee particularly requests that no individual hotel reservations be made in advance. No preference will be shown in selection of rooms.

BAGGAGE

Each contestant must take care of and handle such baggage as he and his guests may need.

Columbia Plant Was Merged

(Continued from page 667)

The factory is of a peculiar layout, with a large office building, two stories high, and having a large basement, while the main part of the factory proper is three stories high with a high basement making it practically four stories high. This part of the plant has a peculiar shape, consisting of two ells, one of which has the office structure for a top, while the other ell branches out from the side of this, the long part of the latter being by far the longest building of the whole plant, and exceeding 500 feet in length. In addition, an equally long structure of but one-story height, houses part of the immense drop forge shop, the blacksmith shop, the battery rooms, the tin shop, and at the extreme rear, a very large repair shop, where the testers also make their headquarters. All around the rear of the buildings, there is ample space to grow, in unoccupied land the property of the company, while in the front, the power house is located within an angle of the main high buildings. Taken as a whole, the available floor space covers no less than 350,000 square feet, while the land now owned would allow of an addition of an equal amount without crowding or increasing the height of the present buildings.

As to shipping facilities, the factory is served by the railroads through the medium of the company's own siding, well located along the side of the building in which the raw stock is stored as well as that in which the chassis are finished and in which they receive the finishing touches.

In these buildings, not in their present guise however, Columbia cars have been built for the past sixteen years, or since 1895. It is true, that the product did not always have the worth it possesses at present, but viewed from the state of the industry at that time, it doubless was fully as good then as it is considered to be to-day.

Moreover, most of the mechanics who worked on the first Columbia cars of sixteen years ago are still working upon Columbia cars, for the employees of this firm have been well cared for, and have stayed with the firm through many vicissitudes. So, it is not strange in passing through the shop with some officer of the firm to hear that "this man has been with us fifteen years, that man has been here sixteen years, over there is a man who came with us fourteen years ago, etc."

Machine tools are not all new, but those which are too old to lend themselves well to the modern highspeed work are now being removed and replaced by more up-to-date tools, which have been purchased. These additions will bring the plant right up to the minute, and place it in a position to turn out the balance of the projected 800 cars for 1910 in rapid fire order. Following that, the work on 1911 cars will be begun, the present plans including 2,000 of the popular and swift-selling Model 48, and in addition, 1,000 electrics, principally victorias.

Notable among the present tool equipment is the drop forging outfit, which in all fairness is not outranked by any similar outfit in the automobile business to-day. Not alone are there numerous drop forge hammers, but the stock of dies for this work covering many years experience with it, is most full and complete. Camshafts, crankshafts, hubs, all levers, all rod ends, gear blanks, jig and tool blanks, fender irons, body irons, dumb irons for the springs, spring seats, valves, connecting rods, axles; all these and many more are turned out in this most complete shop. In addition to the large number of drop hammers, there are many bulldozers, hand forges, small, and large trip hammers for working over steel required to be of a high quality, while the hardening and tempering outfit is such as to complement the forge equipment. Fully as valuable to the firm as the tools, space they occupy, dies, and small tools to go with them, are the men to operate the machines, the latter all of them old hands. Now-a-days, good hammersmen are very scarce, so much so that men of this calibre are really prizes which farseeing firms keep close and jealous watch upon. In this respect, the Columbia works is well fixed.

Body building and trimming work for automobiles has become a fine art, and in this, no less than in other departments, the plant at Hartford is fitted out with the best. The body department occupies a full floor of the longest building, where the natty runabouts, stately enclosed bodies, and more usual touring cars are turned out in quantities, but with all the care possible.

At the rear end of the ground floor is located the very large repair shop, from which the testers work also. In this room all repairs are made on old cars brought back for renewal, while the aforementioned testers do their work of taking up bearings and such other little things as the outside test—which is always strenuous—has brought to their notice. In the matter of final testing of the complete chassis the company is peculiarly fortunate in its location, this being on the outskirts of the town, so that the main road alongside of the works may be used without giving trouble. This gives room for a test of many miles of diversified testing, which would not be possible on a limited track.

ACCOUNT OF REPAIR OF AN OLD CAR

(*Continued from page* 661)

The peining process consists of holding the rings on an anvil, or other suitable shape, and with a pein hammer, strike a series of sharp but light taps against the inner surfaces of the rings at equidistant points around the inner periphery, thus gently but persistently forcing the lay of the metal in the rings into the shape which will render it persistent and of the new desired diameter. The rings must be poised on the edge of the anvil in such a way that the metal will tend to flow in the direction which will afford the new and larger diameter, but they will be broken if in the process the novice strikes too hard a blow, landing the face of the pein hammer at too great a distance from the point of support.

An examination of the pistons in the figure will show that they are considerably worn at diametrically opposite surfaces as at P1, and show no wear at all at points 90 degrees around from the worn areas, as at P2. This is evidence of deformation of the pistons, due, no doubt, to an inadequacy of design, and contrary to the usual expectation the surfaces of greatest wear are 90 degrees remote from the surfaces of maximum pressure. This is a point which has never before been brought out, and it would seem that when the pressure comes on the pistons buckle, tending to form an ellipse, which formation is restrained due to contact with the cylinder walls, but the pressure thus exerted over a relatively small area of the total piston surface produces the undue wear as indicated in the illustration.

The connecting rods seem to be of sufficient strength for their intended purpose, but the brasses at the crankpin end show wear in such a way as to indicate that there was a considerable amount of side pressure due, no doubt, to absence of perfect alignment and a lack of proper endshake. Going back to the illustration, it will be observed that the least wear came at B1 and B3 of the brasses, and the greatest wear at B2 and B4. It will also be observed that the liners which separate the large end from the cap were not at all uniform in thickness, and in one of the connecting rods there were no liners at all. This state of affairs seems to indicate either a lack of uniformity in the assembling process, or a considerable amount of wear on a basis which was anything but uniform, as between the respective journals.

TIGHT COMPRESSION NOT READILY REALIZED

The very fact that the pistons show wear over two diametrically opposite zones and no wear on the surfaces, which are 90 degrees remote from the surfaces of greatest depreciation, indicates that the bores of the cylinders are not round, and it is scarcely to be supposed that the packing rings, no matter how well they may be fitted, will serve well their intended purpose under such conditions. If the motor is to deliver even a fair proportion of power, considering its original ability, it will be necessary to rebore the cylinders to make them round, or, what is better yet, they may be ground to a new and true bore.

The blackened zones which show over the piston surfaces, presents evidence of the lack of ability of the rings to maintain tight compression, and, if a proper repair is to be made, it is necessary to not only make the bore of the cylinders round by grinding or otherwise, and then, in view of the now larger diameter, it will be proper to substitute new pistons for the old.

SUMMARY OF REPLACEMENTS INDICATED

In a motor of this size, considering the character of the service it is designed to render, the piston clearance at the top of the stroke should be 0.015 of an inch. This allowance will be sufficient to take care of piston expansion due to heat and assure good lubrication. Were the clearance to be much greater the pistons would slap against the walls of the cylinders and a very annoying noise would result. With the new pistons new packing rings would come as a matter of course, and, for a proper repair, under the circumstances, it looks as if the motor should have been benefited by the substitution of new parts as follows:

(A) New pistons machined to the new diameter to compensate for re-boring of the cylinders to make them round.

(B) New piston rings.

On account of the wear of the cams and the battered condition of the tappets, it is more than likely that it would have been worth while to add:

(C) New camshafts.

(D) New lifts.

(E) New supplementary springs for the lifts.

(F) New brasses for the camshafts.

A close examination of the brasses for the camshafts indicated that the repairman who made the overhauling last year was lacking in skill, and in fitting the camshaft brasses he carelessly filed them down so that they will scarcely serve well for the purpose, although the repair, as it is now completed, is very good indeed; the present work is being done by an expert in this line, and by the proper use of liners, after the brasses were properly shaped up, good alignment was realized, and there is a fair chance that it will remain so for a reasonable length of time.

CRANKSHAFT REQUIRES SOME EXPERT ATTENTION

The condition of the crankpin brasses is a sign of uneven wear of the crankpins, and, if the future performance is to be as good as ever, it is necessary to remove and regrind the crankshaft in order to make the pins round. That they are now elliptical is one of the points that a micrometer will very quickly settle, and that brasses will render good service when they are fitted to elliptical pins is a settled impossibility.

Each effort, when it is directed to the more complete repair of a car, adds responsibility; were the crankshaft reground the diameters of the pins would be reduced, and the brasses might have to be re-babbited. It is possible that 0.010 of an inch off the pins would bring them to round. This reduction would have to be compensated for by reducing the thickness of the liners an equal amount, and since the brasses would have to be re-scraped, they would be reduced in radial thickness at least 0.015 of an inch. This does not sound like a very considerable amount, but it is an important difference, and if it is not to be had nothing remains but to reline the brasses in order to realize it.

There are risks to take in a matter of this sort; if the crankshaft is reground, the strength of the same will be much reduced. Considering the fact that the strength of a crankshaft is proportional to the cube of the diameter, a very slight reduction in diameter has a marked influence on the ultimate strength of the same.

In a new shaft this reduction of diameter is a serious matter, but in an old shaft it amounts to a positive risk, it is well understood that the life of every crankshaft is limited; it depreciates in service; the kinetic ability of the metal reduces as sure as kinetic work is done, and, the older the automobile, that is to say, the greater the length of service rendered, the greater will be the chances of crankshaft failure, after the crankpins are reground to make them round and true.

It might be said, why regrind the pins if the danger is so great? The answer is, why repair the motor if the brasses are likely to melt out when the motor is put back to work. Certainly the chances of bearing trouble will be very great if the brasses are clamped up against elliptic pins.

How can the crankshaft be conserved after it is reduced in strength by the grinding process, which is utilized to bring the pins back to round? Let us examine the law and find out. Secondary moments increase as the square of the velocity. The answer is, reduce the velocity in the ratio, which will limit the extreme fiber strain to a safe point in view of the fact that the extreme fiber strain increases inversely as the cube of the diameter.

Since secondary moments increase as the velocity squared, it follows that any method which will limit the speed of the motor will serve as the remedy. A governor, for illustration, answers every requirement. By adding more teeth to the driving sprockets, leaving the number of teeth in the driven sprockets as before, the speed of the crankshaft considering the speed of the automobile on the road, will be lowered, and, a governor, if it is so adjusted that the motor will not speed up when the clutch is removed, will afford all the protection that the occasion requires.

In view of what has been said, if the truth is reflected, an unskilled repair man is in a position to play "hob" with an automobile, and the cost of the play falls upon the owner of the car. In a matter of this sort skilled workmen will do as much or more damage than will follow the efforts of unskilled men. Accentuated skill on the part of the artisan is bound to lead to greater activity and the extra effort, if it is in the direction of the reduction in diameter of the crankshaft in the absence of some method of compensation, will serve as the prelude to a broken crankshaft.

SUMMARY OF CONCLUSION FOR THE CASE IN POINT

Considering the automobile, which is taken as the example in this instance, a summary of conclusions are as follows:

(A) The crankshaft should be centered in a grinding machine and all the pins should be ground round and true.

(B) Since the linings of the brasses are worn down, and the shims are in bad shape, to reline the brasses would be proper. The new shims would then be of even thickness, with takeup available for the future, and, after scraping in, the bearings would then be in as good order as when the automobile was new.

(C) This would leave the crankshaft in a precarious state considering a high rotative speed, and in order to correct this evil it would be proper to apply a governor to the carbureter in order to limit the maximum possible speed after declutching.

(D) On account of the unbalanced condition of the clutch (a construction fault which was mentioned), it would be an advantage to add teeth to the driving sprockets in order to limit the speed of the motor when it is running the automobile on a hard level roadbed, and the steadying effect of the extra load thus imposed, while it would tend to load the motor more than before, would be advantageous because it would limit the speed of the same and minimize the kinetic strains.

(E) By setting the governor for a certain safe speed, the motor would be limited in its ability, and the speed of the automobile on a hard level road would then be kept down to a safe point independent of the ability of the motor from the abstract power point of view.

(F) The noted state of the sprocket wheels and chains is such as to call for a new set, and, as before stated, it would be the height of a fallacy to put a new set of chains upon the old sprockets.

(G) In view of the manner in which the side frame was repaired, and the fact that there is no lateral bracing just where the winding effect of the motor is most pronounced, it would be an excellent idea to re-inforce the frame at this point; this is difficult in view of the location, and to accomplish the purpose it would be necessary to apply a curved cross-member, so shaping the same that it would pass under, or over, the flywheel and fasten to the sidebars at a point just back of the rear arms of the motor, in the plane of the flywheel.

(H) Since it is a fair assumption that the parts throughout the whole automobile, one like the crankshaft, effected by speed, the maximum speed of the automobile on the road should be limited to something less than the original speed of the same when it was new. To accomplish this the governor would have to be set accordingly, and, in view of this possibility it would be safe enterprise to use the larger driving sprockets, making them as large as possible, consistent with hill-climbing ability on the high gear.

In the absence of a governor there are other ways of limiting power, hence, speed of the motor. If the best power, considering speed, is due to the use of a magneto (disregarding other points of design for the moment) for ignition purposes, with the same so timed as to deliver an efficient spark at the best possible angle of advance, advantage may be taken of the fact that the angle of advance should be increased with the speed of the motor for the best results. By fixing the spark so that the angle of advance will be insufficient at the higher speeds, the power of the motor will not increase with the speed, in direct proportion to speed, and at the higher speeds, the power will be below the requirement as indicated by the automobile.

In a word, independent of the inherent ability of the motor, the spark may be so set that the speed of the automobile may be limited to, say 40 miles per hour on a hard level road, and this method of treatment will accomplish the desired result, without interfering with the hill-climbing ability of the automobile, because the spark will be sufficiently advanced to do efficient work at the speed of the motor which is likely to obtain in hill-climbing work.

If it is conceded that the original speed of the automobile was 50 miles per hour on a hard level road, then, by limiting the performance to a speed of 40 miles per hour, the strains will be reduced to about 2-3 of what they were originally, and this reduction will obtain throughout the whole automobile, so that safety will be assured, and the repair will be worth while. It is just possible that it is not necessary to make such a large reducton in speed, but this is a matter which cannot be definitely determined, since it depends (a) upon the quality of the material used in the automobile; (b) the time and character of the service rendered by the same, and (c) the character of the repair work done.

This particular automobile was made in 1906; it has done hard and nearly continuous work ever since, and it has not been properly repaired at any time. The body, while it was not positively light, was by no means heavy, and the automobile was speedy; the owner took advantage of this fact as often as possible.

Considering all the attending facts, it is a reasonable assumption that the possible speed, after repair, should be limited sufficiently to reduce the extreme fiber strain in the parts to approximately 2-3 of the original figure, and this will follow in case the speed is limited to 40 instead of 50 miles per hour. In fixing this limit, the gear ratio must be so adjusted that the crankshaft rotation will be reduced in the same ratio, besides taking into account the extent of reduction of the crankpins in case they are centered and ground to make them round.

OTHER PARTS WERE PUT IN GOOD ORDER

The transmission gear, front and rear axles, and other parts of the automobile not previously mentioned, were put in good working order and demountable rims were placed on all four road wheels. A new "dual" ignition system, including a Remy magneto, was installed, so that, on the whole, the cost of doing the work, as here noted down, was not high. This cost includes new ball bearings in the jackshafts, and a considerable amount of labor in divers ways that cannot well be stated.

COST OF ACTUAL WORK DONE

Substituting a Remy magneto and a dual arrangement of the ignition system for the old multicoil and magneto, eliminating the chain drive for the magneto, and other troublesome details	$55.00
Substituting detachable rims for clincher	20.00
New dashboard	15.00
Refinishing the car (paint)	75.00
Bolts, nuts, washers, etc.	5.70
Miscellaneous cash expenditures	45.00
Salaries paid for work done in dissembling the car, repairing the side frame, overhauling the motor, and starting the final assembling process	180.00
Estimated labor costs required to complete the work	60.00
Total cost	$455.70

WITH THE AGENCIES

Eight Hudson runabouts appeared in line in the parade held in Detroit before the start of the Glidden tour last summer. G. W. Dunham, the chief engineer, is in the first car

J. S. Bretz, president of the J. S. Bretz Company, New York

Recent Wisconsin agency appointments are: Cadillac, Park Hotel Garage, E. A. Kemmerer, proprietor, Janesville, Wis.; Kissel, E-M-F, Maxwell, Stoddard-Dayton, Matheson and Flanders, Baack, Reed & Gage Co., 111-113 North Main street, Janesville, Wis.; Overland, Sykes & Davis Garage, formerly Pierson's, 17-19 South Main street, Janesville, Wis.; Ford, Blodgett & Holmes, Riverside Garage, Janesville, Wis.; Overland, Merrill Iron Works, Merrill, Wis.; Overland, Calumet Auto Co., Brillion, Wis.; E-M-F, Flanders, Collmar's Garage, Baraboo, Wis.; Overland, L. P. Helm, Baraboo, Wis.; Reo, Wilke Garage, Sheboygan, Wis.; Overland, T. H. Jacobs, Wausau, Wis.; Badger, W. T. Schwantz, Lowell, Wis.; Jackson, Fuller, Cochrane & Son, Fox Lake, Wis.; Ford, Mayville Auto Co., Mayville, Wis.

A Baltimore branch for the Washington car has been established at North avenue and Oak street. The Auto Trading and Garage Company has been organized for handling this car here. The officers of the new company are Philip Wenchel, president; Jacob Baumann, vice-president; F. W. Lilly, treasurer, and W. Howard Schweizer, general manager. Messrs. Baumann and Lilly have the State agency for the car, with headquarters at Catonsville, Md.

The recently organized U. S. Auto Company, of Cleveland, has leased a large garage on Euclid avenue for five years and has received demonstrators of the Paterson "Thirty" and the Whiting lines, for which cars the company will act as agents. E. E. Robbins is president of the company, and A. A. Grimes, recently Jones speedometer salesman, will have charge of the sales.

The John Deere Plow Company, of St. Louis, Mo., Southwestern distributor for the Jackson Automobile Company, of Jackson, Mich., has appointed the following Jackson agents in Texas: Eikel Automobile Company, San Antonio, Tex.; Wortham-Shotts Company, Fort Worth, Tex.; Lee, McKallif & Abbey, Houston, Tex.

The Korach-Kraus Motor Sales Company has been organized at Cleveland by E. J. Korach and E. F. Kraus for the purpose of distributing the De Tamble models in Ohio. The company has acquired large salesrooms on Euclid avenue.

A new home for the Pierce-Arrow car is in the course of construction at 812 North Charles street, Baltimore. This store will be occupied after May 1 by the Foss-Hughes Motor Car Company, H. J. Sturdevant, manager.

The Standard Motor Car Company has added to its agency in Nashville the Empire 20 and the demonstrating car is expected to arrive within the next few days.

The East St. Louis Automobile Company, of East St. Louis, Ill., has taken the agency for the Jackson.

The Olds Motor Works' Louisville branch has made arrangements whereby Hamilton & Dodge, of the Phœnix Motor Car Company, of Lexington, become a branch of the Olds Motor Works.

Charles E. Miller recently announced the opening of another branch at 601-603 Baronne Street, New Orleans, La., for April 1. This makes eleven stores that Mr. Miller is operating.

H. A. Reifenberg, formerly of the Detroit branch of the Warner Instrument Company, has been given charge of the new office of that company at Kansas City.

The Toledo agency for the Paterson "30" has been landed by E. F. Lienhard, one of the most enterprising dealers on the banks of the Maumee.

The Davis-Bell Hardware Company of Itta Bena, Miss., has secured the agency in that section for the Maxwell cars.

The Presto-Lite Company has established a branch in Cleveland and a recharging plant. S. M. Paxton is manager.

The Jackson will be represented in Florida this year by C. F. Irsch, at Tampa, and McIver & McKay, at Ocala.

The Deere Implement & Vehicle Company, of Montgomery, Ala., will handle the Jackson this year.

Tuschen Brothers, of Watertown, Wis., have added the White, Waverley electric and Halladay cars.

Bretz Says Torpedo is Passing

J. S. Bretz, head of the J. S. Bretz Company, returned Monday from a flying business trip to Europe. He left New York on March 9. The chief part of his time abroad was spent at Schweinfurt-on-Main, where the F. & S. steel ball factory he represents, is located; at Liège, Belgium, and in London. While in Germany he had an opportunity to see the new types of German cars.

"At the Opel factory they are getting away from the torpedo shape," said Mr. Bretz. "The newest style of body slopes slightly inward at the back, and the radiator comes almost to a point, in an effort to decrease atmospheric pressure.

"I visited Henri Peiper, of the Société Internationale de l'Electricité, at Liège, Belgium, and then returned to London. One of the most interesting things I noticed about British motoring was the almost universal use that is being made of the Rudge-Whitworth detachable wire wheels."

While in Germany, Mr. Bretz witnessed the making of some steel ball bearings, nine inches in diameter, such as are used in the heaviest types of battleships to revolve the turrets.

Owing to the peculiar bungling of a cablegram by a London hotel, Mrs. Bretz failed to meet her husband as planned, and they passed one another on the high seas.

AMONG THE GARAGES

This E-M-F car takes care of the mail service of the Detroit factory of the Everitt-Metzger-Flanders Company. During February it delivered 143,000 pieces of mail satisfactorily

Horace De Lisser, vice-president of the U. S. Motor Company

B. M. Shea, manager of the George C. John Motor Company, New York, says that each year finds a larger volume of all-the-year-around business at the garage of the company. He says that the general use of the automobile has resulted in holding hundreds of business men in New York in Summer, who formerly visited distant summer resorts. The use of the car in their cases, takes the place of tiresome and expensive Summer trips.

The garage of the Warner Motor Company, at 1204 New Hampshire avenue, Washington, D. C., is reported to have been purchased by W. H Wyman. The garage is two stories in height, with a frontage of 70 feet on New Hampshire avenue, and has about 3,000 square feet of floor space. Mr. Wyman will do a general repair and garage business, and also wishes to embark in the manufacture of machines of his own design.

The store-room and garage of the De Dion-Bouton Company at Fifty-first and Broadway, New York, is in course of reconstruction. The partitions that formly cut up the interior of the garage have been torn out and the whole space will be utilized in the near future. The shops and boiler room have been removed to a small building adjoining the garage in the rear, thus affording considerable additional room.

At Marietta, O., Hinds & Bailey will make extensive improvements to their garage and sales agency on Putnam street. An addition will be erected in the rear of the lot, giving almost double space. A new arch entrance will be made on Putnam street and a second entrance will be made on Second street.

Automobile owners in Minneapolis now have all-night service as far as regards the repairing of their automobiles. The Parger garage has started keeping open house 24 hours a day in its repair department, and this innovation permits owners to have their cars washed or repaired at all times.

The Carl H. Page Company, 1627 Broadway, which handles the Chalmers cars, is seeking more room for its garage. Garage Manager James Bell says he sent out 116 new cars during March, but was seriously handicapped by lack of space. No new location for the garage has been selected.

At New Philadelphia, O., Edward Goodwin is remodeling the skating rink into a modern garage, which will be opened at once. The main portion of the building will be used for storage purposes and the rear is fitted as a repair shop.

Eastern Texas will have its first garage when the East Texas Automobile Company opens its quarters in Palestine, Tex. It will be located in the Wainwright Building, on Avenue A, and will be managed by W. H. Brooks.

Work has been begun on the new Packard garage in Portland, Ore. The building, which is located at Twenty-third street and Cornell road, will cost $30,000.

The Woodville Garage Company, of Woodville, Sandusky County, O., was incorporated with a capital of $10,000 by Fred H. Hartman, W. H. Price, Charles A. Kuhlman, William Uschel and J. T. Smith.

A. J. Schnell, the Scranton, Pa., agent for the Pullman, will erect a one-story brick garage, 40 by 74 1-2 feet, at 119 Jefferson avenue. It is expected that it will be ready for occupancy some time next month.

Work on the new Stevens garage to be installed in the Mosgrove block, Urbana, O., is progressing rapidly and will be ready for occupancy May 1.

Brief Personal Trade Mention

Irving H. Manning, recently with the American Locomotive Company, has joined the selling force of the Warner Instrument Company, as special representative. Mr. Manning has been selling cars for twelve years or more. For five years past his headquarters have been New York City.

Walter Schmunk, formerly of Cleveland and for several years identified with the automobile industry, has left the Boston branch of the White Company to return to Cleveland where he will be connected with the sales department of the Peerless Motor Car Company.

Julian G. Kursten, paying teller of the Union Trust Company of Detroit, and assistant manager of the Clearing-house Association, has resigned to accept a position with the selling force of the Anderson Carriage Company, making the Detroit Electric.

John W. Bate, designer of the Mitchell car and superintendent of the works of the Mitchell-Lewis company, of Racine, is enjoying his first extensive vacation trip. Mr. Bate will visit various countries in Europe, especially Italy.

E. J. Bohannon, assistant secretary of the Louisville Automobile Club, has resigned to become identified with a business house. The resignation will become effective May 1. His successor has not yet been appointed.

A. B. Barkman, for over four years connected with the Maxwell-Briscoe interests, and who has been one of the district managers of the company, has been appointed sales manager of the Maxwell organization.

George H. Votteler, for many years prominent in Cleveland business circles has entered the automobile field and accepted an offer from the Sterling Motor Sales Company, Ohio agents for the Sterling.

F. A. Bowers, for the past 10 years master mechanic and designer of pressed-steel stamping tools for the O. A. Smith Company, has resigned. His plans for the future are indefinite.

Office building recently added to the Maxwell-Briscoe Motor Company's plant at Tarrytown, N. Y. The architecture is in keeping with the suburban landscape

Merle L. Downs, secretary of the A. L. A. M. Show Committee

The Continental Motor Manufacturing Company, of Muskegon, Mich., manufacturer of automobile and marine motors, is constructing an addition to its machine shop, 132 feet by 160 feet, and adding two additional floors to its stock warehouse, which will give additional floor space of about 12,000 square feet. An extension, 40 feet by 150 feet, is also being made to the motor-testing building. The additions will give an additional floor space of approximately 40,000 square feet. The construction work is being pushed and it is expected will be ready for occupancy about May 1.

The Mitchell-Lewis Motor Company, of Racine, Wis., manufacturer of the Mitchell, is completing its new testing track, which is one-half mile long and wide enough for two or three machines abreast. A track was built last year, but did not prove adequate because it was built hurriedly. The new track is built to be permanent. The completion of this track obviates the necessity for using any public highways for testing purposes.

The West Milwaukee shops of the Chicago, Milwaukee & St. Paul Railway are turning out from three to five "automobile" freight cars daily, the demand having grown enormously. Manufacturers whose plants are situated along the Milwaukee road lines are not satisfied with the old-fashioned freight car. The new cars are of 60,000 pounds capacity and are marked "Automobile" on either side.

The Kelly-Toledo Tire & Rubber Company has been organized at Toledo with a capitalization of $375,000. Charles F. U. Kelly, for many years identified with the Akron industry as sales manager, will be general manager. The new company will erect a large factory in Toledo, employing 500 men, and will devote most of its time to the manufacture of automobile tires.

Papers have been filed with Secretary of State Thompson of Ohio increasing the capital stock of the Firestone Tire & Rubber Company from $5,000 to $4.000,000. The company, which was formerly a West Virginia corporation, was recently chartered with the small capital to permit of its organization before the capital was increased to the amount desired.

N. Lazarnick, photographer, with headquarters in New York and a branch office at 870 Woodward avenue, Detroit, is making a tour of the principal automobile manufacturing centers with a view to opening branch establishments at Cleveland, Indianapolis, and such other points as would seem to be of sufficient promise to make it worth while.

The National Rubber Tire Manufacturing Company has been organized and incorporated to manufacture automobile tires, non-skid treads, and inner tubes. The company expects to complete arrangements for manufacturing within the next thirty days. The present headquarters is Bullitt Building, Philadelphia, with Clifford R. Skinner in charge.

The Cass Motor Truck Company, capitalized at $300,000, has been organized at Detroit, for the purpose of building commercial vehicles. The incorporators are: John I. Turnbull, George G. Epstean, Alex M. Spater and F. W. Ferguson. The company is negotiating for a site upon which an extensive fireproof factory will be erected.

The Packers' Motor Truck Company has been organized in Pittsburg with a capital of $100,000 by W. M. Zoller and E. K. Callahan, of this city; James F. McGarry, of East Liverpool, Ohio; Geo. P. Pratt, of Buffalo, N. Y., and Albert M. Schenk of Wheeling, W. Va. The company will manufacture two and three-ton trucks.

At a meeting of the stockholders of the Findlay Carriage Company, of Findlay, O., it was decided to increase the capital stock from $50,000 to $150,000 for the purpose of opening a department for the manufacture of automobiles. The first car, a gasoline runabout, has been finished and tested.

C. West & Company, carriage builders, who have been located in Duquesne Way, Pittsburg, since 1847, are opening an automobile department, which will be under the management of W. F. Melhuish, Jr. They will handle the Simplex car, and will also build bodies for the Buffalo truck chassis.

The Lozier Motor Company has purchased 65 acres of land in the east end of Detroit, at an approximate cost of $2,000 an acre, as the site for an immense plant. It is announced that construction work will begin early in April. The location has both railroad and street car facilities.

At the annual meeting of the board of directors of the Keller Manufacturing Company, Philadelphia, the following officers were elected: Julius Keller, president; W. P. Pressinger, Wm. H. Keller, S. W. Prince, vice-presidents; Francis J. Rue, treasurer; C. S. Bell, secretary.

It was rumored last week that the price of the Hupmobile, as made by the Hupp Motor Car Company, Detroit, would be advanced in price to $800 from $750. Later advices direct from the company are to the effect that the price will not be advanced.

The Pierce Motor Company, of Racine, Wis., has already started its engineers and draftsmen on 1911 models. The torpedo style, which is being produced in limited quantities, will be incorporated in the regular 1911 line.

The Franklin Commercial Truck Company has been formed at Franklin, Pa., by Charles H. Sheanley, Charles E. Trace and Harry A. Myers, and will manufacture an automobile truck.

The Consumers Rubber Company, of Cleveland, has taken the agency for Star tires. The Star Rubber Company, Akron, began to make automobile tires a few months ago.

The Hercules Specialty Company, of Grove City, Pa., has secured James McIntosh as superintendent, and will begin the manufacture of motor trucks at once.

The third semi-annual dividend of 3 1-2 per cent. was paid April 1 on the preferred shares of the General Motors Company.

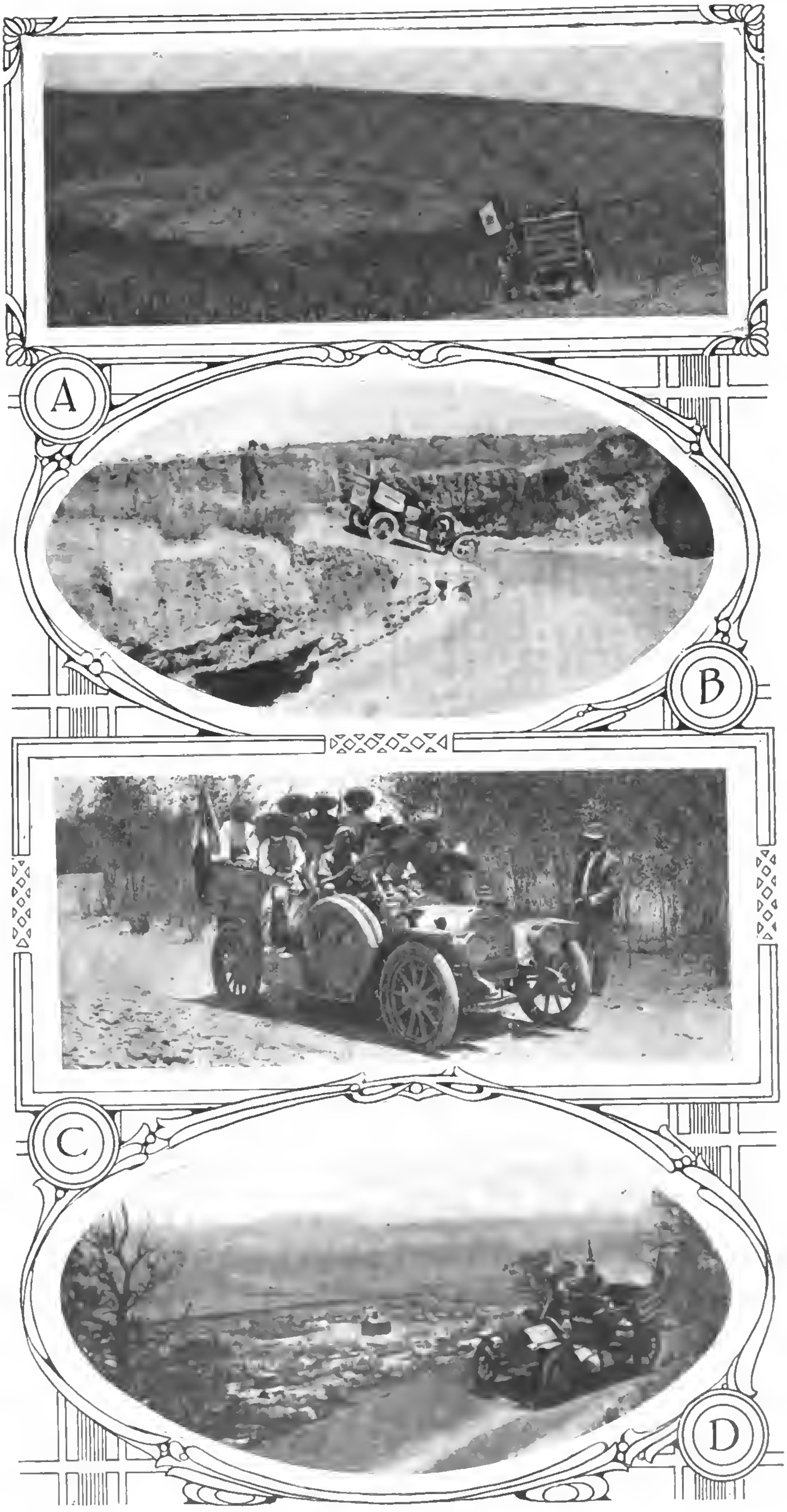
FLAG TO FLAG

With a score or more cars assured of entry in the Flag to Flag Contest for the Wahlgreen trophy, which starts at Denver City May 2 and finishes at Mexico City, the event promises an interesting and valuable trip. The course, as laid out, is about 2,500 miles long and is largely planned through country that is new to the automobile.

The course will be south from Denver, through Colorado Springs, Pueblo and Trinidad to the southern boundary of Colorado. This country is a desert during the greater part of each year, save for the spots where irrigation has served to make it a luxuriant garden. In sight of the route, to the westward, the snowy caps of the Sierra Blancas tower into the Italian blue of the unclouded sky, while the exhilarating air and good roads lend themselves to the enjoyment of the tourist. Crossing the New Mexican boundary, the course leads on through the Raton foot hills and stretching southwestward enters Texas in the rolling Panhandle country. The route touches Amarillo, San Angelo, Kerville, near the center of the State, and then, swinging back, circles through San Antonio. From thence the course is straight to the Rio Grande, crossing at Eagle Pass in our romantic sister republic. The route from the border traverses the State of Coahuila to Torreon, thence south to Zacatecas and Aguas Calientes. From this point, rich in interest for Americans, the route swings easterly through Celaya, San Juan del Rio and Tula to the capital.

It has been estimated that the trip should cost about $5 a day for each man and an allowance of $5 a day for each car should also be made. Gasoline and oil will be furnished free to entrants by the Waters-Pierce Oil Company at numerous supply stations all the way from Denver to Mexico.

The tour is under the management of G. A. Wahlgreen, donor of the trophy, who is assisted by G. A. Blanchard, assistant manager. The aim of the project is largely educational, as the country traversed en route is rich and able to buy large numbers of cars.



A—Road Leading Down Into Raton Valley, a 3,000-Foot Drop
B—Chalmers Pathfinder in an Arroyo, 35 Miles from Trinidad
C—Knipper Giving a Crowd of Mexicans Their First Auto Ride
D—Descending Raton Mountain, with the Town of Raton Below

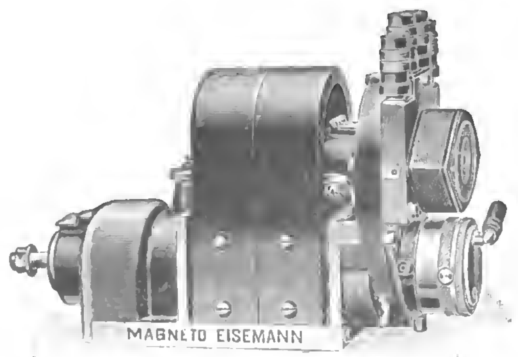
PROMINENT ACCESSORIES

AUTOMATIC ignition timing has frequently been tried on automobile engines, but hitherto has met but a slight measure of success. Although on a number of cars the absence of the usual timing lever may be remarked, the majority of these avoid it by the use of fixed timing. However, no one has ever attempted to dispute the desirability of an automatically timed ignition, if its apparently inherent disadvantages could be done away with; and the announcement of the makers of the Eisemann magneto that they have perfected such a device will be received with the greatest interest by all automobilists.

The device in question is simply a fly-ball governor arranged on the magneto shaft, and built in with the magneto as a unit. The governor balls act through bell cranks to shift a sleeve on an extension of the armature spindle. This sleeve is provided with internal threads of a square section which engage with corresponding external threads on the armature spindle. These threads are of a steep pitch, and as the governor acts they serve to rotate the armature shaft relatively to the governor shaft, through which the driving power is transmitted.

It will be noted that in this system the armature as a whole is rotated, thereby causing the break at the time of the maximum strength of current regardless of the amount of advance. Such a system, of course, gives a spark of equal intensity at a given speed of the magneto, and permits of utilizing the hottest sparks of which the magneto is capable. It is stated that because of this a quarter turn of the crank suffices to start the motor.

Another ingenious feature has been incorporated in this magneto, namely, a device for facilitating setting the armature with respect to the crankshaft. In the rear portion of the regulator housing is a slot into which may be inserted a correspondingly shaped key. The sleeve, which is rigidly connected to the armature shaft, is square and the key will fit into either of two sides of the square. When the key is inserted, the armature is held stationary in the position in which the platinum points of the circuit breaker begin to move away from each other. With this device it is no longer necessary to look at the make-and-break mechanism to determine the moment at which the points are separated. The Eisemann magneto is now handled in this country by the Eisemann Magneto Company, 225 West Fifty-seventh street, New York City. The magneto itself, of French manufacture, is favorably known and is used as standard on a number of high-grade cars. The company is also prepared to meet the requirements of the aeroplane industry, having brought out a lightweight magneto specially designed for use on aeronautic motors, in which aluminum has been freely used.



Eisemann Magneto with Automatic Timing

The Safety Tire Gauge Company, 315 Dearborn street, Chicago, is offering to automobilists the type of tire gauge illustrated herewith. It is a combined pump connection and pressure gauge. It makes a very convenient pump connection, and by means of the protruding rod, which is forced out by the air pressure within the body of the device, the pressure is always indicated. The gauge is stoutly constructed, and will stand hard knocks in the tool box without injury.

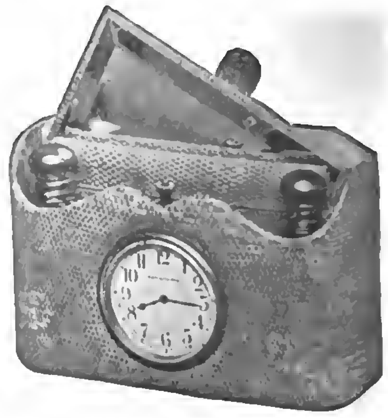
"Safety" Tire Pressure Gauge

If automobile engines ran at a constant speed, the problem of electric lighting and storage would be simple, but as the engine speed varies from zero to 1,500 revolutions a minute, some method of governing the output of the generator is necessary. The latest method of accomplishing this end is by the Ward Leonard system of electric lighting, which has been brought out by the Ward Leonard Electric Company, Bronxville, N. Y., and was specially designed for automobile service.

In this system the generator is a small dynamo mounted on the engine, by which it is driven through a magnetic clutch. When the dynamo speed is such that the dynamo voltage is equal to or slightly greater than the battery voltage, the circuit is established automatically, and the output of the dynamo charges the batteries. When the dynamo slows down, the circuit is automatically broken. The automatic switch also breaks the circuit to the magnetic clutch when the charging amperage exceeds the proper amount. Two storage batteries are provided, one of which is used for lighting, while the other is used for ignition. Besides the usual lamp equipment, the electric system will also provide current for a horn, a reading light, a speedometer light, a cigar lighter and a trouble light.

The Mechanical Instrument Company, 120 Liberty street, New York City, has brought out an instrument under the name of the "Mico reciprocating meter" for registering accurately the total feet of travel of all reciprocating motions. The instrument resembles a large speedometer in appearance, having a circular dial face reading up to 10 feet, on which a hand travels clockwise, and a counter reading up to 100,000,000 feet. It is connected with a crosshead or other reciprocating part by a flexible bronze cable which winds around a drum on the rear of the instrument. This handy little meter will be of the greatest possible value to factory engineers and superintendents, in that it will enable them to check up the operation of steam pumps, and other similar machines with accuracy, while its simplicity makes it easy operable by any employee.

Limousine owners will doubtless fancy the toilet rack watch which screws into the toilet rack or vanity box usually included in the equipment of closed cars. The watch is in three parts, two of which screw together, clamping between them the leather of the case. The back snaps on, making the mechanism dust and damp-proof. The watch may be wound and set without removing from the rack. The watch regularly furnished has seven jewels, Breguet hairspring, cut expansion balance and other standard features. It is made by the New England Watch Company, Waterbury, Conn., and should be warmly greeted by the trade.



"Limousine" Watch for Closed Cars

THE AUTOMOBILE

LOS ANGELES MOTORDROME OPENING

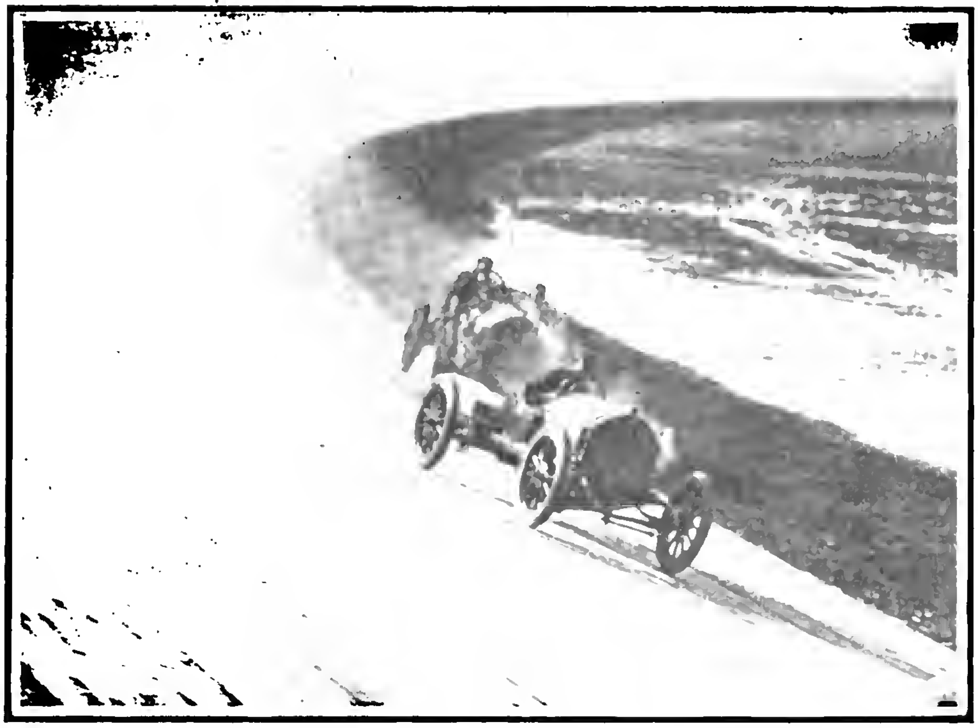
LOS ANGELES, Apr. 13—Racing began at the Motordrome on last Friday under favorable auspices with a scheduled meet of seven days, and from indications, thus far, it is anticipated that the closing on Saturday will be in a blaze of enthusiasm. The Motordrome is more interesting than it otherwise would be, because it is along absolutely new lines, and represents something definite; with the expectation that it will prove out the real capability of the circular track. Heretofore, circular track work was hampered by unavoidable but interfering considerations. Tracks laid out specifically for horse racing offered so many disadvantages that failure to make speed made it impossible for experts to decide as to whether or not the shortage was due to centrifugal force, and other true phenomena, which belong properly to the circular track, or to lack of suitable characteristics of the roadbed.

In this case the track is one mile in circumference. The width of the track available for the cars is 45 feet, and the outer edge of the same is 15 feet higher than the inner edge. The amount of the embankment, therefore, is represented by an elevation of 15 feet in 45 feet. A safety zone is provided around the inside of the track proper, which zone is 30 feet wide, made of dirt. The track proper is built up of 2 by 4 deal timber on edges, supported by a suitable framing which rests on vertical members, with a distance between bents which is regarded as consistent with the load to be supported, considering the ability of the 2 by 4 deal roadbed.

Anticipating a high rate of speed on the part of the racing automobiles, and remembering that casualties are possibilities which increase in the ratio of the speed squared, the design of the track is such that even if the embankment proves to be inadequate for the purpose, a further safety measure is induced through vertical backboard which runs all around the outer edge of the track, provided with T-rails, the first of which is 24 inches above the level of the platform, and the second is 7 inches (centers) above the first. It is anticipated that a car, in the event control is lost, will render a "swipe" below against the T-rails, and skid along for a sufficient distance to dissipate the energy represented in the moving mass, doing the least possible damage in the process.

A SPEED BRUSH BETWEEN BUICK, COLE "30," AND APPERSON AUTOMOBILES ON LOS ANGELES BOARD TRACK

Should a car take fire, which is within the range of possibility, a means is provided for prompt quenching of the fire, and this is deemed of importance, in view of the fact that the track is of wood, and remembering that water is not efficacious as a fire-fighting instrument in the presence of gasoline. For the purpose of quenching any incipient flame, a strip 5 feet wide runs all around inside of the dirt auxiliary track, which strip is composed



A LONG CHASE BETWEEN DE PALMA IN FIAT AND LESCAULT IN PALMER-SINGER

taking advantage of wide experience.

Six repair pits are located in front of the boxes and extend around the circle for a distance of 300 feet; they are situated in a radial direction 40 feet in from the board track, and the space is covered by the same 2 by 4 scantling material as that of which the track proper is made. The repair pits are built in the light of experience under racing conditions, every facility is afforded for prompt and accurate work, and the location is such that the officials, the spectators and the press will be enabled to witness the rapid fire process which is so essential to success under racing conditions, and also to judge of the necessity and the character of the repair work undertaken. The press stand, which is well appointed and sufficiently commodious for the purpose, is located directly opposite repair pits.

of sand in sufficient presence to serve for every requirement, and it is claimed by the track designer that it may possibly serve as a good landing place for a car if it runs wild, provided it travels in the direction of the axis of the circle.

AMPLE ACCOMMODATION FOR THE PATRONS OF THE TRACK

The grand stand stretches for 2,000 feet around the periphery of the track, and a box section for 1,000 feet. The box section is roofed over, and has accommodation for 3,000 people. In the grand stand the seats are six rows deep, and the seating capacity is stated to be 11,000 persons. Safety measures obtain at every point; access to the infield is by subways from without, and an aero club building is placed to one side of the field inside of the track. It includes every facility for the intended purpose. The infield is sufficiently large to afford ample maneuvering space for aeroplanes, and the spectators, from their point of vantage in the boxes or grand stand, could not be better placed.

A CONSIDERABLE UNDERTAKING

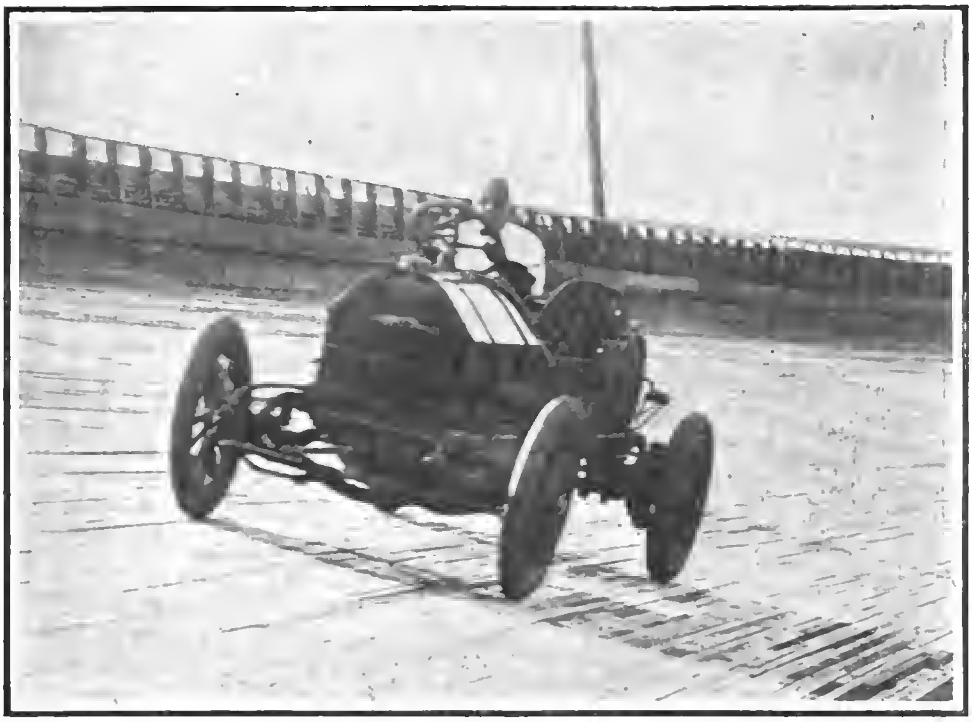
Visitors at the Motordrome will scarcely be in a position to judge of the enormity of the undertaking; they will hardly appreciate the fact that the building of the track called for the use of 3,000,000 feet of Oregon pine, nor is it possible to fully realize what it means to procure this material and whip it into shape within the short time which elapsed from the ordering of the material in December last to the official opening of the track on April 8. The actual work of building the track was started on February 1, and it went forward unceasingly to the finish, due to the foresight of the management, and the completeness of the plans which were made under the direction of Manager Moskovics, thus bringing into play the facility which comes from close application,

LOCATION WELL SELECTED

The distance from the ocean is barely three-fourths of a mile, and to Venice is 1 1-2 miles. Venice is a town with a population of 10,000, and it is 11 miles distant from Los Angeles. The transportation facilities are by means of two trolley lines, one of which is designated the Venice short line, and the other is the Playa del Rey road. A loop enters the outfield of the Motordrome, adjacent to the grand stand and the boxes, so that visitors who may not care to ride in automobiles will find the trolley efficacious, and the scenery as pleasant as the air is balmy. There are a large number of automobile owners in and about Los Angeles; it is the automobile center of the Pacific Coast, barring the rivalry of "Frisco" and vicinity.

The events scheduled for the present meet are, in the main, composed of stock chassis entrants, and the scheduled dis-

HARROUN, MARMON, DOING MILE IN 49 SECONDS PRELIMINARY TO SOME REAL WORK tances are 5, 10, and 25 miles. Added interest is due to the longer distance races, one of which is for 100 miles, and a second is in the 160-230 class, another for the 230-300 class; then comes the 301-450 class, and finally the 451-600 class. The last named is the more formidable, unless it proves that the 24-hour event is, for which the prize is $1,000 in cash for the winner, $500 in coin for the second, $300 for the third, $200 for the fourth, and the right to participate for the rest. It is predicted that the two-hour race for stock chassis in the class having over 600 cubic inches displacement will be of more than passing interest in relation to which a remark or two may not be out of place.



HANSHUE IN APPERSON JACKRABBIT COAXING THE FIELD TO COME ON

SUMMARIES OF RESULTS

Friday, April 8—One-mile trial, Benz (Oldfield), 36.22, new American track record.

One-mile trial, amateur, Fiat (Bragg), 37.56.

Ten-mile trial, Simplex (Robertson), 6.31.37, new American track record.

Two-mile trial, Darracq (Kerscher), 1.18.29, new American track record.

Five-mile trial, Fiat (De Palma), 3.15.62, new American track record.

Ten-mile, Class C, 451-600 cubic inches piston displacement, Knox (Oldfield) won, Apperson (Hanshue) second, Isotta (Marquis) third. Time, 7.49 2-5.

Ten-mile chassis, 161-300 cubic inches piston displacement, Cole (Endicott) won, Buick (Nikrent) second, Firestone (Linthwaite) third. Time, 9.03.25.

Five-mile, free-for-all, Class D, Fiat (De Palma) won, Simplex (Robertson) second, Darracq (Kerscher) third. Time, 3.16.3.

Ten-mile, 230-300 cubic inches piston displacement, Marmon (Harroun) won, Dorris (Siefert) second, Corbin (Livingston) third. Time, 1.25.22.

Saturday, April 9—Five-mile, Class C, 451-600 displacement, Knox (Oldfield) won, Apperson (Hanshue) second, Isotta (Marquis) third. Time, 3.52.20.

Ten-mile, free-for-all, Simplex (Robertson) won, Fiat (Bragg) second. Time, 6.35.6.

Fifty-mile, stock chassis, 161-230 displacement, Cole (Endicott) won, Buick (Nikrent) second, Warren-Detroit (Miller) third. Time, 43.49.69 (National Speedway record).

Ten-mile, stock chassis, handicap, Ford (Hampton) 3.10, won, Stoddard-Dayton (Livingston) 25, second, Knox (Oldfield) scratch, third. Time, 10.10.1.

COLE "30," ENDICOTT DRIVING, IN A RECORD PERFORMANCE ENDING EASY

Sunday, April 10—Fifteen-mile, stock chassis Class C, 160 displacement. Fiat (De Palma) won, Isotta (Marquis) second, Hupmobile (Kelly) third. Time, 17.07.81.

Five-mile, Chanslor and Lyon handicap, Palmer-Singer (Lescault) one minute, won, Stoddard-Dayton (Livingston) 35 seconds, second. Isotta (Marquis) one minute, third. Time, 3.23.16.

Five-mile, 231-300 class, Marmon (Harroun) won, Dorris (Siefert) second. Time, 3.55.97.

Fifty-mile, Venice sweepstakes, 451-600 class, Isotta (Marquis) won, Stoddard-Dayton (Livingston), second. Time, 39.20.69 (National Speedway record).

Five-mile handicap, Simplex (Robertson) scratch, won, Palmer-Singer (Lescault), 50 seconds, second, Stoddard-Dayton (Livingston), 30 seconds, third. Time, 3.29.28.

Five-mile, free-for-all, Fiat (Bragg) won, Simplex (Robertson) second, Darracq (Kerscher) third. Time. 3.15.89 (American record).

FELLOWSHIP was the keynote pervading the harmony that surrounded the first annual banquet of the Association of Licensed Automobile Manufacturers at the Hotel Astor on the evening of April 7. The attendance included about 150 and was composed of representatives of practically all the companies engaged in the making of the motor car under the Selden patents as well as the press.

The function was held in the main dining-room of the hotel and the menu was of particular choiceness and completeness. The fundamental motive in all the addresses was the advancement of the automobile and the subject was treated from a great variety of angles.

The Hon. Fred M. Warner, Governor of Michigan, the leading State in the making of motor cars, was the guest of honor. His address was devoted in large measure to tracing the influence of the automobile as an actual factor in modern development, with particular reference to its importance to the State of Michigan as an automobile center.

Governor Warner prophesied that the Federal Government would cooperate with the individual States at no distant period in advancing the cause of good roads in a practical way to obtain results.

Job Hedges acted as toastmaster and was at his wittiest in his introduction of the various speakers and in making pat comments upon their efforts to entertain and explain.

Arthur Brisbane, editor, made a number of striking statements with regard to the development of the automobile. One of these was as follows: "The automobile does not destroy city pavements. The vast bulk of the damage in this respect is accomplished by the caulks with which the shoes of horses are armed. In the day when the horse shall be no more, I venture to prophesy that the saving in one big city in the matter of paving and repairs in one year will reach a

Scene in the Banquet Hall of Hotel Astor Upon the Occasion of the First Annual A. L. A. M. Banquet

figure that will be of sufficient size to cover the purchase of all the automobiles made in the country during that year."

Other speakers were Joseph E. G. Ryan, of Chicago, and William H. Edwards, Commissioner of Street Cleaning of New York.

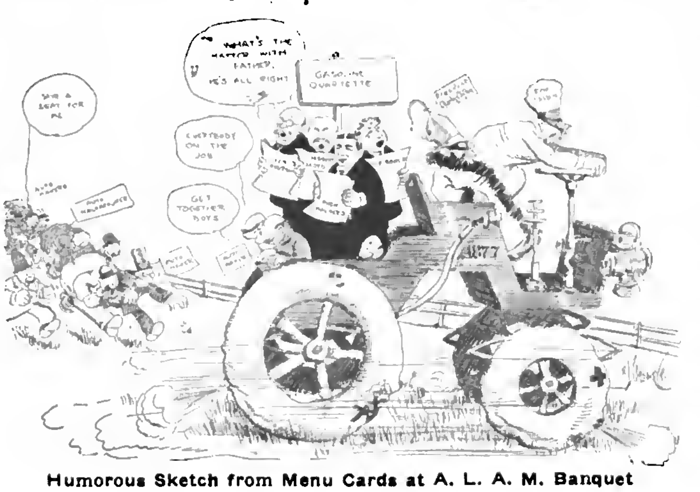
The feature of the affair was the incident attending the presentation of a loving cup to Colonel Clifton and a Steinway Baby Grand piano to Mrs. Clifton, on behalf of the association.

At the appropriate period of the speaking, Colonel Pope arose and said that he had a duty to perform that was a real pleasure. He pointed out that such labor as had been given freely by Colonel Clifton in the interests of the association could not be bought with money.

In accepting the cup, the president said that the basis of presentation would have to be altered before he would be easy in his mind about receiving it. He said that whatever success he had achieved as head of the organization was due to the fact that he had been accorded efficient support by the other officers and members of the association and that credit was due to them, even more than to himself. He made an earnest plea for continued co-operation and said that the only basis upon which he felt justified in accepting the cup was that it should be regarded as a rallying point for the forces of the association.

As he was about to resume his seat amid a volley of applause, Mr. Hedges turned toward Colonel Clifton and, when quiet had been restored, said that every member of the association knew how much valuable time had been given by Colonel Clifton to the association's work. That was in the past and could not be recalled.

But during all that time in which Colonel Clifton labored to build up the motor industry he almost forgot that he had a home. He could not forget his helpmeet and the partner of his joys and sorrows, but if had not been for the free service he gave the association, he undoubtedly would have spent more time in her company. Therefore, while the success of the association was sufficient reward in itself for Colonel Clifton, the association thought this a good time to make some sort of amends to Mrs. Clifton for the loss of her husband's company.



Humorous Sketch from Menu Cards at A. L. A. M. Banquet

R. H. Johnston, of the White Company, composed some amusing parodies that met with much applause.

The full list of those who attended the banquet is as follows: C. B. Ames, John E. Baker, F. A. Barker, J. B. Bartholomew, A. G. Batchelder, Leigh Best, Samuel R. Betts, W. R. Blodgett, Preston H. Breed, Arthur Brisbane, Benjamin Briscoe, Frank Briscoe, Geo. H. Brown, M. J. Budlong, H. P. Burchell, Geo. H. Buzby, Henry Caldwell, Hugh Chalmers, Julian Chase, Coker F. Clarkson, Charles Clifton, H. E. Coffin, Lee Counselman, James G. Cowling, H. F. Cuntz, Duncan Curry, S. T. Davis, Jr., Horace De Lisser, H. F. Donaldson, F. D. Dorman, M. L. Downs, Geo. J. Dunham, Calvin H. Dunlap, W. C. Durant, J. Frank Duryea, Arthur N. Dutton, Hayden Eames, William H. Edwards, C. A. Emise, Hermann G. Farr, T. J. Fay, Frederick P. Fish, Edwin A. Fitts, Harry Fosdick, Geo. G. Foster, Lewis H. Freedman, W. N. Freeman, C. W. Fuller, R. D. Garden, C. J. Giegerich, J. W. Gilson, Charles Glover, Morris A. Hall, C. C. Hanch, L. P. Hardy, W. H. Harrison, M. S. Hart, Elwood Haynes, E. W. Headington, Job E. Hedges, Thomas Henderson, Edward R. Hewitt, C. C. Hildebrand, William H. Horner, Russell Huff, H. L. Humphries, Wm. R. Innis, R. B. Jackson, R. H. Johnston, H. B. Joy, James Joyce, F. M. Kirby, L. H. Kittredge, N. Lazarnick, Frank C. Lewin, Herbert Lloyd, V. A. Longaker, Henry A. Lozier, David S. Ludlum, G. G. Luthy, C. J. McIntosh, Alvan Macauley, J. M. Mack, Steven S. Manes, C. W. Matheson, F. F. Matheson, Walter C. Marmon, W. H. Marshall, J. S. Marvin, J. D. Maxwell, A. N. Mayo, W. S. M. Mead, William E. Metzger, F. L. Mitchell, Guy E. Mitchell, C. J. Moore, S. H. Mora, W. J. Morgan, W. G. Morse, A. C. Newby, M. H. Newton, H. W. Nuckols, Thomas C. O'Connor, R. E. Olds, R. M. Owen, Carl H. Page, I. H. Page, A. P. Palmer, E. F. Peer, John F. Plummer, Albert L. Pope, Harold L. Pope, George Pope, C. F. Pratt, Howard E. Raymond, William A. Redding, Alfred Reeves, Samuel Regar, A. L. Riker, A. W. Robinson, Frank W. Roche, E. H. Rounds, E. F. Russell, R. H. Salmons, P. D. Schenck, Kenneth B. Schley, E. E. Schwartzkopf, George B. Selden, Albert E. Smith, H. O. Smith, F. B. Stearns, Oscar Stevenson, W. S. Stevenson, Walter Stewart, C. G. Stoddard, Geo. H. Strout, Walter Sullivan, William M. Sweet, H. M. Swetland, E. L. Thomas, E. R. Thomas, Thomas H. Thomas, Carll Tucker, W. H. Van Dervoort, R. B. Van Dyke, S. D. Waldon, C. E. Walker, W. C. Walker, Walter Wardrop, Hon. Fred M. Warner, J. W. Wellington, O. H. L. Wernicke, J. C. Wetmore, William T. White, Walter C. White, Windsor T. White, Alexander Winton.

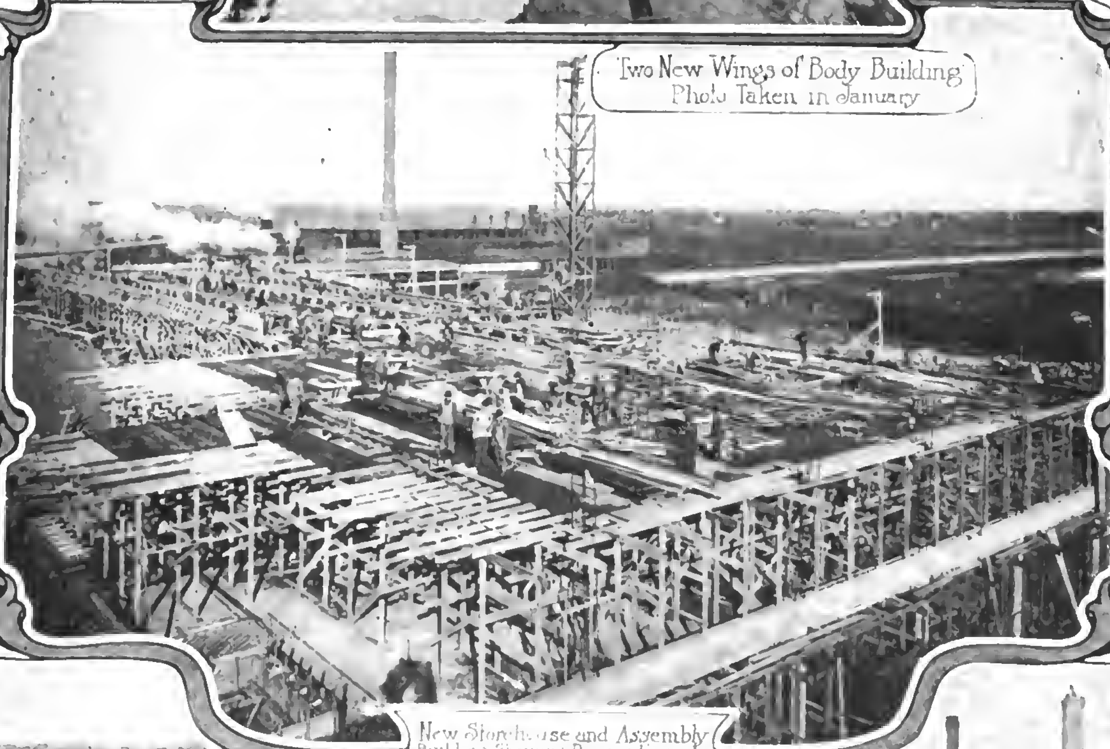
Little daughter of Mr. and Mrs. W. C. Johnson, assistant general manager of The Waverley Company. Mrs. W. C. Johnson and Mrs. W. F. Taylor graced the seat of the Waverley Electric, enjoying the privilege of chaperons to the " Belle," who appeared to appreciate the situation.

RECENT PIERCE-ARROW FACTORY ADDITIONS

Even Winter Weather Couldn't Stop Progress

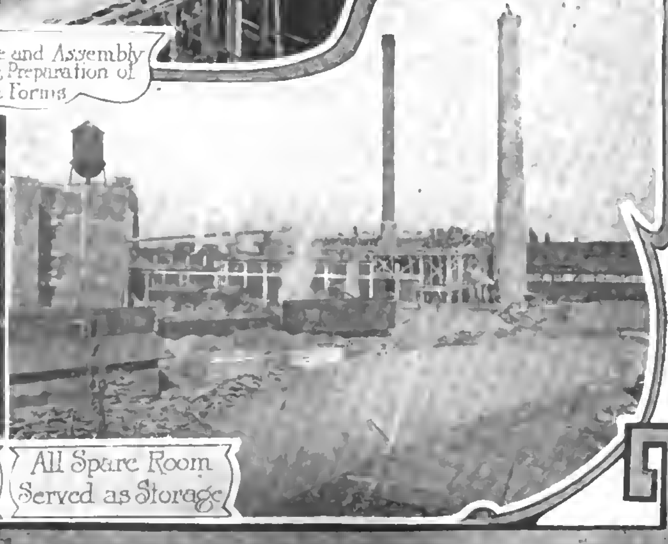
Two New Wings of Body Building Photo Taken in January

View of one Addition to Body Building



New Storehouse and Assembly Building Showing Preparation of Concrete Forms

Breaking Ground in November



All Spare Room Served as Storage

Panorama view of the Pierce-Arrow plant along Great Arrow avenue. The three-story structure in the foreground is one wing of the original body building, while at the right may be seen one of the four-story 350 by 60 foot wings just added to it. At the left is shown one end of the Administration building.

ENLARGEMENTS of the largest automobile factory in Buffalo, some of them practically accomplished, others under way or planned for the immediate future, and in conjunction herewith a final, long-expected announcement to the effect that the same factory will presently manufacture a heavy-load, high-powered automobile truck, constitute steps in the onward march of the automobile industry which must attract national and international attention by reason of their intrinsic interest.

The factory in question is that of the Pierce-Arrow Motor Car Company, and the public interest attaching to the enlargements of its activities, as referred to, lies rather in the promise of a greater output of a favorite car of high grade than in the encouragement which the company's success must afford for all automobile manufacturers who may wish to adopt its methods, highly deliberate as they have been, yet leading safely and quickly to large production and an eminent position in the industrial world.

The truck which the Pierce-Arrow company will manufacture in one of the new buildings to be erected for this purpose has been on trial for about two years. It was loaned to a tire manufacturing company for five months with a view to giving it the hardest possible usage; namely, such as the tire company found necessary in order to test its own output of truck tires to destination, and, even during its earliest experimental days, the new model truck bore itself as a true prime mover of heavy loads over roads of all descriptions, never requiring outside assistance or roadside repairs. After having observed the progress of truck construction all over the world for a number of years, without feeling quite sure that full value for commercial work was produced anywhere, or that the manufacture of trucks could be undertaken properly in a plant intended for the production of pleasure vehicles, the designers of the experimental Pierce-Arrow truck had the satisfaction, when the time finally seemed ripe for active steps, to find that their observations had rounded themselves into a full-fledged conception of the type of truck most needed and most economically useful, but also most difficult to produce for the variable American road conditions; the truck of a load and power rating far exceeding that of most commercial vehicles in successful use.

The contemplated production of this heavy truck is only in small part responsible for the new enlargements of the Pierce-Arrow plant. The floor space, the mechanical equipment and the number of employees are being increased in all departments, and the fact that this expansion can take place without interfering in the least with the prosecution of the daily routine of work brings in an element of absorbing interest far beyond the automobile industry. The factory, as it was planned four years ago and as it became ready for occupancy in 1907, was laid out with just this

Giving an idea of the size of the new storehouse and assembly building. To carry materials used in the new buildings it was necessary to run two lines of railroad track into the Pierce-Arrow yards. One, with a line of cars on it is shown, the other being in the extreme rear of the site or foreground of the photograph.

The new Pierce-Arrow plant from the rear. On the left are the two almost completed wings of the new body building. The small building, just inside of the fence, is that for motor testing which is to be enlarged. The structure on which work is shown to be in progress is the nickel-plating building, while to the right is the new storehouse and unit assembly building.

possibility of expansion in view and yet without any sacrifice of economic advantage. But it was thought at the time that the facilities provided would be sufficient for a number of years.

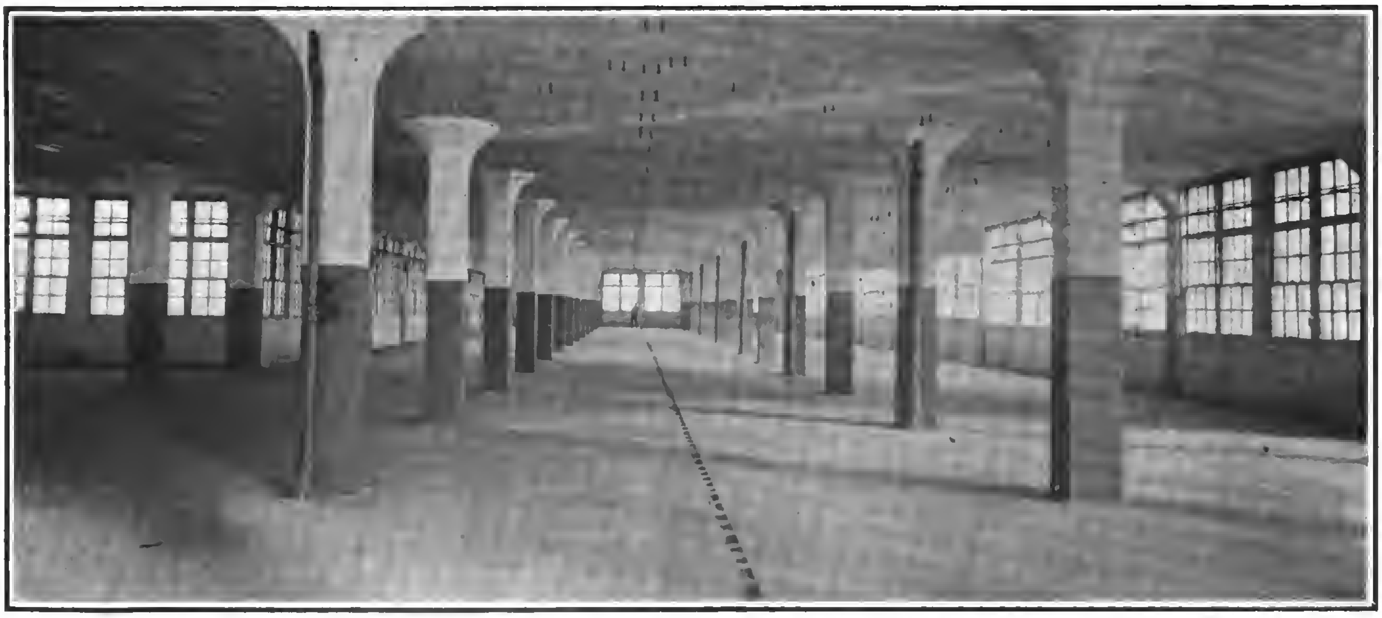
A brief retrospect will give the best idea of the foresight employed and of the value which will flow from it when factory managers from other cities and countries take note of the manner in which the plant has been made susceptible of expansion without any piecemeal addition of incongruous features or buildings.

The Pierce-Arrow plant of 1907 was one of the first great factories in the world built exclusively for the production of the highest grade of automobiles on a large scale and fitted no less for the welfare of employees than for solution of all problems in manufacture and independent research along lines of improvement. The ground plans bore evidence of the importance attached to economical handling of stock and parts. From the freight and express cars, through the inspection department all materials passed with strict reference to the order of the successive processes which they must undergo, before finally reaching the department of assembling. Here improved methods for saving labor and space were well instanced in two traveling cranes, which carried not only whole chassis, but also motors and other units, so that wide aisles for wheeled trucks could be entirely dispensed with. Saw-tooth roofs were used wherever possible and in the higher buildings the combination of steel and glass secured an abundance of daylight, rendering artificial lighting almost superfluous on even the darkest days. This was part and parcel of those provisions for the comfort of employees in which enlightened self-interest meets the demands of humanity, with the understanding that only ideal working conditions will produce the best workmanship. Other features of this nature were the hygienic kitchen, bakery, meat dressing plant, ice plant and laundry and the great dining hall seating 800 persons, as well as the most improved system of individual lockers, bicycle racks and wash bowls with towels and soap.

When this factory was taken into use, Buffalo immediately took great civic pride in it. It became one of the industrial show places which all visitors to the city must see. Men from England, France, Germany and Italy came to see for themselves how structural and production problems had been met. The machinery installed in this plant was all new and designed to give the highest efficiency in the handling of the work and with special reference to the machining of the grades of steel required for select automobile construction. Additions to this equipment have been made since, as machine tools have improved.

For little more than two years this plant has been generally considered a model of modernity and thoroughness, and the enlargements now in progress are bringing out its adaptability.

(Continued on page 735)



Ground floor of the new storehouse and unit assembly building. This floor is now being used for the reception of raw material. The second floor of this building, exactly similar in aspect, is used for finished stock and the third and fourth for the assembly of units such as motors, transmissions, rear axles, carbureters, steering gears, pumps and clutches.

Advanced Methods Obtain in the National Plant

By THOS. J. FAY

QUALITY is induced into an automobile in proportion as the materials are suited to the purpose, the design is wise, and the workmanship is excellent. Let it be taken for granted that the materials are suitable, and that the design is that which will survive, and the field will then be free, leaving it open to the discussion of the remaining important question—the methods employed in the manufacturing plant.

It might appear that the remaining main situation allowing that it involves factory equipment is possible of solution on the basis of an abstract problem. A moment's thought must certainly lead to a sound basis for contending that to simply purchase stock machine tools, and place them in orderly array, in a well-designed building, let it be admitted, would hardly do; the tools would not of necessity be suited to the occasion.

An ordinary lathe, while it may be regarded as capable of doing general work at a convenient rate of speed, is entirely too weak to stand up against alloy steel, particularly when the cutting tools are high tungsten product, and the speed of cutting is all the way from 60 to 100 feet per minute. Lathes as they were designed originally, and as they obtain under conventional conditions, are capable of machining cast iron at perhaps 20 feet per minute for the speed of cutting; they will do this work with excellent accuracy, but the tensile strength of cast iron is maximum at 30,000 pounds per square inch, whereas the tensile strength of many of the grades of steel used in automobile work reaches above 80,000 pounds per square inch, and 100,000 pounds tensility is not unusual. In the case of cast iron, the elongation is normal, whereas in the better grades of alloy steel it is not far from 25 per cent. in 2 inches of a ½-inch test proof, and too, account must be taken of the elastic limit of alloy steel. In some of the product this factor reaches as high as 80,000 pounds per square inch, whereas the elastic limit of cast iron is very low.

Obviously, lathes, or in fact any generic type of tool, which may have been designed to handle cast iron, or even the mild grades of machinery steel, as formerly utilized in structural work, are bound to fall below a fitting requirement when high-class automobiles are to be manufactured. Accuracy, while it is necessary in general machinery, is an absolute requirement in automobiles. The old idea was that accuracy depended upon the skill of the man, and it does to a very considerable extent, when the man takes into account the weakness of the tool and by skill limits output to that which will check with the inherent defect in the tools placed at his disposal.

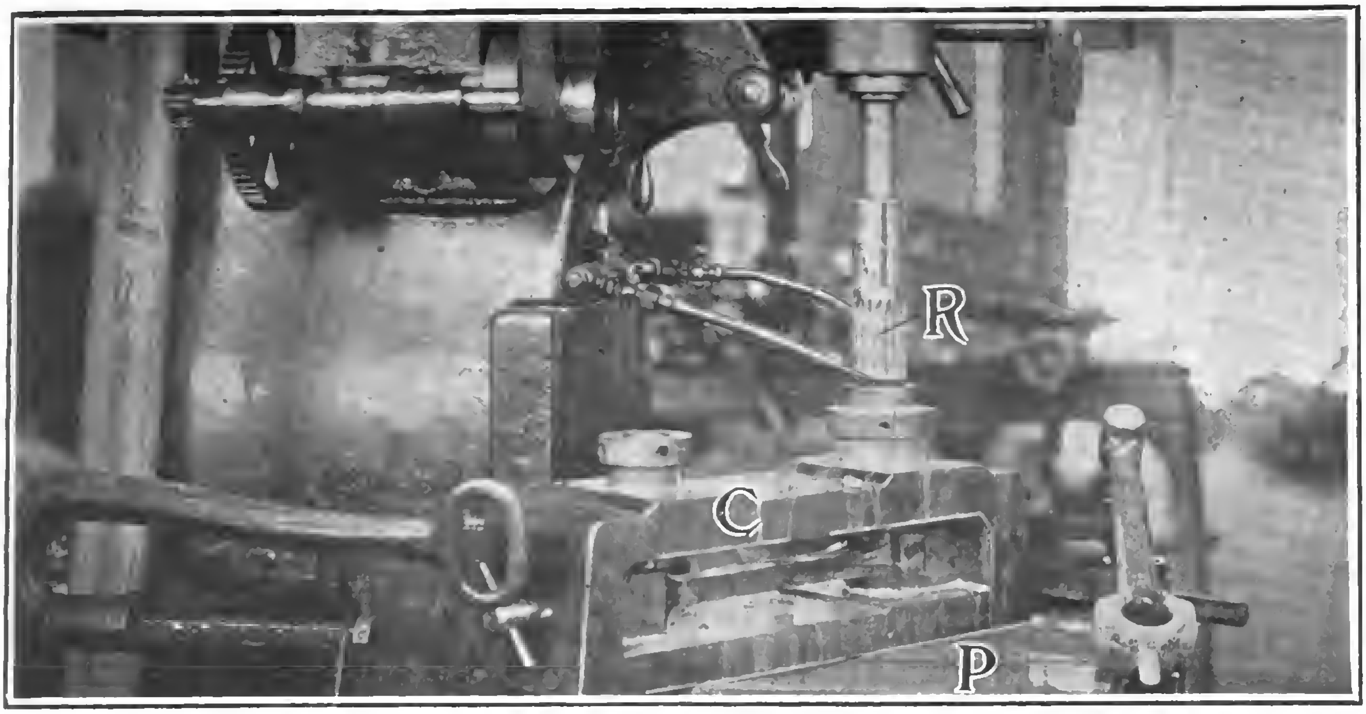
In the early days of the automobile, when ordinary machine tools were all that could be had, men were paid to limit output, and skill on the part of the men was an absolute necessity, because the limit they placed upon the output was that which would induce a measure of accuracy in view of the inherent weakness of the machine tools.

No wise automobile builder will care to go back to the days when skilled machinists were paid to limit the work in proportion to lack of ability of the tools used. No doubt this is an odd way of putting it, but it is in exact accord with the facts as they existed. Automobile work then reflected excess cost and poor workmanship, taking it as a whole. Makers of automobiles were compelled to exact special and more rigid machine tools for the purpose, and in the absence of regular stock products to be had on this basis it became necessary to go in for special machine tools and they, in all probability, considering the respective shops, were designed with a particular eye to the hardness and tenacity of the metal used in the construction of the automobiles.

In the National plant at Indianapolis this phase of the situation was taken cognizance of almost at the start, and the plant equipment is made up very largely of special machine tools, each one designed to do the very work required, and a system of jigs, fixtures, gauges, and instruments of precision is so designed and employed that the antonym of the skill which was formerly sought for on the part of machinists is utilized.

With heavy and well-designed machine tools, fitted with fixtures and jigs, appropriate to the undertakings, skill of the operators is for the purpose of producing the work quickly, a high rate of speed being possible; accuracy is a direct result of the process so that the skill of the workman is not utilized in the act of apologizing for the weakness of the tool.

Fig. 1—General view of machine shop in National Motor Vehicle Company, showing cylinder boring machines working on gangs of engine cylinders. Crankcases are shown in the foreground



No. 2—Fixture used on vertical heavy milling tool to machine connecting rods. The fixture allows the machining of both ends by simply changing the cutter to the proper size

Fig. 1 shows a general view of one corner of the plant with a number of aluminum crankcases in the foreground, and some of the special machine tools in sight. A represents a large and well-designed cylinder boring machine, with a revolving platen on which a fixture is mounted, and the arrangement is such that four pairs of cylinders are in position for work to be done upon them at all times. This type of machine is available for either boring or grinding, and the workman is enabled to swing the platen around as fast as the cylinders are finished, and to replace the finished cylinders with cylinders to be machined as the occasion requires.

In this work the cylinders are rough machined at a high rate of speed, it being the object to remove metal as rapidly as possible, but the final operation, being that of grinding, assures accuracy to the desired limit, and in order to prevent the cylinders from warping in the grinding process, they are maintained at a constant temperature for the time. It is advantageous to rough machine the cylinders at a high rate of speed because the internal strains will be released as the direct result of high speed work, and since the grinding operations take place subsequently, the chances of deformation, due to the release of internal strains, are substantially eliminated.

Referring again to Fig. 1, B presents a multiple spindle tool which is fitted out to do rapid and accurate work on the aluminum crankcases which are of the character shown in the fore-

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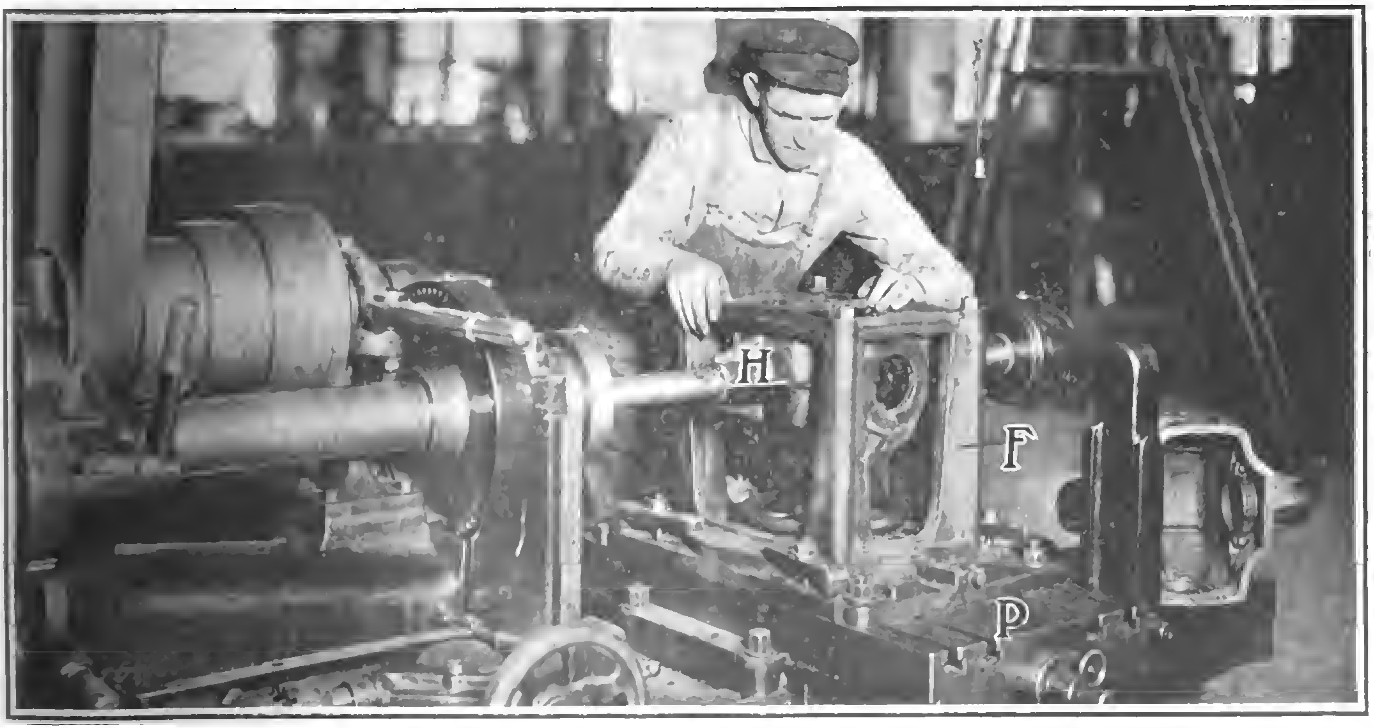
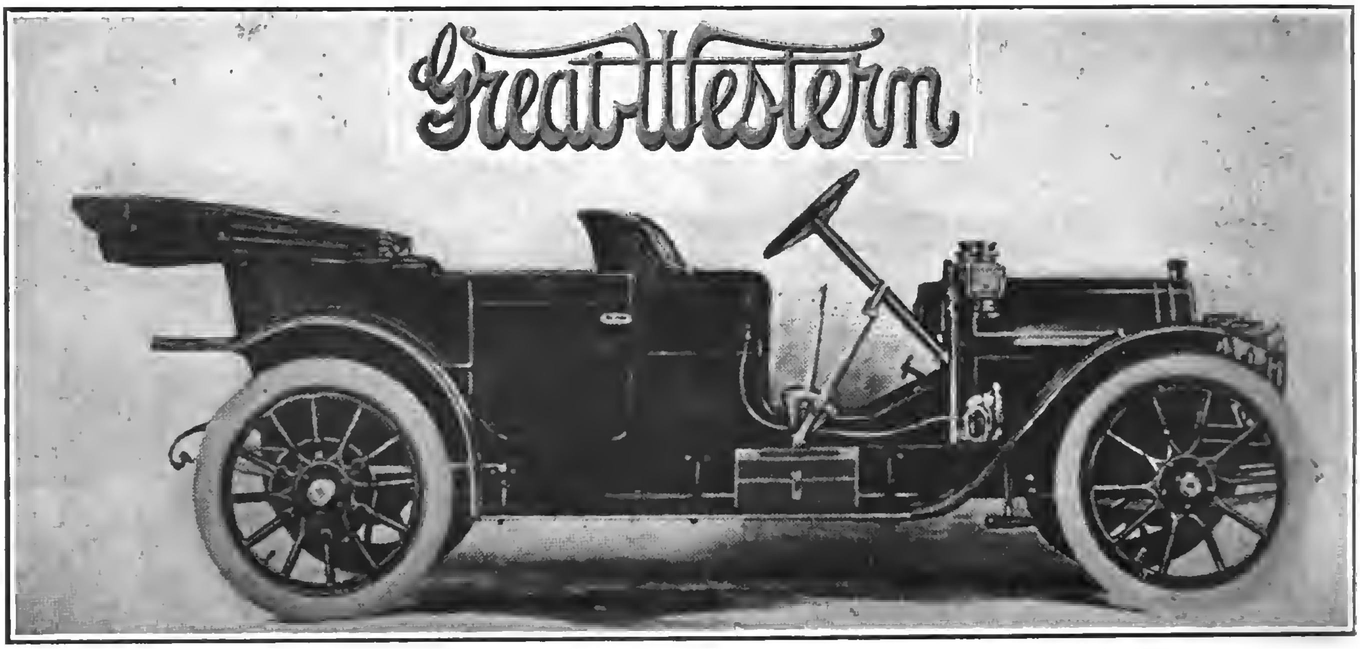


Fig. 3—Horizontal boring machine in National plant working on rear axle and differential housing, the work being held in a special fixture. A finished case is shown at the right

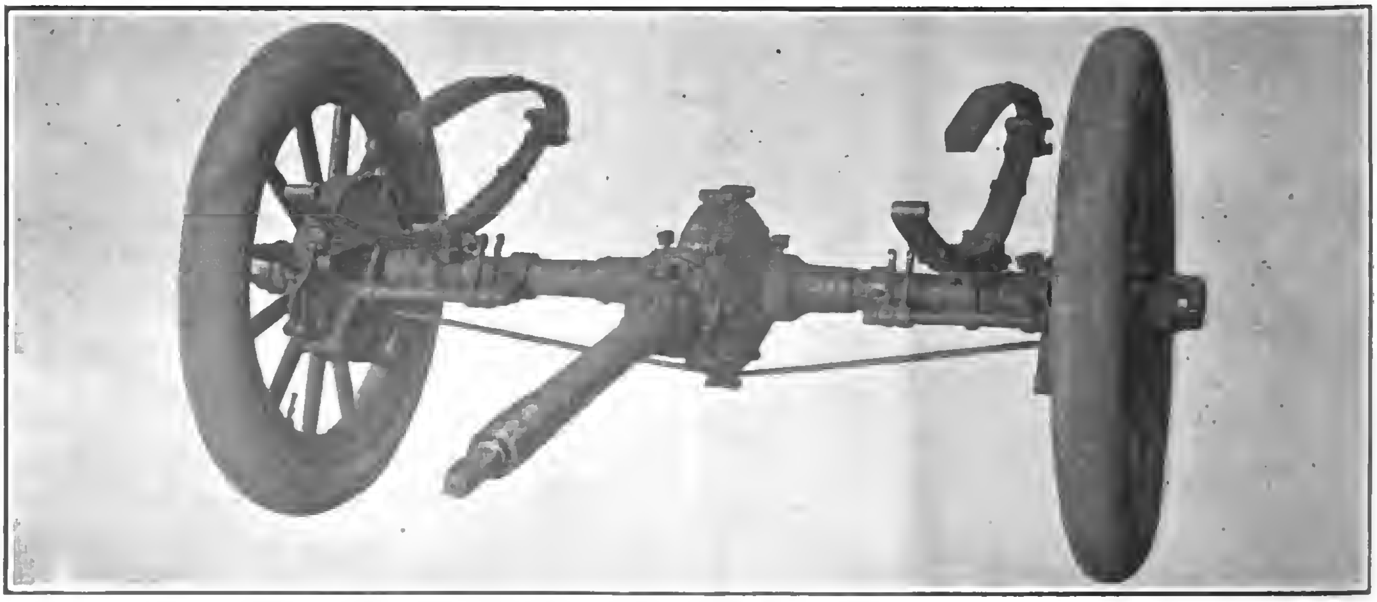


Great Western Thirty With Touring Body Is the Result of Many Years' Experience

FOR 1910 the Great Western Automobile Company, Peru, Ind., previously known as the Model Automobile Company, will continue to build a single type of touring car designated as the Great Western Thirty. This 1910 model has a 4 1-4 by 5-inch motor, with a formula rating of 28.9 horsepower.

Many new features are present in this model, among which are: The enclosing of the timing gears in an oil-tight case, the removal of the magneto from the intake side of the motor to the exhaust side so that the magneto and the water-pump are both operated from the same shaft, and the parts more symmetrically and conveniently placed. This year the fan is supported on an adjustable bracket on the front cylinder; the flywheel is marked for timing; a water-jacketed Schebler carbureter and Remy magneto are regular equipment; and improved water piping is employed in the cooling system. An improved transmission is also claimed for the new model, the gears being now made in the company's factory. The cone clutch is lined with raybestos, with springs underneath to insure easy engagement; and a novelty has been brought forth in the attachment of the pan which hangs under the motor, clutch and gearbox in that it operates on hinges so that it can be lowered by releasing the catches on one side when the car is being washed or adjustments are being made.

The motor is neat and simple in appearance and has a number of the most approved features characteristic of the best modern engineering practice. The four cylinders are cast separately with long spacious waterjackets, the inner walls are ground to the top of the head and the heads are machined to prevent the accumulation of carbon, connections are very direct and quite accessible, all moving parts are adjustable for wear, an absolute interchangeability of parts is claimed, and all outboard bearings not automatically lubricated by the oil circulation in the motor are provided with compression grease cups. The outside features of the motor are clearly shown on the next page. In this, the right side of the motor, the valve mechanisms, which are operated from a single camshaft within the crankcase, may be plainly seen. Note the accessible location of the spark plugs and priming cocks in the intake valve chambers, and the peculiar construction of the intake manifold. This type of manifold construction has been successfully employed by some of the most prominent motor manufacturers. The carbureter, as may



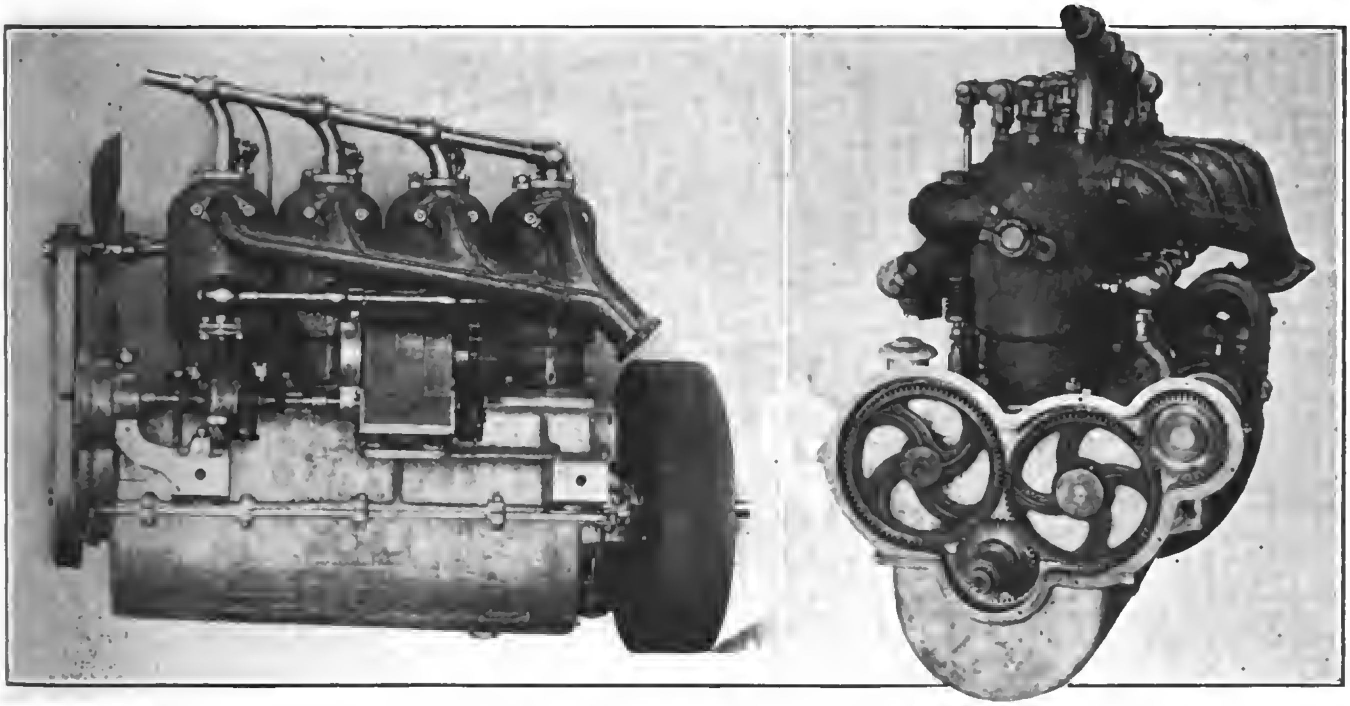
Rear Axle of Floating Type Showing Also Spring Suspension, Driving Shaft, and Wheels be seen, is also accessible, a feature which is greatly to be appreciated by the owner or repairman who has found it necessary on some cars to drop a most unwieldly pan, then try to make adjustments or disconnect a carbureter which is located in a most unapproachable position.

Two large hand-hole plates in the side of the crankcase are provided in order that the contents of the crankcase may be readily inspected; and a vent pipe relieves the crankcase compression. This vent pipe is so constructed that oil cannot possibly be thrown out and yet the compression is released. Between the end of the lower half of the crankcase and the flywheel may be seen the oil pump, which maintains the proper level in the upper portion of the lower half of the case. It is a gear pump, gear-driven off the end of the camshaft through the vertical shaft; and draws the oil from the lowermost portion of the oil reservoir, and forces it into the crankcase proper through the connection.

Turning to the left side of the motor, special attention is called to the construction of the exhaust manifold. It is not only graceful in appearance and easy to remove, but its chief feature is that it has no sharp bends and enlarges gradually toward the rear end so that the gases are so well taken care of that back pressure is reduced to a minimum. The direct connections and rigid supports of the magneto and waterpump are shown in this illustration; the magneto resting on a bracket cast integral with the case, and the water pump bolted to a boss on the leg of the engine. The water, entering the pump at the inlet, passes up into the waterjackets of the cylinders through the manifold, and after circulating around the cylinder walls, valve and explosion chambers, issues from the top of the cylinders and passes to the radiator through the manifold. Each bearing of the shaft which drives the pump and magneto is provided with a grease cup. The metal timing gears are enclosed and run in a bath of oil. The simplicity of the adjustable fan support is also shown in this illustration. Loosening the pinching screw permits the rocking up or down of the bracket to secure the desired tension.

The exhaust valves of this motor are located in the center of the cylinder head, and operated through pushrods and rocker-arms. They are contained in cages and may be readily removed for grinding. The intake valves are contained in outboard chambers characteristic of an L type motor, and operated in a conventional manner from lifters below. All pushrods are adjustable and the entire set may be easily removed for inspection by simply removing the four yokes through which they are clamped down to the crankcase.

All pistons are ground to very accurate measurements and are ribbed for the purpose of reducing weight without decreasing their strength; and to further strengthen their construction and reduce expansion, their heads are convexed. Each piston is annealed to eliminate the unequal strain of the metal when subjected to heat, and then ground to measurement. Four eccentric expansion rings are fitted to each piston and a snap ring is employed to hold the wristpin in place. Oil grooves are also cut into the pistons so that the oil may be uniformly distributed to the cylinder walls, and every piston is machined on the inside to a given weight in order that a replacement may be made without throwing the motor out of balance, should a replacement be found necessary. The connection rods are of drop-forged steel and of I-beam section, with die-cast nickel babbitt bearings at the piston end and split bushings of the same material at the crankpin end. The crankshaft is a solid forging with a flange forged integral with it, to which the flywheel is bolted, and is supported in five die-cast nickel babbitt bearings with a bearing surface of reasonable area. The camshaft, which is supported on three main bearings, is a solid forging with all cams forged integral; and it is so arranged that by loosening the nuts on two of the three bearings the camshaft can be withdrawn. The crankcase is of aluminum alloy, and the motor is so designed that the working stresses of the cylinders do not fall upon the crankcase but are taken up entirely by the steel studs that hold the cylinders and support the crankshaft bearing caps as well.



Exhaust and Ignition Side of Engine, Also End View Showing Timing Gears, Valve Rockers, and Manifold

Transmission from the motor to the rear wheels of this car is conventional in every respect. The clutch is of the regular cone type faced with raybestos, a composition of asbestos and fabric which has been widely adapted as an efficient brake-lining material, and springs have been fitted beneath this clutch facing to facilitate smooth engagement. The change speed arrangement is a sliding gear transmission of the selective type giving three forward speeds and reverse. A locking device is fitted to this mechanism to prevent the gears from sliding out of engagement and it is impossible to bring two sets of gears into mesh at the same time. Drive to the rear axle is by means of a shaft, enclosed in a tubular housing which serves as a torsion tube. The rear axle is of the semi-floating type and the front axle is one-piece nickel steel forging.

Pointers In Repair Work—Referring Specifically to Valves

LAST week in the discussion of the repair of an automobile, it was pointed out, among other things, that the valve grinding process as it obtained through the life of the car had resulted in the valve seats being widened until it became a question as to whether or not tightness could be relied upon. Fig. 1 shows the relatively narrow bevel seats as they obtain in motors when they are new. In some makes of motors the distance across the face of the seat is limited to 3-16 of an inch, and very few motors will be found in which this distance will exceed 5-16 of an inch. Valve grinding has two unfortunate effects, one of which is the face of the seat is increased, and the second trouble is due to the dropping down of the valve to accommodate itself to the new seating, and the timing of the valve is therefore upset because the clearance distance as marked in Figs. 7 and 8 is decreased. This distance may be diminished so much that the valves will not be permitted to seat, in which event they will fail to serve their intended purpose.

Referring to Fig. 2, it will be observed that the seat of the valve is very wide indeed, and this is the condition which was found in the motor referred to above. In this particular motor, the cam wore faster than the amount of the grinding away of the valve seat, so that the clearance, as shown in Figs. 7 and 8, increased instead of decreasing. The result was equally bad, because the timing was upset in any case. It was decided that a good repair could not be realized without reducing the valve seat, and it was suggested that the method as shown in Fig. 3 might be employed to advantage.

Referring to Fig. 3, it will be observed that a wing cutter is inserted in a round hole in a boring bar and the boring bar is then passed through a valve cover opening of the cylinder, after which the guide as shown is screwed down tight in place of the regular cover. It will be necessary of course to slide the guide over the boring bar before the wing cutter is inserted in the hole unless it is found that the cutter can be slipped over from the other end. The length of the wing cutter must be less than the diameter of the valve cover hole, and a measurement must be taken which will permit the repairer to tap the cutter out so that the cutting edge will engage the face as shown by the radius of the dotted line, which is placed to indicate the amount of metal to be removed in the process of reducing the face of the valve seat.

The guide should be quite long, and should extend down in order to support the bar at a point as near the cutter as possible: the larger the bar the less will be the necessity of support. The bar may be driven in any desired way, and a vertical drill press would serve very well indeed. There are certain dangers attached to a process such as this, and Fig. 4 very clearly indicates one of them. It is a well-established fact and known to every foundryman, and those who have to do with cylinders when they are cast from gray iron, that shrink holes abound in the body of the metal wherever it is accumulated, sufficiently to make the rate of cooling lower than the rate in general for the whole casting. The part of the metal which cools off fastest will be the most solid, and it will draw metal from the portions which remain liquid in the process of solidifying. In this way shrink holes are formed and they are very likely to obtain in the metal adjacent to the valve seat unless the design is so contrived as to overcome this difficulty.

In any attempt to re-adjust the seat for the valve, especially if the process as shown in Fig. 3 is resorted to, it will be wise to examine the design and note if there are excesses of metal in the vicinity of the valve seat. If metal obtains there to a considerable extent, there is a good chance of uncovering pockets when the wind cutter engages the metal and takes away any considerable portion thereof. Fig. 5 shows a design which is practically free from trouble of this sort, in which it will be observed that the walls of the forts are not in the same plane as the metal out of which the valve seats are formed. The design has for its basis great uniformity of the thicknesses of the walls throughout, and a further object in thus proceeding is to make the wall thickness back of the valve seat such that water will tend to cool every portion of the seat equally. There are other good teachers to be observed in this design; as, for illustration, the valve stem is in a boss which is water-jacketed for nearly the entire distance, so that the heat which passes down the valve stem from the mushroom is tapped away to the adjacent water, through the stem guide formed out of the boss, which is integral with the metal of the cylinder proper.

It is claimed by some designers that a valve stem bushing is ill advised, on the ground that the conductivity of the joints which form between the bushing and the retaining wall is far below the same property in the absence of joints. The bushing according to this method of reasoning, retards the transfer of heat, and the stems of the valves are then not in a position to tote away the heat which is picked up by the mushroom on the end of the stem, due to its contact at first hand with the flaming products of combustion.

It was observed in the motor which underwent repair, that

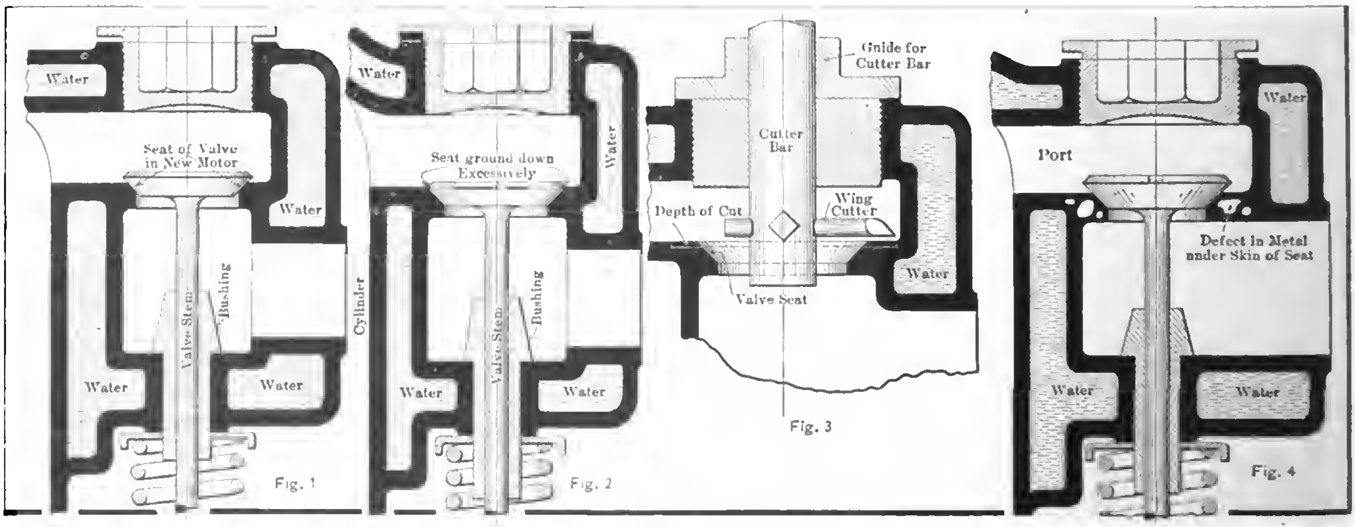


Fig. 1—Showing proper seat as found in new engines. Fig. 2—Condition to be avoided, valve ground down too far into seat. Fig. 3—Wing cutter and guide bar for cutting correct seat. Fig. 4—Unavoidable but troublesome defect in metal just at valve seat

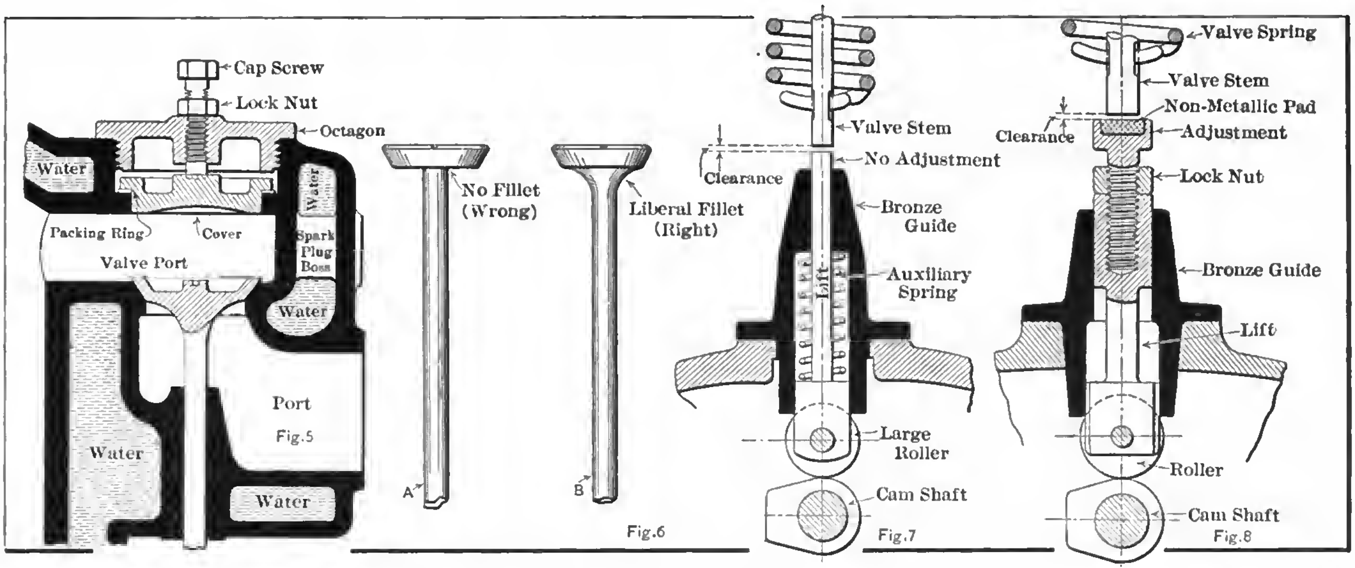


Fig. 5—One method of retaining valve cover in place from above. Fig. 6—Right and wrong way of constructing valves. Fig. 7—Valve construction in which no adjustment is provided for wear, as contrasted with Fig. 8—Proper form of construction with adjustment

the mushrooms on the stems forming the valves were integral, but the joint was made without taking advantage of more than a perceptible fillet. A, Fig. 6 indicates the character of the design, whereas B, is more nearly in accord with the dictates of approved practice. This is an extremely important detail, so it is believed, and tightness of the valves depends upon the rigidity of the relation of the mushroom to the stem. If the point of fastening is only equal to the diameter of the stem, the mushroom will be heated to a very high point relatively to the temperature which will obtain in the stem, so that the stem proper will take on the characteristics of a dog's tail and curl up. The result will be that the stem will stick in the guide unless the guide is provided with excess clearance, and the mushroom will be prevented from lying flat on the seat.

It ofttimes happens that motors perform badly, and credit is given the valves for being mechanically in good order, so that the trouble is blamed on the ignition system or the timing. In divers of these instances, it was ascertained that the valves stuck when they became hot, and the resistance offered was in excess of the ability of the springs. It is not a real remedy to attach stouter springs, and there are disadvantages in so proceeding. The stouter the springs the greater will be the wear on the cam, roller, lift, and the end of the valve stem. If a soft pad is used in the head of the adjusting member, as shown in Fig. 8, it will be pulverized if the spring is too strong; or in the absence of a buffer such as this, the end of the valve stem will broom out. The trouble is due to the curling up of the stem because a means is not afforded for transmitting the heat away from the mushroom, down through the length of the stem, and off to the water jacket, in the manner as before stated.

A very liberal fillet at the junction of the valve stem with the mushroom not only prevents the curling up of the stem by equalizing the temperature throughout, but it also prevents the mushroom from tilting out of its position at right angles to the plane of the stem. There are two reasons apparently for placing a fillet of liberal proportions at the junction, one of which is to impart mechanical rigidity to the mushroom, and its joint with the stem; the other reason is bound up in the greater mass of metal which is available for the transfer of heat. If the maker of an automobile fails to observe these well understood conditions, the repair man, if he appreciates the true situation, is offered a wonderful opportunity to deliver a satisfactory repair and materially improve the actual working qualities.

Should a repair man decide to substitute new valves of his own make for those regularly in use in a given model of automobile, it will be well for him to take into account the proper grades of metal for the intended work. One fabric used for valves is composed as follows:

HIGH CARBON STEEL SUITABLE FOR MAKING VALVES

Carbon	Silicon	Sulphur	Phosphorus	Manganese
.115	.10	.013	.018	.45

It will be understood that these valves will scarcely obtain without variation as between heats, or within adjacent sections in the same bar. Segregation and other variables will defeat the puddlers' attempt, but the carbon should be at least 110 points, and the sulphur and phosphorus should fall below the values given, rather than to exceed them. Manganese and silicon may vary quite a little.

HIGH NICKEL STEEL HAS A WELL-DEFINED VALUE

Nickel	Carbon	Silicon	Sulphur	Phosphorus	Manganese
35.0	.20	.10	.012	.012	.35

Frequently, the high nickel steel mushrooms are attached to carbon steel stems. There is no objection to this if the joint is well made, both from the point of view of mechanical rigidity and in view of the desire to obtain the best heat-conducting ability. The electrical weld seems to be valuable for this character of undertaking, but the welding must be done under the most expert conditions.

When the pressure of the spring is excessive, and the valve stem brooms out in consequence, it becomes extremely difficult to adjust the timing, and a decided loss of power of the motor results. The motor referred to in the repair case was so designed that there was no means of making an adjustment, and as shown in Fig. 7, a large clearance is necessary because the diameter of the roller at the end of the lift as it bears upon the cam is large. An auxiliary spring concentrically related to the lift stem within the bronze guide housing helped to give life to the motion, andto prevent the large roller from bouncing off of the cam. This spring, however, lost much of its life in this service, and offered the further disadvantage of slipping out of place, and in contact with the constantly reciprocating lift, burrowed into the metal. This burrowing process, besides offering evidences of depreciation, also indicated that the motion was not perfectly free to act. A further examination of the mechanism showed that the end of the lift where it engaged the end of the valve stem was broomed out sufficiently to make the clearance in the bronze guide considerably less than that which originally obtained, so that the lift was sticky in the guide.

The repairer wanted very much to attack this problem for the purpose of introducing an adjustment, but the room afforded lent a very uninviting air to the situation, and he finally decided that it was in the path of wisdom to put the parts in good working order, compensate for the increased clearance due to the wearing away of the cam, and take advantage of the fact that the device served for a long time without showing serious

(*Continued on page 735*)

Adjusting the Carbureter—for the Novice

By HERBERT L. TOWLE

IN AN article last week the writer enumerated the four usual adjustments of an automatic carbureter of the auxiliary air valve type. The adjustable elements were as follows:

1. The float valve.
2. The needle valve controlling the spray orifice.
3. The auxiliary air valve spring tension.
4. The auxiliary air valve stop.

As previously intimated, this list varies in different carbureters. The float is always regulated in some manner, but it may be by the crude device of bending the float lever, instead of by a threaded adjustment. Some carbureters have no needle valve in the spray orifice, but instead substitute nozzles with one or another size of orifice to suit different engines. Still others control the size of the primary intake through which air is drawn past the spray orifice. The air valve spring is always adjustable, but the spring itself may be made to act very differently according to the size of the wire, diameter of the coil, and number of turns. When automatic carbureters were new it was not uncommon to find them fitted with springs wholly unsuited to the work in hand, so that the only thing to do was to wind springs experimentally till a suitable one was found. We will first assume that the spring is suited to the carbureter and only needs tension adjustment.

In some carbureters with no needle valve spray adjustment, the auxiliary air valve has two springs, one very light and responsive to slight suctions, the other heavy enough to take care of the suctions due to medium and high speeds. In such carbureters the spray nozzle is correctly chosen at the factory, and the owner adjusts the light air valve spring for low speeds in lieu of a needle valve.

The novice's general instructions for adjusting his carbureter are as follows: Assume that the float valve is correctly adjusted for gasoline. Prime the carbureter, usually by depressing the float, but sometimes by closing a choke valve in the primary air intake to increase the suction. Set the gears in neutral and the throttle valve slightly open and run the engine idle at low speed with retarded spark. Adjust the needle valve, if there is one, otherwise the light air valve spring of the primary air intake, to make the engine run best with the given spark and throttle. Now open the throttle a trifle, allowing the engine to run at about its maximum road speed or a little higher, and advance the spark about half or two-thirds. As the engine is not loaded it will not take much gas, but the auxiliary air valve should open a little. Adjust the air valve spring tension till the engine runs best under these conditions.

Next try the car on the road. Retard the spark and run the car as slow as possible in high gear. Try slightly increasing and decreasing the spray opening and note result. An opening of an eighth to a quarter of a turn of the needle valve is likely to be sufficient. If the engine backfires the needle opening is too small. Be particular to change only one adjustment at a time, otherwise you will not know where you stand. When you get a good adjustment it is well to mark it, so that you can come back to it if an unsuccessful change is made.

Now run the car at medium speed in high gear. Note particularly the pulling power on grades, and the promptness of the response on opening the throttle. If the engine weakens when the throttle is opened it indicates a decided change in the mixture. Try slackening and tightening the auxiliary air valve spring a little and note result. The adjustment previously obtained on the floor should be nearly right, but is likely to need slight changing.

Finally try high speed. If, when running at 20 or 25 miles an hour with the muffler open, the car accelerates smartly on opening the throttle wide, you have a good adjustment. Adjust the auxiliary air valve stop to give a little more or less lift, and note the result. Try slightly changing the spring tension also. Quite likely the same adjustment will not give equally good results at medium speed and high speed. If that is the case, and you do not care to experiment with other forms of spring, it is best to favor the medium speed adjustment as being that most used. Quite possibly a slight further change in the needle valve adjustment may seem advisable. If so, remember that opening or closing the needle valve increases or reduces the gasoline supply throughout the entire range of carbureter action. Increasing the air valve tension, on the contrary, has its greatest effect at

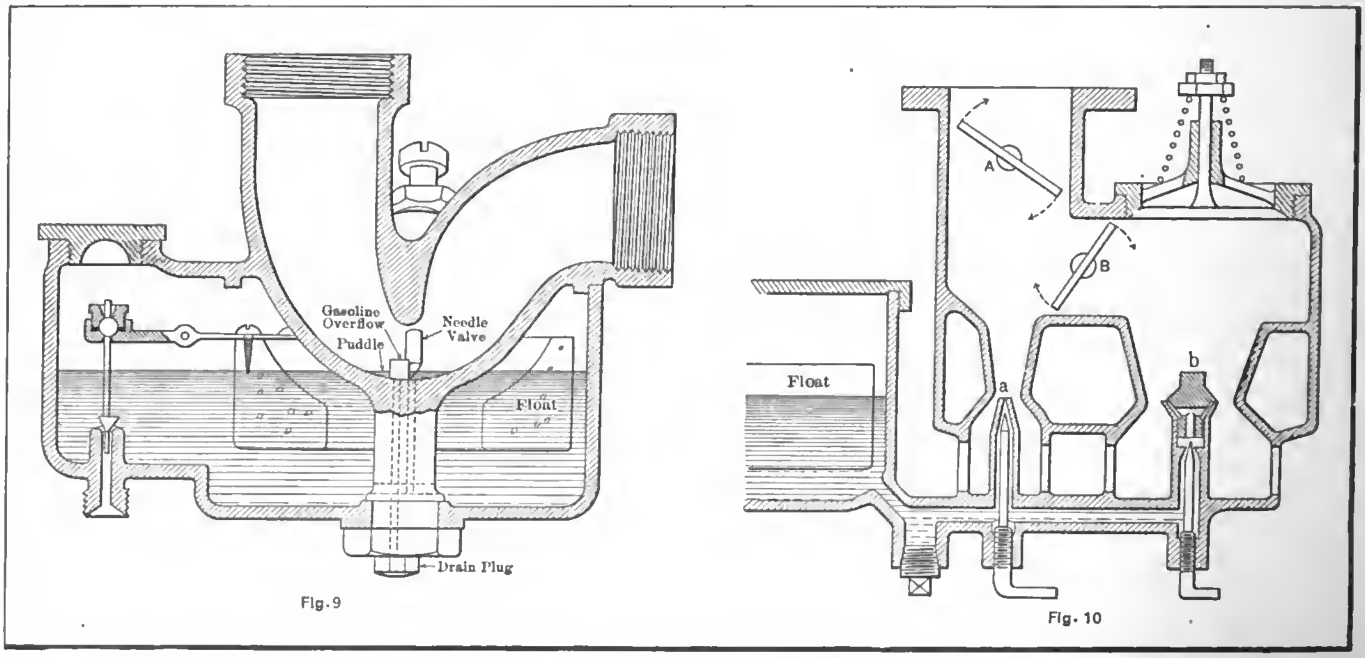


Fig. 9—Typical puddle type carbureter. Either the top or side opening can be used for the outlet. No auxiliary air valve is used. Only the gasoline level and needle valve are adjustable. Fig. 10—Two-nozzle type of carbureter. B remains closed until throttle valve A opens enough to pass as much mixture as the spray nozzle A can furnish.

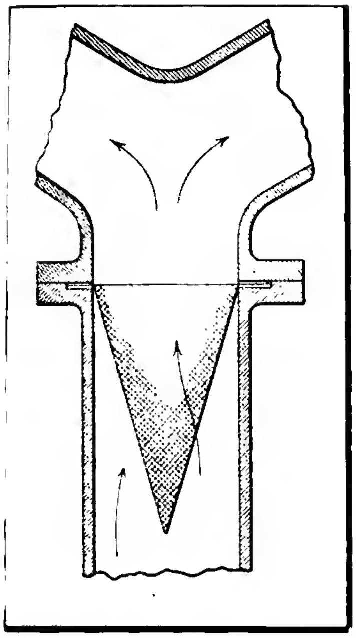


Fig. 14—Gauze cones are sometimes inserted in the intake pipe to break up the gasoline spray

the particular speed or suction at which the valve starts to open, and the effect is relatively less at high speeds. As the spring is always under some initial tension a certain minimum suction is required to start the air valve, and a comparatively slight change in spring adjustment will make a material change in this suction.

In case no combination of needle valve, air valve spring and stop adjustment gives satisfactory results throughout the engine's range, either the carbureter is too large or too small for the engine, or the design is defective at some point. Before abandoning the carbureter it is best to try the effect of changing the spring. To do this intelligently the user must understand something of the action of coil springs. A complete analysis of this subject lies outside the scope of this article, but its most essential points are as follows:

1. The "tension" of the spring (i. e., the force exerted by it under stretch or compression) is the tension of each individual coil composing it, and this tension is directly proportional to the amount that that individual coil is compressed or extended.

2. Consequently, the total stretch or compression of the spring is the strength per coil, multiplied by the number of coils.

3. Inversely, to produce a given stretch or compression, the fewer the coils the greater will be the tension required, and vice versa. To produce a light tension with a given total stretch or compression a spring should have many coils. To produce a strong tension with given compression or extension the spring should have few coils.

4. Extending a spring by merely stretching it has only the same effect as screwing down the retaining nut. It does not alter the character of the spring.

5. A coil with small diameter requires a greater force to compress or extend it than a coil with large diameter, the ratio being inversely as the diameter.

6. The stiffness of the spring is proportioned to the cube of the diameter of the wire.

To show how to apply these principles, let us assume typical cases:

1. Suppose the mixture is correct at moderate speeds, but too lean at high speeds. Adjusting the stop for a smaller lift will correct the trouble if the latter exists only near the limit of speed. If it occurs below the limit of speed the effect of reducing the lift will be to make the mixture again too rich at maximum speeds. This situation calls for a spring which, while exerting some tension at low speeds, has a much greater tension at high speeds. Cut one coil at a time from the existing spring and bend the end square. Adjust to give the same tension as before when the valve opens. The tension at maximum opening will be greater as the number of coils is reduced. If necessary, pull the spring out longer and change the adjusting nut accordingly.

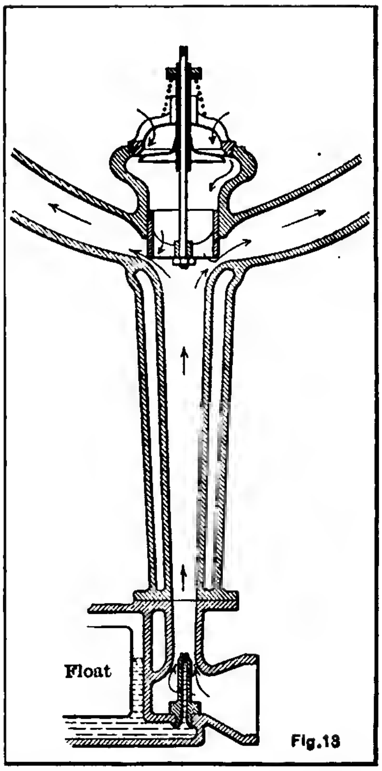
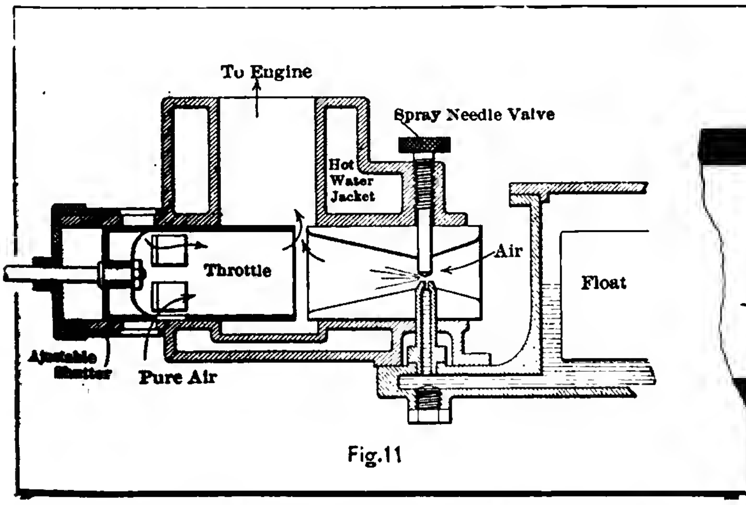


Fig. 13—Carbureter having hot-water-jacketed mixing pipe with throttle at the junction with manifold

2. Suppose the mixture is much too rich at low speeds, correct at medium speeds and again too rich at high speeds. Probably the spray opening is too large for the engine. Substitute a smaller nozzle if you can. If not, reduce the needle opening, or enlarge the primary air intake so that it is adjustable. If the former is done, the mixture will probably be correct at low and high speeds, but too lean at medium speeds. Increase the tension of the auxiliary air valve a trifle and adjust the stop for a greater lift. Follow the same procedure in case the primary air intake has been enlarged. If the design does not permit any of the above changes, the air valve may have a special light spring for low tensions.

(To be continued)



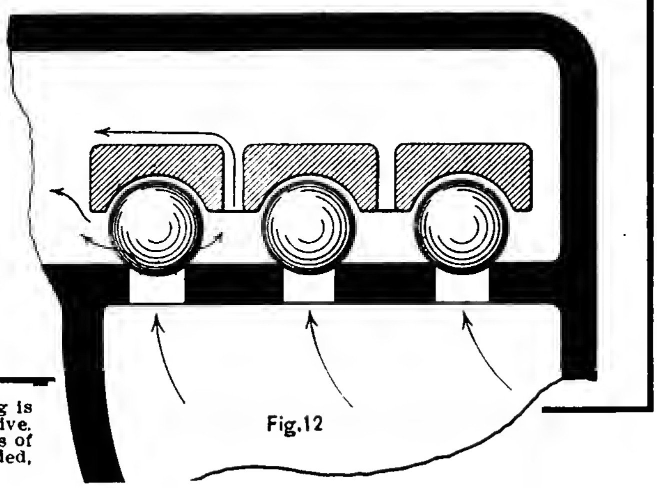
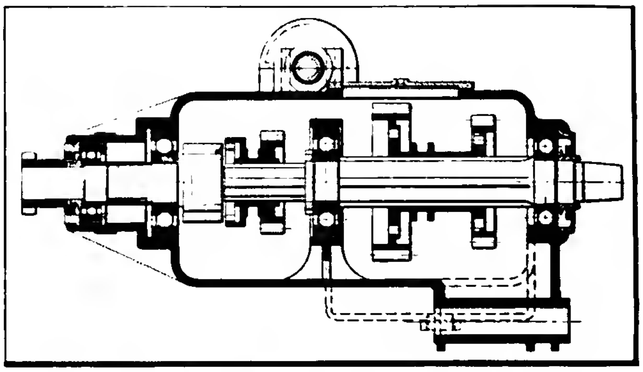


Fig. 11—Non-automatic carbureter, in which the auxiliary air opening is controlled by the movement of the mechanically-operated throttle valve.

Fig. 12—Gravity seated bronze balls of varying diameter resting on holes of different sizes are used for an auxiliary air valve, no springs being needed, since the suction of the engine uncovers holes of the correct area.

Constructional Details From Engineers Abroad



Protos Change Gear Showing Bearings on Shafts

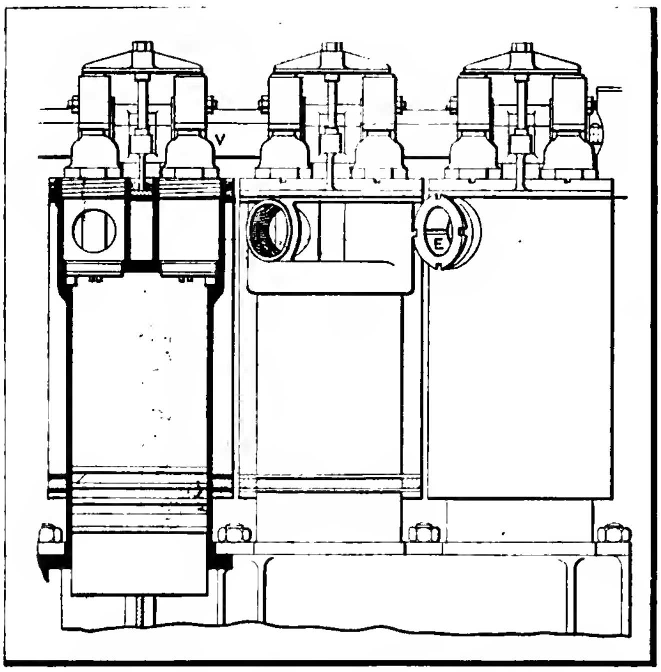
Method of Attaching the Copper Waterjacket

Of the various aeronautical motors exhibited at the recent London aeronautical show none was more favorably received than the Green, an English make with a record of several years' satisfactory service. One point of the motor which few noticed was the method of attaching the copper waterjacket, which is shown by the accompanying drawing.

The cylinders are individual, and the jackets are simple cylindrical copper tubes. At the bottom end of the jacket the cylinder has two narrow flanges, forming between them a groove, in which is placed a gasket or ring of gray rubber. The lower end of the copper jacket is slightly bell-shaped, so that it can be forced over this gasket, the process being assisted by the use of soap as a lubricant. At its upper end the jacket is slightly flanged inward, where it rests on a flange turned on the cylinder head, and is held by a ring clamped by nuts screwing down on the pockets of the overhead valves. The construction can be better understood from a study of the drawing.

Having a sliding joint at the bottom end of the jacket allows a slight movement to compensate for inaccuracies in fitting, so that the upper joint can always be screwed down to a firm seat, and at the same time allow for expansion due to heat. It might be expected that the rubber would be deteriorated by the heat, but it is said that motors of this type have been running for several years without renewals of this part.

The inlet and exhaust ports pass right through the jacket, holes being made in the latter to register with the ports. The manifolds are made with union joints, screwing down to a seat, and the edges of the holes in the jacket act as gaskets for the joint. Thus both the gas passage joints and the gasket joints are made tight at one stroke.



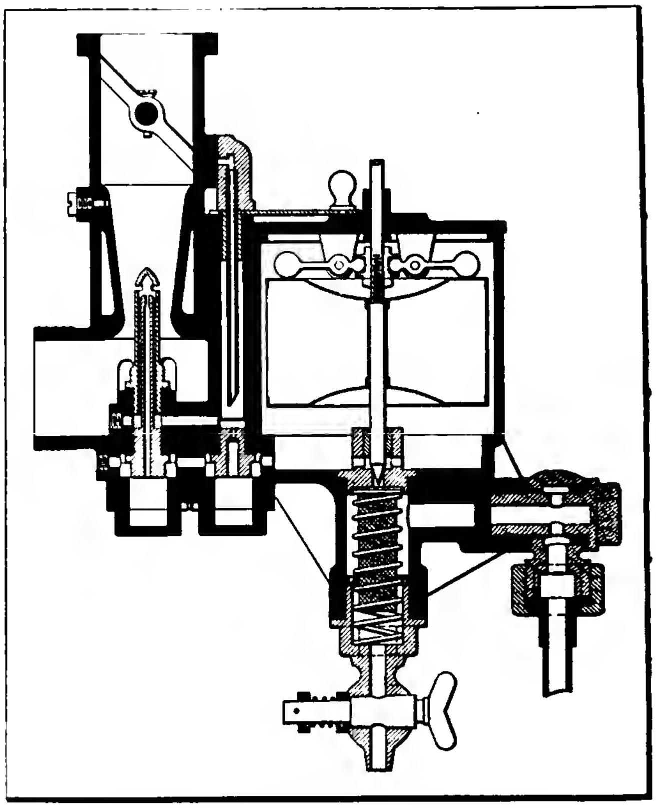
Green Aero Motor Showing Valves and Waterjacket

Overhung Shaft in German Change-Gear

Common practice in the designing of change-gears appears to be to reduce to the minimum the number of overhung shafts, and doubtless this is good as a general principle. Thus the lay-shaft and the sliding-gear shaft are almost invariably supported by bearings at their extreme ends.

On the 18-38-horsepower Protos (German) this principle has been disregarded, and, as it appears, with some reason. It is customary to have one of the bearings of the sliding-gear shaft telescope into the stub shaft which is in line with it; this bearing is either a plain bushing, or else a ball-bearing, the diameter of which is determined not so much by the load as by the space limitation. This bearing often gives extremely unsatisfactory service, and is nearly always the first bearing in the change-gear to wear out.

In order to avoid this construction, the designer of the Protos decided to place the second bearing of the sliding-gear shaft



New De Dion Carbureter on "Zenith" Principle between the two sliding members, in such a way that that part of the shaft carrying the high-speed clutch and the third-speed gear should be overhung. At first glance this design appears only to make a bad situation worse, but a closer inspection will show that the good points considerably outnumber the bad.

When the high speed is engaged the sliding-gear shaft and the stub shaft act as a unit; there is none of the load on the bearing which comes from the thrust of gear teeth. When the third speed is engaged, on the other hand, the third-speed gear lies close against the bearing, and is overhung a distance equal only to its own thickness. In this respect it is no worse than the constant-mesh gear on the stub shaft. Further, the removal of size restrictions permits the use of a large bearing. In this particular case the bearing in question is as large as the main bearing of the stub shaft, and larger than any other in the case. To be exact, the two large bearings are number 408; the rear sliding-gear shaft bearing is number 309, the rear lay-shaft bearing number 406, the forward lay-shaft bearing number 308, and the forward stubshaft bearing number 307.

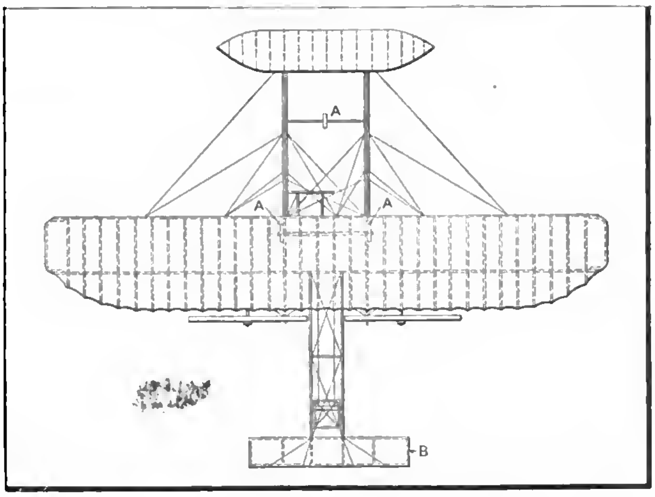
De Dion Adopts New Carbureter Principle

Multi-jet carbureters are far from novel, but most devices of this type have the jets arranged in a row, with some mechanical means for bringing them into action in succession. The carbureter adopted by De Dion-Bouton for its 1910 models, working on what is known as the "Zenith" principle, has its two jets concentric. The general arrangement is shown by the sectional drawing reproduced from *The Autocar*.

The automatic action of the carbureter is due to the limitation in the speed of the gasoline flow to the outer of the two concentric jets. The float chamber supplies both jets, but, whereas the gasoline reaches the central jet through large channels, the supply to the outer jet is limited by the small orifice through which it must pass. Between the float chamber and the central jet there is a cylindrical chamber open to the air. When at rest, the gasoline rises in the two jets to the same height.

At slow speeds gasoline is drawn from the two jets in about equal proportions. In a single-jet carbureter the proportion of gasoline to air increases with the speed at which the air passes the jet; but in this type the output is in correct proportion at all speeds, because the supply from the jet remains constant.

In the cylindrical chamber between the float chamber and the central jet is a small tube, the upper end of which connects with the inlet pipe just at the throttle valve. The valve is arranged so that when it is nearly closed all the mixture that passes through must go directly over the end of this tube. The air passes at high speed, even when the engine is turning slowly, so that gasoline is sucked up through the tube. This additional supply greatly facilitates starting the engine, and makes priming unnecessary: it also allows the engine to be run at very slow speeds.

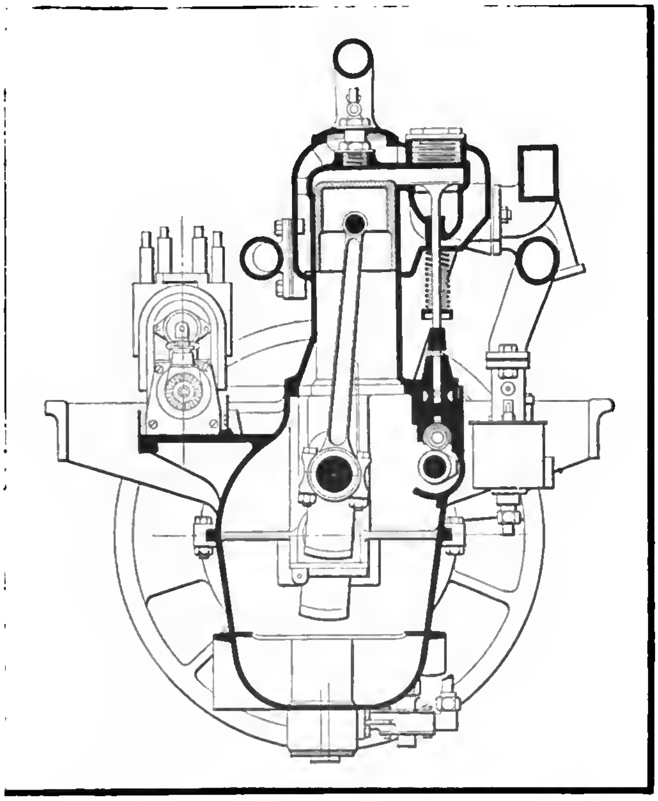


Plan View of Wright Biplane Showing Wheels and Tailplane

German Wright 'Planes Have Wheels

All the Wright aeroplanes made by the Deutsche Wright Gesellschaft will henceforth be fitted with wheels and tails, according to the *Automobil-Welt*. The accompanying drawing shows the new machines in plan view. The wheels are three in number, and are attached one to each of the two skids, just under the front edge of the planes, and one forward of these, attached to a cross-member. It has been found that with these wheels the teaching of purchasers to operate the machines is much simplified, as the beginners can make short flights on their own account without using the starting derrick.

The dimensions of the aeroplanes being built by the German company are given by *Automobil-Welt* as 12.50 meters wide, 9.50 meters long and 2.75 meters high, mounted on wheels. The main planes are 12.50 meters across and 2.00 meters deep; the forward horizontal rudder is 4.65 by 0.95 meters; the propellors are 2.60 meters in diameter. Improvements in the motor have reduced the weight from 108 to 95 kg., increased its output from 28 to 33 horsepower, and at the same time reduced the gasoline consumption from 400 to 290 grams per hour.


Cross Section of Metallurgique Motor Showing Offset

Unusual Amount of Cylinder Offset

Offsetting the cylinders from the crankshaft is a recognized and legitimate practice in automobile design, but few designers have dared to go to the length shown in the accompanying sectional drawing of the motor of the Metallurgique (Belgian) 12-14-horsepower car. Although no exact measurement of the offset can be found, it is apparent from the drawing that the amount is nearly half the cylinder bore. The motor in question has a bore of 75 mm. and a stroke of 110 mm. (approximately 2.95 by 4.33 inches). Thus the offset is approximately 1 1-4 inches for a 4 3-8-inch stroke. This motor also has the valves slightly offset from the camshaft. It will be noticed that the designer has found it necessary to spread out the lower part of the cylinder bore to give the connecting rod free action.

Baratoux, *Wright*, Warping His Planes

Henry Farman on His Latest Biplane

Seen From Henry Farman's Biplane

Riemsdyk, *Curtiss*, in front of Grand Stand

Sands, *Antoinette*, competing for Distance Prize

CANNES, FRANCE, Mar. 28—Never has an aviation meeting been heralded by such a fine series of performances as were shown here yesterday. All the flyers were in the air, doing their utmost to beat their rivals, with the result that many flights of over an hour's duration were accomplished. The only accident of the day befell Molon, one of the favorites. On his Blériot he was the first away, quickly joined by Christiaens on his Farman. For some time the two raced with each other, until at one of the corners, when Christiaens was overtaking his rival, there was a miscalculation by one or the other, which resulted in the monoplane being thrown off the course and landing in an adjacent field. Molon was unhurt, except for a cut on the face, but his machine was badly damaged. Later in the day, however, he made his appearance on another machine and succeeded in covering several laps.

The meet was organized by the city of Cannes, under the patronage of the Aero Club of France, and the different events are held under the rules of the International Aeronautic Federation. The prizes amount to a total of 100,000 francs. Among the more important of the events scheduled are the prizes for first laps, which are rewards of 500 francs for each of the twenty aviators first to make the circuit of the course; the prizes for the longest single flights, amounting to a total of 10,000 francs; the grand prize of Cannes, for greatest total duration of flights by a single aviator, and a prize of 20,000 francs for the winner of a cross-country flight of 19 kilometers over a specified course.

Most of the competitors who have engaged their entries are comparative novices; but nothing could better show the ease with which the new sport is learned than the excellent performances these same novices made. Farman biplanes, of the type made familiar in America by Paulhan, appear to predominate; they are used by Frey, Christiaens and Edmond, all promising drivers. Molon uses the Blériot monoplane; Hayden Sands, the American, drives an Antoinette monoplane; Baratoux has one of the French-built Wright machines, which has been fitted with wheels in addition to its skids, and Riemsdyk handles a Curtiss biplane, the only American-built machine to appear.

Henry Farman's new biplane has received much comment, favorable and otherwise, although no one doubts that this pioneer knows what he is about. The peculiarity of his latest machine is that the upper plane is wider than the lower, having five panels to three in the lower plane. The overlapping panels of the upper plane alone are provided with the hinged flaps for maintaining lateral equilibrium. On one of his flights in this machine Farman took up a photographer as passenger, securing some very interesting views.

Another clever photograph was secured of Baratoux' Wright machine making a turn and in the act of warping its wings. The increased curvature of the planes on the depressed side of the machine is clearly visible, as well as the flatter shape of those on the raised side. Baratoux may also be seen with his right arm extended to work the lever producing the warping.

Aeronautic Progress Along Constructive Lines

By MARIUS C. KRARUP

AVIATION is an art so young that intuition and invention play a greater part in solving its problems than science and engineering. Its data are insecure and scattered. Even in the fundamentals, there is more to be learned than has been learned, and probably a good deal to be unlearned. By a systematic and orderly discussion of aeronautic construction, which it is proposed to inaugurate in these columns, it should be possible to advance the art and concentrate inventive energies, as well as public appreciation, in channels where these important factors in new work will do the most good. But before proceeding to this orderly discussion, the unsettled condition of all knowledge on the subject makes it desirable to throw out feelers first in order to ascertain the present state of mind of all those most vitally interested in aviation matters, so that material may come to hand showing on what particular phases of the subject strong differences of opinion exist and where the center of interest is located. With this object in view, a number of assertive statements are presented in the following without proof or discussion, and dissenting opinions are cordially invited from readers who fail to agree with the statements made. Subsequently, in the more orderly but also more lengthy discussion, those portions of the subject on which most vital dissension exists, or which most keenly engage the interest of the workers in the new art, will then be treated most promptly and elaborately in text and sketches.

In horizontal aeroplane flight no power is spent in overcoming gravitation; all the power delivered by the propellers is completely used up in overcoming air resistance. Gravitation need not be overcome by a flying machine any more than by an automobile. It is the peculiarity of aeroplane action that it renders the atmosphere momentarily as unyielding under the surfaces of the aeroplane-machine as a hard road is under the wheels of an automobile. The less perfect aeroplane meets more air resistance, other things equal, than the better one; much as the poorly constructed automobile has more friction, of various sorts, to overcome than an automobile of higher grade and quality. There is a close analogy between air resistance in fliers and friction in automobiles, but the aeroplanc constructor has the advantage that, when he improves his planes, he improves the road at the same time, because the plane makes its own road, as it flies, while the automobile builder must take the road, as he finds it. At present, planes adapted for fast flight differ in shape from planes best adapted for slow flight, but this is a shortcoming based upon faulty understanding of aeroplane action, faulty construction and the lack of suitable aeronautic materials. Machines can be built suitable for all speeds.

If the air resistance against the propulsion of a machine at the lowest speed at which it can fly equals $R+r$, in which R stands for the resistance against the propulsion of the supporting surfaces and r for the resistance of stanchions, body of aviator, engine, radiator, front edges of planes and other non-supporting parts of the machine, the air resistance at doubled speed and the same load will be $R-x+r^{2+}$; hence the extreme value of redncing r to a minimum. But if the load is doubled as well as the speed, the resistance will be in the form of $(R-x)^{2+}+r^{2+}$. The x is a small value compared to R and depends on the increased efficiency of a properly constructed plane when worked at small tilts. The exponent $^{2+}$ indicates that resistance increases somewhat faster than the square of velocity.

The curve of an aeroplane serves the purpose of establishing a cushion of somewhat compressed and somewhat confined air between the plane and the free atmosphere, thereby retarding the yielding of the latter, preventing the formation of eddies under the planes and contributing to an equable distribution of pressures. The curve is destined to be superseded by other means for accomplishing the same purposes. Among these means will be the introduction of flexibility and resiliency in large portions of the planes and the contrivance of compartment air pockets under those portions of the planes which remain rigid. These improvements are absolutely necessary for the automatic balancing of aeroplane machines in gusts of wind, but will also greatly increase the cost of their construction.

The cheap aeroplane is doomed. The irregular movements of the atmosphere are as fatal to a frail rigidity maintained by means of guy wires or steel tape as the unevenness of roads was to early automobiles with angle-iron frames and a rigid suspension of parts, forming a construction in which the most severe shock always found the weakest spot for its attack, by natural selection.

The efficiency of the power thrust from propellers in all present-day biplanes and monoplanes varies with the tilt of the planes in flight, and the tilt varies according to load and speed (speed always considered and measured in relation to the enveloping atmosphere). The power works directly in line with the resistance to motion only at one certain tilt for each machine. The tilt should be adjustable with relation to the direction of the propeller shaft and the whole power plant and the payload.

Other losses in power application are much larger. More than fifty per cent. of the engine power is wasted in setting up centrifugal stresses in the propellers. Hence the choice of four-bladed propellers by many French constructors, the small rotary velocity of the Wright propellers, the pointed ends of Cody's propeller. But more efficient improvements are needed.

If one propeller of seven feet diameter calls for thirty horsepower in order to be rotated at one thousand revolutions per minute, and wastes eighteen horsepower in centrifugality, five in friction and misdirection of thrust and delivers seven in useful propulsion, and another propeller of the same dimensions and shape is constructed so as to require sixty horsepower in order to be rotated at the same speed and pitch, the loss in centrifugality will be the same as in the case of the first propeller and the direction of forces will be the same. In the first case there was twelve horsepower left for thrusts against the atmosphere; in the second there is forty-two, which, divided in the proportion of five and seven, leaves twenty-four and one-half horsepower—available for useful propulsion. To accomplish this improvement in efficiency and applicability of high powers is plainly within easy range of mechanical feasibility, by compelling the atmosphere itself to produce the required pitch against a resilient resistance in the propeller, as the birds do with their wings and the fishes with their tails.

Four-bladed propellers should lose much of their efficiency in the higher strata of the atmosphere—where the pressure of the air column is smaller—and, as flying machines will be required to pass over high mountains as well as out of cannon range, two-bladed propellers placed tandem give more promise.

A headwind acting horizontally does not reduce the power required for flight but permits the aeroplane to rise more steeply, both from the ground and when in the air.

Kite action is less efficacious than aeroplane action. This has been observed by the Wrights and is explained by the fact that the whole atmosphere moves under the kite—or under the aeroplane held by power in the teeth of the wind—while the aeroplane propelled through a calm atmosphere meets an extra resistance and derives an extra support from driving the layer of air directly in its path against the quiescent air underneath.

The same cause makes aeroplane action somewhat more effective near to the resistant earth and supplies an explanation, when none better seems available, for the failure of many amateurish machines, in not leaving the earth more than a few feet, moving in a series of hops and bounds.

(To be continued)

Recent Trade Publications

Prominent on the first page of the American Locomotive Company's catalog is the famous Vanderbilt Cup, now in the possession of this company, and the idea is carried through the entire book by miniature drawings of the cup appearing beneath the trade name "Alco" in the corner of each page. The cover is in heavy linen paper with the design stamped in without the use of color, producing a distinctive effect; the design includes the word "Alco" and the outline of a touring car, behind which looms the dark shadow of a locomotive. It is a very creditable piece of work. There are 35 pages of text and illustrations devoted to the car which "stays new," both in touring, taxicab and commercial models.

More fully to set forth the lines and colorings of the Chalmers models, the catalog of the Chalmers Motor Company, of Detroit, is provided with half a dozen separate colored illustrations, on heavy cardboard, contained in a pocket on the back cover. Each of these shows some one of the Chalmers models in a coat of different hue—one in thistle green, one in red, one in hazel brown, one all in blue, one in blue with cream wheels, and one in blue with red striping. The catalog proper has 32 pages of good size, with clear-cut half-tone illustrations, and text in the well-known Chalmers style, which is good reading and at the same time instructive to technical man and novice.

Between covers of soft, heavy paper stamped with a gold design, the Anderson Carriage Company, of Detroit, sends out 55 pages of description and illustration of the Detroit Electric. The matter is arranged in a novel fashion. Every alternate pair of facing pages has on the left a picture of one of the Detroit models, and on the right the specifications of that model; the other pairs have on the left a photograph of the model of the preceding pages with some attractive detail of setting, or a view in the Anderson factory, and on the right a brief story of some of the cars' accomplishments.

As the original and native American, the catalog of the American Motor Car Company, Indianapolis, bears on its cover a portrait head of a pretty young lady in the aboriginal headdress, no doubt the forerunner of the only too familiar "peachbasket." The catalog contains four full-page plates of the different American models, in which the car is printed in black and the landscape background in a warm brown ink. The latter is also used for decorative borders on the other pages. The mechanical illustrations are especially commendable, there being an abundance of both general and detail views.

Shaft drive for electric cars is the chief talking point of the Baker Motor Vehicle Company, Cleveland, O., and its advantages are well set forth in a handsome catalog of 32 pages issued by that company. A cover of stiff grey paper with a design stamped in blue, black and gold forms, the outer dress, and within the various models are illustrated and described in an attractive fashion. The Baker line is unusually complete, including an even score of models, of which thirteen are shaft-driven; the prices range from $850 for a runabout to $3,500 for the landaulet and brougham.

"Buick 1910 Specifications" is the title of a small but well filled book issued by the Buick Motor Company, of Flint, Mich. It is printed on rough paper in two colors, line cuts being used only. The plan is followed of having a side elevation drawing of the car on the left-hand page, and its specifications, in a compact form, on the right. Seven different styles are shown, these being the two-cylinder model F, the four-cylinder model 10 as roadster, surrey and baby tonneau, model 16 as roadster and touring car, and the new model 17.

Two-cycle motors are steadily overcoming the prejudice opposing them, and the catechism contained in the catalog of the Atlas Motor Car Company, of Springfield, Mass., will go a long ways towards giving the final conviction. In the question and answer form, this expresses in popular language the advantages of the two-cycle construction. The catalog is unpretentious in comparison with some of the recent high art effects, but contains much real information, which, after all, is what the prospective purchaser wants.

The "Columbus Red Book," as might be expected, is the catalog of the Columbus Buggy Company, Columbus, O., devoted to that company's electric vehicles. The covers from which the catalog takes its name are a rich, dull red, and enclose 24 pages of medium size. After pages setting forth the advantages of the electric automobile, and describing the special features and advantages of the Columbus, follow photographs and specifications of the seven different Columbus models.

Striking in appearance is the catalog of the Black Mfg. Co., of Chicago, describing its Black-Crow cars; the sheet size is unusually large, and it is bound in covers of one of the new pastel shades of reddish brown, with the caption "1910 Black-Crow" in black. Although the pages number but 16, their size enables them to carry an ample amount of descriptive text, as well as large and clear illustrations. The text is particularly commendable in its accuracy and detail.

Dorris cars for 1910 are described in a catalog of convenient size. The pages are given a distinctive touch by a half-inch border of grey: those on the left hand carry illustrations of the cars and their parts, and are faced by pages of descriptive type. The full-page plates show the front and side views of the standard touring car, the chassis in plan view, the roadster and the limousine. The catalog is issued by the Dorris Motor Car Company, St. Louis.

Bailey electric vehicles are described in a neat booklet being sent out by the S. R. Bailey Company, Amesbury, Mass. The Bailey phaeton has particularly graceful lines, the frame being curved to correspond with the body design. This has the additional advantage of bringing the weight low. With the catalog comes a folder entitled "an appreciation," in which a prominent automobilist, who has owned 28 cars, tells what he thinks of the Bailey.

"Built and tested in the Berkshire Hills," can mean only the Berkshire car, the product of the Berkshire Auto-Car Company, of Pittsfield, Mass. The reading matter is reprinted from a trade magazine, and describes the car in considerable detail, in such manner that the technical man will find much value in it. On the inner back cover the specifications are summarized.

"Automobile Components" is the title of catalog G, from the Briscoe Manufacturing Company, of Detroit, Mich., and Newark, N. J. Besides illustrating the four or five principal plants of the company, much space is given to the square tube and tubular radiators, as well as the sheet steel products, which include hoods, fenders, fender fasteners and irons, drip pans, tanks, tool boxes, mufflers, steering wheels, and many other accessories.

Making a Demonstration

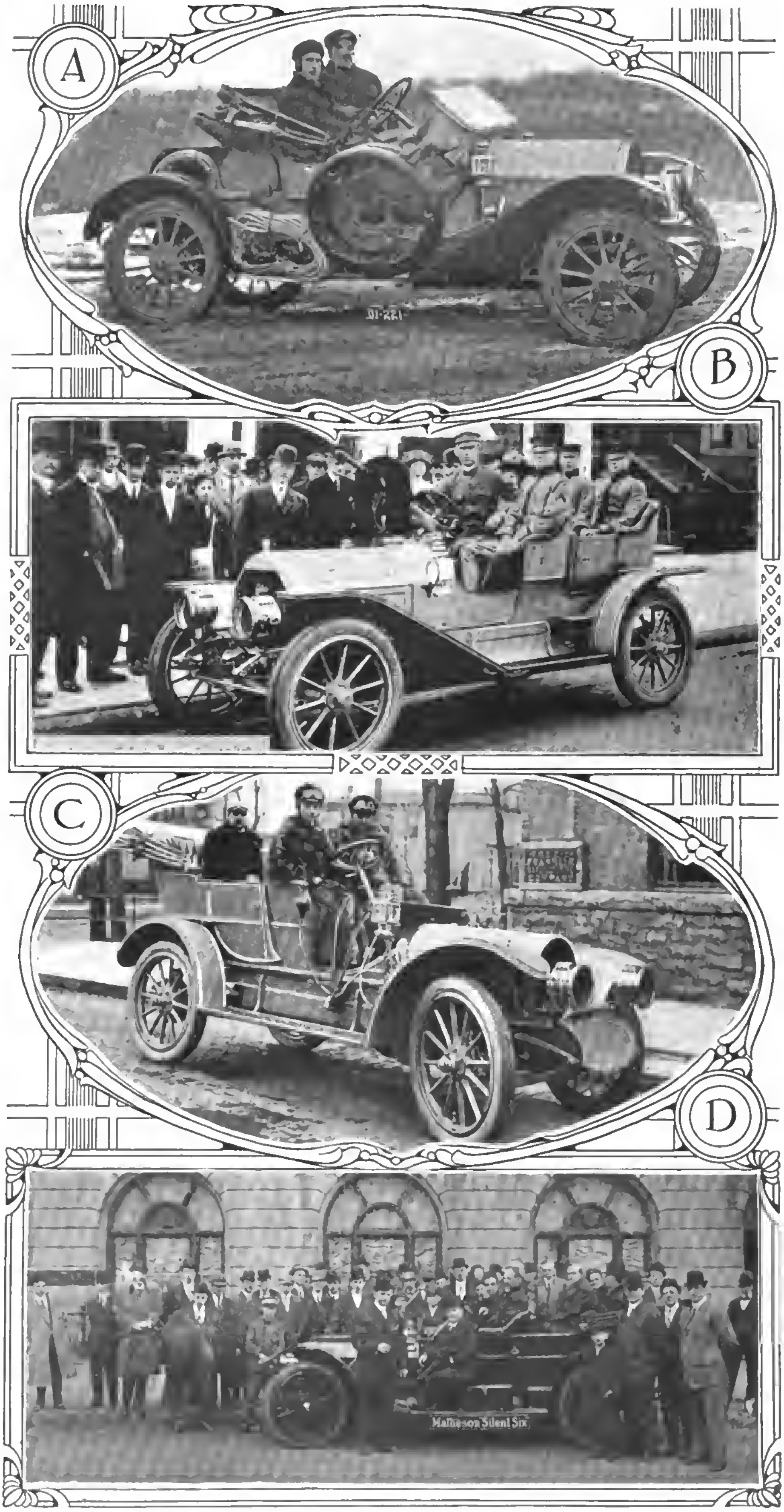
DEMONSTRATIONS are not alone the daily work, the source of bread and butter so to speak, of the agency and garage men, but are also closely interwoven into the work of the second-hand dealers, and a part of the routine work of the factory testers. This makes the subject of wide interest.

(A) Hudson runabout which has just completed a trip from Detroit to San Antonio, Tex., with the equipment which was carried along and which carried the car through many dangerous spots on the Western desert, in the alkali country and elsewhere. This trip was made in the dead of Winter, so that the perils of the road were greater than would be the case to-day. The long drive consumed four weeks, during which time J. S. Mohrhardt and Freeman Monroe, of Detroit, put in a very strenuous time.

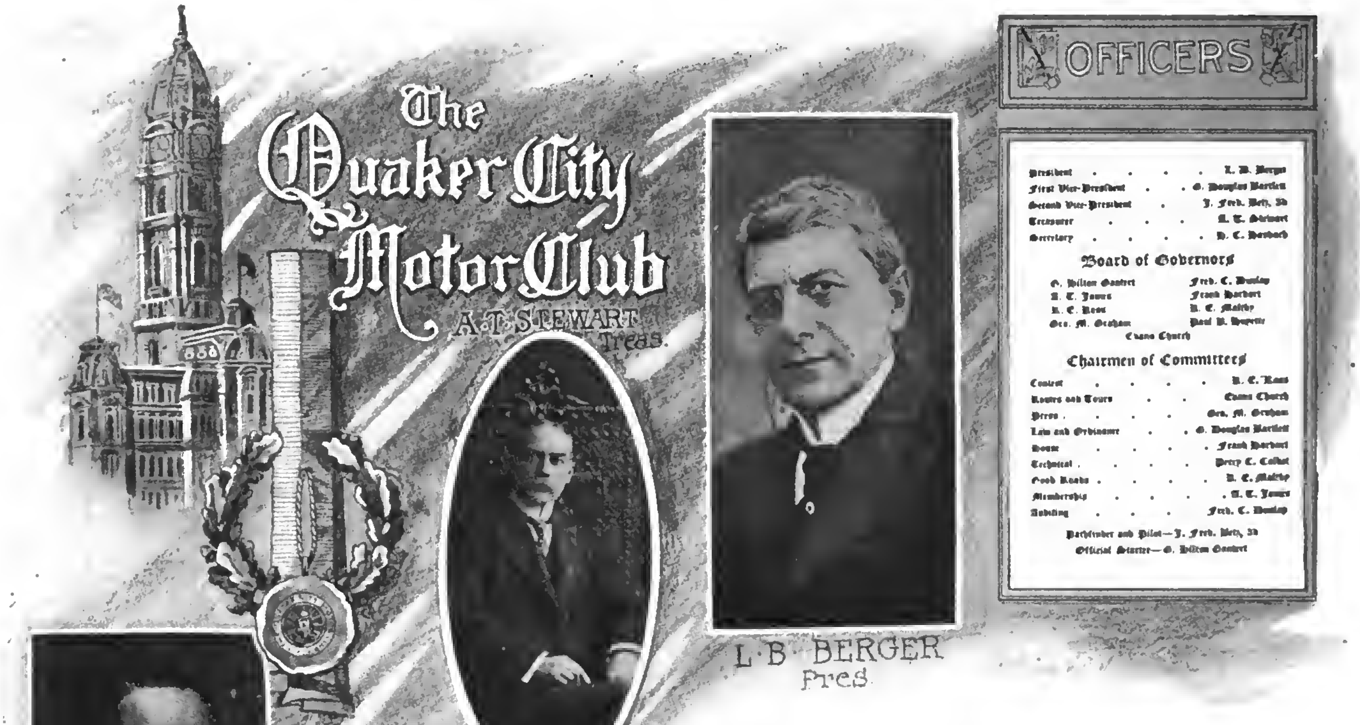
(B) Cadillac Thirty fitted with rapid-fire gun for army officers' use. The Northwestern Military Academy, Highland Park, Chicago, recently placed an order for a Cadillac Thirty fitted with a demi tonneau body, to which was added a Colt automatic rapid-fire gun. The armament was mounted directly upon the dash, so that it can be operated by the man alongside of the man at the wheel. With the gun equipment, the car weighs 2,500 pounds.

(C) Franklin six-cylinder car of 1910 model, which the owner, Mrs. Seaman, a Brooklyn woman, drove from the factory in Syracuse back to her home. The long trip was made without an untoward incident or a moment's trouble, which speaks volumes for the thoroughness of the factory testing of this make of car.

(D) A short time ago C. W. Matheson, president of the selling organization of the Matheson Motor Car Company, with offices in New York City, undertook to show to the newspaper and trade paper men of the metropolis the absolute silence of the new 1910 models of the Matheson, demonstrating at the same time the flexibility of the car by walking in front of it, throttled down, but with the high gear engaged.



A—HUDSON RUNABOUT, WHICH MADE TRIP FROM DETROIT TO TEXAS
B—CADILLAC THIRTY EQUIPPED WITH COLT AUTOMATIC RAPID FIRE GUN
C—MRS. SEAMAN DRIVING HER FRANKLIN FROM THE FACTORY TO BROOKLYN
D—DEMONSTRATION OF SILENCE AND FLEXIBILITY OF NEW MATHESON SIX



AN organization of motorists, actually popular with the general public and in high favor with the authorities of a great city, is rare enough to deserve special mention and such is the position and condition of the Quaker City Motor Club of Philadelphia. It is not the largest, wealthiest and most venerable body of men in Philadelphia, but the Quaker City seems to think that the club had an important part in controlling the recent street car strike, saving immense amounts of property and not a little of blood and violence and it is correspondingly honored. An active section of the membership formed a body known as the First Volunteer Motor Corps over two years ago and when the traction strike took place last February, the Emergency Patrol No. 1, formed of progressive members of the Quaker City Motor Club enlisted for the whole campaign.

The members were sworn in as special officers and the club donated the use of as many powerful cars as necessary and promptly assumed their duties. For forty days the motor corps was in service night and day and the concrete result was that whenever a riot call came in, there was a detail of police on the scene so quickly that disorder scarcely had a chance to get started before it was quelled.

The idea of the Motor Corps originated with Secretary H. C. Harbach and the working out of the details was performed by him. Charles J. Swain, former president of the club, was elected Commander of the Motor Corps and he was assisted actively by about a dozen of the leading members of the organization, under the direction of William Carleton Jackson. Behind this effective force stood the whole club membership. Special letters of thanks have been written to the corps by the municipal authorities, acknowledging the obligation of the city. The men who were notably active in this connection, include the following: Charles J. Swain, commander: William Carleton Jackson, Edwin H. Lewis, J. R. Overpeck, J. Fred Betz, third; C. Edgar Shreve, Richard Sellers, Louis G. Vogel and Edward B. Morgan, P. D. Folwell, G. Douglas Bartlett, A. T. James, A. E. Maltby, Frank Hardart, L. D. Berger. K. B. Harwood and A. T. Stewart were also in the thick of the fray for a considerable portion of the campaign.

The other principal claim to fame that is made for the club, is the fact that it fathers the Fairmount Park Race, one of the automobile classics. This race is run annually over an eight mile course in beautiful Fairmount Park and is 200 miles in length. The race is run the week after the Vanderbilt and it is estimated that last year 1,000,000 persons witnessed its decision. Besides magnificent plate trophies, the money awards to the placed cars. amount to thousands of dollars.

The race has one specially unique feature, in that the city receives all money realized from sale of seats and other concessions and divides it among several worthy charities. This fund is a material help to the institutions as it is liberal in size and constantly growing.

Aside from the Fairmount Park race, the club holds two race meets each year at the Point Breeze track and an annual Roadability Run. As described in a recent issue of THE AUTOMOBILE, the latter event will take place April 30, this year and will be to Atlantic City.

The club's quarters are in the Hotel Walton and while not large nor ornate, they are comfortably and tastefully fitted up The organization was started with a preliminary meeting Nov. 13, 1906, with George H. Smith, as president pro tem. in the chair. The first stated meeting was held a week later and the first regular meeting for organization was held at the Hotel

Majestic, March 7, 1907, when Charles J. Swain was chosen president. The first quarters of the club were in the Hotel Majestic from which removal was made to the Hotel Walton in March, 1909.

There are just 212 members on the club rolls, and each is an active, actual member with dues paid and interest alive.

Primarily the club is not a social organization, although about the usual percentage of its members take advantage of that feature of its life. It is dedicated to the sport of automobiling and its energy is directed toward popularizing the motor car by combatting prejudice and demonstrating its utility and enjoyable attributes. One of its chief aims is toward the general subject of good roads, acting as a factor in the State Federation of Automobile Clubs.

As an individual organization, the Quaker City Motor Club has done a vast work toward improving road conditions. Its road run from Philadelphia to Pittsburgh, over a course pronounced impossible by experts, was a mile-post in the history of motoring. It was costly for the club, but the spirit of the organization is the essence of good sport, so the club pocketed its loss and looked only on the remarkable accomplishment achieved by the race itself.

President L. D. Berger said that there was a tremendous field already open for useful work in the direction of improved highways. He pointed out that Pennsylvania is spending $4,000,000 a year in removing dirt from the gutters of country roads and placing it upon the surfaces of the driveways where the rains wash it back again and nullify the expenditure. He depreciated this sort of thing and said that the State organization, strongly aided by the Quaker City Motor Club was trying to provide for the expenditure of about $2,000,000 a year of the amount now wasted on the dirt roads, for the construction of permanent road improvements.

The men who form the club are prominent citizens of Philadelphia. They represent all lines of business and professional life and every phase of political faith, but they all unite in supporting the decalogue of the Quaker City Motor Club, which is as follows:

1. To assist all legislation for the furtherance of good roads.
2. To promulgate the idea that the automobile is the vehicle of the future and to strive for more liberal laws in regard to the same.
3. To encourage the automobilists in their realm of sport and to abolish impositions on the public highways.
4. To promote automobile contests in such a manner that the spirit of justice shall be embodied in all the rules and regulations.
5. To surround each event with the proper safeguard, so that an admiring public can witness the contests with full appreciation and perfect safety.
6. To endeavor to bring the sport of motoring to the highest level by the appointment of men of known experience and recognized ability as officers to carry on all contests.
7. To create new conditions in contests that will attract both the owner and the manufacturer.
8. To give trophies of intrinsic value, or rewards of real merit.
9. To promote social entertainment at stated periods during the year at which questions of the hour, referring to automobildom, can be discussed by capable men for the benefit of every member.
10. To make every man who owns an automobile feel that by belonging to the Quaker City Motor Club, he becomes part of an organization which is cohesive in principle and progressive in practice, ever ready to further the interests of the motor car, as well as to take care of the rights of the motorist.

In testing and contesting present laws, the club has tried to do a service to motordom generally. The contruction of the Pennsylvania statute as to the exact meaning of the term "chauffeur" was the work of the club. One of its members, Stanley Cooper, volunteered as a sacrifice and was arrested while driving a car belonging to a relative, he not having a chauffeur's license. He was fined in police court and on appeal the court of record held that a chauffeur is a paid driver and that Mr. Cooper had not broken the law. The matter is now pending on the State's appeal to the court of final resort.

The fundamental principle of the club is to subordinate individual and selfish aspirations and to unite to help the sport generally. In addition to this, much help will be given the industry as a whole, so serious as well as frivolous ends are served.

"CHAUFFEUR" IS A PAID DRIVER

Philadelphia, Apr. 11—"A chauffeur is one who drives a motor car for pay," decided Judge Staake of the Quarter Sessions bench, in a recent opinion delivered in the action of the Commonwealth vs. Cooper. Several months ago Assistant Attorney-General W. H. Hargest when asked for an opinion in the matter by the State Highway Department, ruled that a chauffeur meant anyone other than the owner, who operated an automobile.

This opinion was so fraught with significance to the automobile public generally, that the Quaker City Motor Club decided to contest such an interpretation and a test case was prepared. Stanley P. Cooper, a member of the club who did not have a license, borrowed his sister's car and drove up Broad Street and around the city hall until he was arrested by a policeman who had been informed that Cooper did not have a license. He was fined $10 and appealed to Quarter Sessions where the appeal was sustained and the legal status of the chauffeur definitely outlined.

In his opinion Judge Staake declares that the laws of every State in which automobile laws have been passed, define the term "chauffeur" to include the idea of compensation for the operation of a vehicle. He said that if it had been the intention of the Legislature to require all operators of motor cars to be licensed under the present law, it would have made specific provision for such a condition. Under the ruling of Mr. Hargest it would have been necessary for each member of the family of a car owner, who wished to drive and who might be thoroughly competent to do so, to take out a license.

MARYLAND LAW SATISFIES MOTORISTS

Baltimore, Md., Apr. 11—Maryland's new automobile law will be in operation May 1, when the Commissioner of Motor Vehicles, created by the law, will begin his duties. This law, known as the Swann Motor Vehicle law, was passed by the Maryland Legislature and has been signed by Governor Crothers. There have been no kicks registered against it as it now stands, for the members of the Automobile Club of Maryland and members of the State Automobile Commission got together before the bill was introduced in the General Assembly and reached a compromise on the license fee section and other details that were not altogether to the liking of the motorists.

In consequence of this, some of the officials of the club were among those at Annapolis to speak in favor of the adoption of the law. That the law was adopted, too, was due to the efforts of Col. Sherlock Swann, author, and State Senator Linthicum, both of whom are members of the commission, as well as Governor Crothers, who backed the bill from the time it was framed.

FLORAL PARADE TO BE FEATURE

Chicago, Apr. 11—The Chicago Automobile Trade Association has decided to hold its floral parade May 7 in the afternoon. It is planned to have at least 500 cars in the turnout, and the awards will be made by a committee of prominent society women. There will be four divisions in the parade, three prizes being awarded in each. Much interest has already been aroused, so that success is assured.

Will Windshields Break at High Speed?

Editor THE AUTOMOBILE:

[2,224]—I have lately become a subscriber to "The Automobile" and am quite interested in the "Letters Answered and Discussed" section. I wish you would answer a question for me.

I frequently hit up a pace of 45 to 50 miles an hour when out on long trips in my machine, with the windshield up. Is this a safe thing to do? I have been told that the glass is liable to break from the air pressure against it. The shield is a standard make, flat front type, with a brass-bound seam across the center.

Was the Pope-Hartford machine that made such good time in the Portola race a stock chassis or a special? S. L. P.

The attention of readers is again directed to the note which appeared in these columns last week, requesting name and address with each letter. This letter came without name or address except the initials, but as it arrived before the warning we are using it, also for the sake of the interesting question which it brings up.

The pressure of the wind at a speed of 50 miles an hour, according to various authorities, may be taken at about 10 pounds per square foot. Fairbairn gives the following formula for the strength of a glass bar: $w = 3{,}140 \dfrac{bd^2}{l}$, which would give a modulus of rupture of 4,710 pounds. The formula for the breaking load of a beam supported at the ends and loaded uniformly is $W = \dfrac{4\,Rbd^2}{3l}$. Assuming a plate of glass one foot high, three feet wide and 3/8 inch thick, supported at the ends only, and substituting the known quantities, $W = \dfrac{4 \cdot 4{,}710 \cdot 12 \cdot 9}{3 \cdot 36 \cdot 64} = 294$ pounds. Compared to this, the 30 pounds pressure on the three square feet of surface presented to the wind is quite insignificant, the factor of safety being about ten.

Although most people do not appreciate the fact, glass is a comparatively strong substance. Its weakness is against sudden shocks rather than against steady loads. The 100 pounds per square foot pressure necessary to break an ordinary wind shield would only be attained at a speed of 160 miles an hour, which would be "going some," even for Barney Oldfield.

The Pope-Hartford that won the Portola race was a stock chassis.

License Fees and Car Ownership

Editor THE AUTOMOBILE:

[2,225]—Kindly answer the following questions in the columns of "Letters Interesting, Answered and Discussed"? Do I have to get a license or pay a fee to the city or state, to run a hacking car and own it? CONSTANT READER.

New York City.

Yes, it is a necessity to have a license for the car whether it be run as a hacking car or for pleasure. A New York State license is bought but once, and is perpetuated by request, so that the expense is very small. There would be no additional fee to pay to the city for a pleasure car, but a hacking license would be necessary, for which a small license fee is charged. That is, one fee for the car, whatever its use, and another fee to the city for a hacking car, would have to be paid.

Some Questions of Fact and Theory

Editor THE AUTOMOBILE:

[2,226]—Will you please answer the following questions through "Letters"?

1—Was the Marmon "50" ever fully described in "The Automobile" or any other journal? If so, please refer me to same. The Nordyke & Marmon Company does not make this car any more, but I wish to know something about it.

2—What kind of a clutch was used in this car? I am informed it was an excellent one and would like to know its mechanism.

3—Kindly give me some information on the subject of the differential; this is a part of the car I do not fully understand.

4—Does a car derive more power by adjusting the carbureter so that all the gasoline possible is given with a proper proportion of air, or is it better to give less gas and less air? What I mean to say is, are the very best results obtained by mixing the most gas and air possible, or are just as good results obtained by cutting down the amount mxed? GEO. W. WILSON, JR.

St. Louis.

Nordyke & Marmon never made a car rated at 50 horsepower. Their highest-powered car, to which you no doubt refer, was the 1908 model H, rated at 40-45 horsepower. As the cylinders of this car were 5 by 5 inches, 50 horsepower would not be an excessive rating, as things go. This car was described at some length in THE AUTOMOBILE, issue of January 16, 1908.

The clutch of this car was a multiple-disc, consisting of a comparatively small number of bronze plates studded on both sides with cork inserts, and alternating with steel plates. The Marmon Company now uses a leather-faced cone clutch.

When a car goes around a corner the outer wheels travel further than the inner ones, and so must turn faster. The differential allows them to do this, at the same time transmitting the driving power to them. One of the standard forms of differential has bevel gears on the inner ends of each of the live shafts, facing each other; three or four bevel pinions between these gears, their shafts radiating from the center of the live shafts; and a cage surrounding the gears, in which the pinions have their bearing, and on which is bolted the main bevel gear driven by the motor. The arrangement is such that if the cage is held stationary and one of the live shafts rotated, the other live shaft will rotate in the opposite direction, the differential acting as a reversing gear.

In action making a turn, the main bevel gears may be turning at a speed which would give each of the live shafts a speed of 100 r.p.m.; then if the outer wheel turns at 125 r.p.m., giving that side of the mechanism a positive velocity of 25 r.p.m. above normal, the differential, in its capacity of reverse gear, will transmit to the other live shaft a relative negative velocity of 25 r.p.m, reducing the speed of the inner side to 75 r.p.m.

The more gas, the more power, up to the maximum capacity of the cylinders; if it were possible to force the gas into the cylinders under pressure, still more power could be obtained. Cutting down the amount of gas, as you suggest, is simply throttling the motor, and will inevitably result in less power.

Date of Selden Patent

Editor THE AUTOMOBILE:

[2,227]—Will you please answer the following questions and greatly oblige an interested reader of "The Automobile?" On what date does the Selden patent expire? Is there any possibility of the owners of this patent gaining an extension after or beyond that date? Can any one build automobiles after that date without paying any royalty? F. R. ZEIGLER.

Oregon, Ill.

The Selden patent application was filed on May 8, 1879, and the patent was granted on November 5, 1895. Since the term of a patent is 17 years, the patent will expire on November 5, 1912. The sole object of a patent is to protect the inventor from the promiscuous use of his ideas during that term of years, and beyond that the Government does not go. That is, after the expiration of the 17-year term, the idea becomes public property and any one may manufacture, buy or sell machines embodying the formerly patented idea freely and without hindrance. On page 728, a discussion of this matter will be found.

Garage and Repair Shop Arrangement

Editor THE AUTOMOBILE:

[2,228]—I am a reader of your paper and am about to put up a garage to hold from twenty-five to thirty cars combined with a repair department. The building will be 85 ft. front by 66 ft. deep, and with a basement under part of it. Will you kindly let me know the best way of arranging the construction so that it will be efficient and convenient? Try and give me whatever suggestions you can to make the building suitable for the motor business. If you have had, in the past, any articles in your paper which bear on the subject, I would appreciate it if you would mail the issues to me and I will remit on receipt of your bill. J. SERHEGER.
South Bend, Ind.

Generally speaking, each car should have a floor space of at least 9 ft. width by 15 ft. length, or 135 sq. ft. This is not an invariable rule, and many garages find themselves able to handle cars right along in less space, but it is an average size which good practice would call for. This size of floor space would call for about 4,100 sq. ft. for 30 cars, while, in addition, an aisle down the center not less than 10 or 11 ft. wide would be a necessity. This in the depth of building mentioned would add about 700 sq. ft., or make the total 4,800. Since the building as spoken of would have over 5,600 sq. ft., the size is on the safe side. As to arrangements, that varies with individual preference and the location and character of the cars handled, the patrons of the place, and many other things. One very good plan is to have the ground floor given up entirely to live storage, with a specified, numbered place for each regular car. Then, utilize the top floor, or at least one of the upper floors, for dead storage. This will take little space, probably not more than half of one floor in the above case, and the balance of the floor can be given over to painting, varnishing and upholstering shops. Another floor should be given up to repair and machine shops, while the basement can be utilized for storage of materials, parts for the cars handled, and old or second-hand cars taken in trade. If an agency is to be taken as part of the program, the best part of the ground floor should be selected for this purpose.

In any case, the office should be alongside of the door, through which the cars must enter and leave. In the basement would also be placed the power plant, the air compressor, and similar tools. Provision should also be made for lockers, both for the men employed in the building and for the patrons. They should be located in a clean, light place, and made preferably of steel.

In starting a garage, much thought should be given to a simple yet comprehensive system of keeping the books. The materials of the garage, its floors, and its equipment, will all depend upon the tendency of the owner and builder, as well as to the class of people to whom the garage will be a home for their cars. In a series of articles about to be started in the paper, prominent New York garages will be described in detail, with illustrations, and where possible, floor plans. This series of articles will be of much use to you, and will start in this issue, the first one being found on page 739.

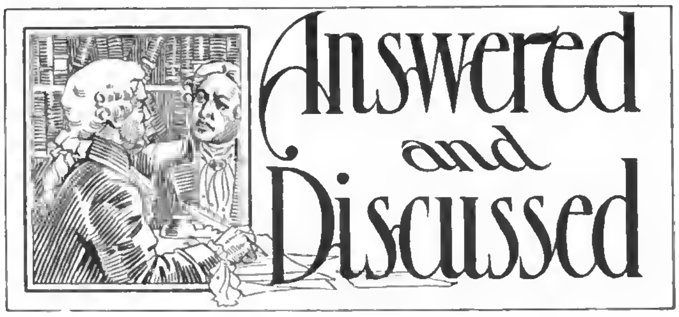
Polishes for Metal Work and Bodies

Editor THE AUTOMOBILE:

[2,229]—Will you please advise us as to the best metal polish and body polish on the market? CLIO MOTOR COMPANY.
Clio, S. C.

We cannot recommend preparations quite so definitely as you seem to desire, for obvious reasons. Besides, the best polish is largely a matter of personal opinion, and equally well-informed persons might favor different kinds. There are any number of special preparations on the market, many of them advertised in the advertising pages of this magazine, and we think it quite safe to say that any one of them, if used in accordance with the directions, will prove quite satisfactory.

For metal work a cheap and satisfactory polish may be made from whiting cut with gasoline. Of course, this must be prepared fresh whenever used, as the gasoline quickly evaporates; but as there is always plenty of gasoline around a garage, this will not be found a great inconvenience.



French Automobile Publications

Editor THE AUTOMOBILE:

[2,230]—Can you please give me the name and address of some good French automobile publication, of about the same high character as "The Automobile"? I would appreciate this information very much, or any information regarding French papers, as I subscribe to "The Automobile" and am very much pleased with the same. A. W. B.
Milwaukee.

There are about a half-dozen papers in the list of best published French papers. *Omnia* is published by L. Baudry de Saunier at 20 Rue Duret, Paris, and costs 25 francs per year. It is of a technical or semi-technical character, and contains on an average 20 pages per week. *La Vie Automobile* is a weekly, published by Charles Faroux at 47-49 Quai des Grands Augustins, Paris, at 25 francs. It is of a less technical character than *Omnia*, but a monthly supplement, *La Technique Automobile et Aerienne*, is devoted entirely to that side. The former amounts to about 16 pages per issue, while the latter is of the same size. The price of the technical sheet is 12 francs per year.

L'Automobile is a weekly in which more attention is given to clubs, sporting news, novelties, racing and the like than to technical matter. This is published at 19 Rue des Saints-Pères, contains 16 pages per issue, and is of slightly larger size than the usual. *La Pratique Automobile* is a weekly published by Mortimer Mégret at 12 Avenue de la Grande-Armee, Paris, at 13 fr. 50. Its 20 pages, of small size, are devoted entirely to sporting events of the automobile and aeronautical world.

Then, there is *La France Automobile et Aerienne*, the latter part of the name being a recent addition. It is a weekly of the usual size, 16 pages per issue, and 20 fr. per year. The subject matter is only slightly technical in character, and of late has assumed, coincident with the change in name, a decidedly aeronautical tone.

Why Do Not All Use Friction Drive?

Editor THE AUTOMOBILE:

[2,231]—Please answer in the columns of "The Automobile" the following questions:

1—Why do not all automobile manufacturers use the friction transmission instead of selective or planetary, and do away with the disc or cone clutch, etc.?

2—Is not the friction transmission more desirable on account of obtaining any speed from zero to limit on high gear?

3—Does not a car with friction transmission get more power delivered to the wheels than a car with any other kind of transmission of equal horsepower?

4—Is it not cheaper as to wear and cost of replacing to have a friction than a gear transmission? R. F. HENRY, JR.
Palm, Ala.

Probably the reason why all makers do not use the friction drive is that they do not believe it is the best for their purposes. We doubt if the average user of this gear uses more than three or four of the speeds available; he gets that many favorite positions and does not bother about the intermediate ones.

Friction transmissions, of the simple disc type, are never on the high gear, that is, in the sense that a car with direct drive on the high can be. The friction drive gets more power to the wheels than a sliding gear on its low speeds, but not so much as a sliding gear on high speeds. The friction discs must be replaced every few thousand miles, although the expense is small.

The Duration and Term of the Selden Patent

By XENOPHON P. HUDDY, LL. B.

THE SELDEN PATENT, which was declared valid by the Circuit Court of the United States for the Southern District of New York on September 19, 1909, was granted by the Patent Office in 1895 on an application filed in 1879, more than 16 years before the grant was made. The patent therefore has a remaining period of duration and term of two more years, provided that an extension is not obtained by a special act.

To those who are waiting for the expiration of the remainder of the term of this patent, let it be said that too much dependence should not be placed upon the patent rights being extinguished in 1912 and then becoming general public property. The Selden patent is now valid and alive. It has not yet expired, and until its life ceases forever, hopes should not be indulged in and plans should not be made too definite. Even though the seventeen years of the Selden patent cannot be extended under any general law, its life may be prolonged by a special act of Congress, the same as the Government has done in many other cases.

POWER OF CONGRESS TO EXTEND TERM

Congress possesses the power by means of a private act to grant an extension of a patent, even after the patent has expired and the invention has been introduced to public use. The patent thus extended is to be regarded as a patent for the entire time from the first grant to the end of the extended period. A person making articles under the patent in the interim between the expiration and extension has no right to use them after the extension is allowed.

Prior to the act of March 2, 1861, a patent ran for 14 years, with the privilege of extension for seven years longer, but by that act the term was limited to 17 years without a privilege of extension given under the statute. There is now no general act permitting a patent to be extended, so the only right which a patentee possesses is to apply to Congress for a special act. Whether Congress will grant an extension of time will depend upon the facts and circumstances of each case.

FACTS WARRANTING SPECIAL EXTENSIONS

At the expiration of the present term of the Selden patent the owners thereof have the right to apply to Congress for an extension of its life. In determining whether the application for the extension will be granted by Congress, the primary question to be answered is whether in justice the holders of the patent should receive an extension.

It may be claimed that the rights of the Selden patent are being grossly and openly violated, and that the holders of the patent have lost, and are losing, large sums of money which they are entitled to under the decision of the United States Circuit Court upholding the grant. The natural question to be asked, then, is, if the owners of the Selden patent have received all that is justly due to them under the patent during its term? These facts, taken into consideration with the fact that the patent was not granted until 16 years after its application, and the further fact that the automobile industry is one of modern development, would be most influential in obtaining from Congress the passage of a special act extending the term to expire several years hence.

Congress possesses the power to do this, and has often exercised this power. The following cases are referred to:

In the case of Jordan vs. Dobson, Fed. Cas. No. 7,519, the United States Circuit Court held that Congress has the power to authorize by special act the extention of a patent, notwithstanding the fact that the original patent had previously expired, and the invention has been introduced to public use. The court also held that a special act of Congress authorizing the extension of a particular patent should not be read and construed in connection with the general acts on the subject. In this case it was contended that Congress had no power to extend a patent by special act, but the court said:

"The eighth section of the first article of that instrument [the Constitution of the United States) ordains that Congress shall have power to promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries. This is a large power. It is not said when those limited times shall commence, how long they shall continue, or when they shall end. All that is left to the discretion of Congress."

In the case of Union Manufacturing Company vs. Lounsbury, Fed. Cas. 14,368, a patent was also extended by a special act of Congress. The court held, however, that where certain representations were made to Congress, upon the faith of which a patent was extended by a special act of Congress, the patentee will be held to his representations.

In July, 1862, Congress by a private act extended an expiring patent issued to Etienne Bernot, the inventor of a machine for cutting files. See New American File Co. vs. Nicholson File Co., 8 Fed. Rep., 816.

The patent for Woodworth's Planing Machine was extended from 1842 to 1843 by the Board of Commissioners. In 1845 Congress by a special act extending the time still further, from 1849 to 1856. See Bloomer vs. McQuewan, 14 How. (U. S.), 539, wherein the Supreme Court of the United States held as follows:

First—That a special act of Congress in favor of a patentee, extending the time beyond that originally limited, must be considered ingrafted on the general patent law.

Second—That under the general law in force when the special act of Congress was passed, a party who had purchased the right to use a planing machine during the period to which the patent was first limited was entitled to continue to use it during the extension authorized by that law. (This would apply to users of licensed cars.)

The extension of a patent may be granted to an assignee or to an administrator. Washburn vs. Gould, Fed. Cas. No. 17,214, wherein it is also held, in support of the recent Selden patent decision, that whoever finally perfects a machine and renders it capable of useful operation is entitled to a patent, although others may have had the idea and made experiments toward putting it into practice, and although all of the component parts may have been known under another combination or for a different purpose.

Wrights Define Their Patent Position

During his visit in New York last week, on returning from an inspection of the new aviation farm at Montgomery, Ala., Wilbur Wright issued a statement defining the position of the Wright Company toward aviators infringing the Wright patents.

"The report that we will permit any biplane or monoplane, regardless of who makes it or where, to compete in any aviation meet in this country is untrue," said Mr. Wright. "Unless its owner and navigator takes out a Wright license and agrees not to compete in unlicensed meets, we shall prevent their flying.

"We obtained the first aeroplane patents in 1906, and we have seventeen years, thirteen more, in which to enjoy our monopoly, provided we make our invention salable and protect it by law. That is the explanation of litigation instituted during the year."

Mr. Wright was asked regarding a recent report that the Government might purchase his patent rights and throw the field open. "Such a thing is possible, but hardly probable," he replied, "though nothing would please my brother and myself more. There was talk of something of that sort several years ago, but it fell through. We were approached by a committee of the Aero Club of America, which wanted to buy our patents. The offer looked big to us then and we might have accepted it, but the Aero Club committee allowed the matter to drag along until we put the question squarely up to them. We never received a reply, so we went ahead and developed our own invention.

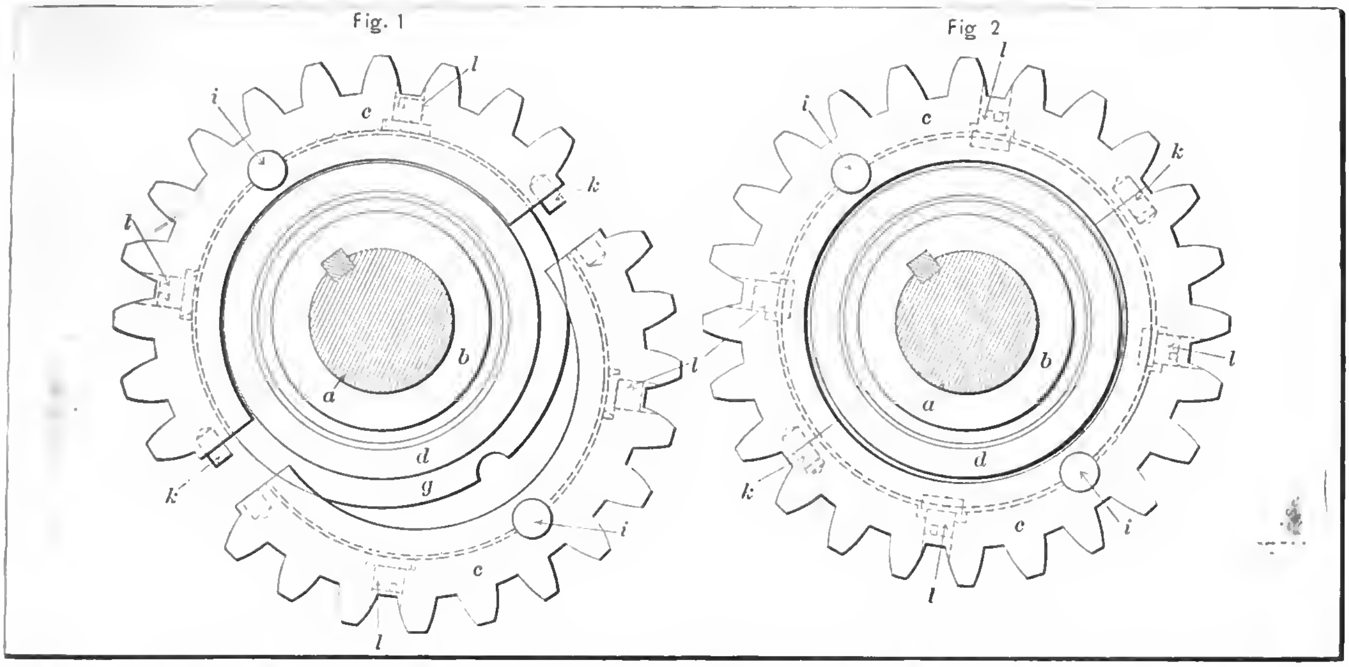


Fig. 1—Showing two sections of a gear made with the Sparr locking device, one half-gear being partly removed. Fig. 2—View of gear with Sparr device assembled and locked ready for use. i, i are the locking screws, l, l are the locking pins, and k, k the dowel pins

New Gear-Locking Device Appears Meritorious

WITH the modern tendency toward simplicity and small number of parts, many inventors have been induced to work on devices which either lessen the number of parts or improve the simplicity of the automobile as a whole. Any device which may be said to lessen the work of assembling or dissembling would come in the class of those simplifying the whole machine.

This is the exact definition of the locking mechanism which has just been invented by a Brooklyn man, Benjamin F. Sparr, and which is illustrated and described herewith. As the patent specifications state, "the object of this invention is to provide a separable or split gear, which may be put on or taken off a shaft without having to be slid along the shaft to and from the end." This is the case with all ordinary gearing, which is made solid with either a round or square hole through the center. To assemble or dissemble, the gear must be slid along the round or square shaft either from the end to its place in case of assembling, or from its place to the end, in the instance of dissembling.

Sparr does away with this by making the gear in two halves, which halves are locked to the shaft by means of a dovetail. In this dovetailed groove, a double locking ring, fundamentally narrower than the groove, locks the ring and shaft together by expanding sideways through the medium of a left and right-hand thread, each actuating one half of the locking ring. This movement of the locking ring is brought about by holding either the shaft or gear and rotating the other. When properly locked in place, the reverse or unlocking process is prevented by one or more taper-ended set screws, of the headless type, which are screwed in between the two halves of the locking ring, the inner faces of this being tapered to facilitate this action.

As the figures show, the two halves of the gear are made with dowel pins, for exact replacement, while a pin is driven through one half of one gear, so as to present a half-round projection into the groove, upon which an indentation on the locking rings fits.

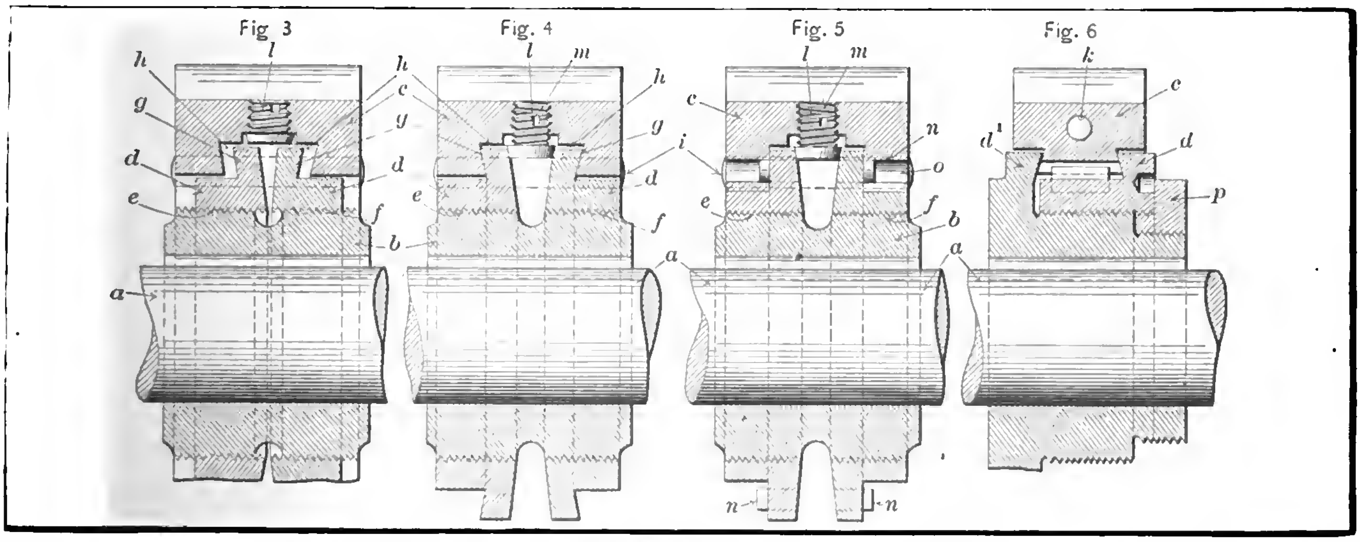


Fig. 3—Section through gear and shaft showing locking ring before expanding. Fig. 4—Same section showing the ring expanded so as to clutch the gear to the shaft, the taper ended set screw to prevent backing off being down into position. Fig. 5 and Fig. 6—Show two alternate methods of constructing the same device, one with an external taper instead of internal, the other with pins in a groove

THE AUTOMOBILE

Vol. XXII Thursday, April 14, 1910 No. 15

THE CLASS JOURNAL COMPANY

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A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

The First Annual Banquet of the Association of Licensed Automobile Manufacturers, which was held at the Hotel Astor, April 7, brought together the executive representatives of 83 makers of automobiles, and the leaders of acumen in the industry who were there for the express purpose of enjoying an evening in each other's company. This is probably the first time that the captains of the automobile industry were enabled to assemble under conditions which would bring out expressions of a character which might be regarded as a true estimate of just what the automobile does mean to the industry, and to the public at large.

Something of the vastness of the automobile industry was reflected in the statistics utilized by Governor Fred M. Warner of Michigan, in his leading speech, and the best estimate, perhaps, to put upon the figures offered, is that they reached into such large numbers that they cease to be comprehensible. These figures were confined to the State of Michigan, and if, in a few short years, an industry reaches such proportions that statistics cease to convey information when they are confined to a single state, it does seem as if a project such as this has epoch-making principles.

It was pointed out, in the course of the evening, that the automobile, in addition to offering a means of livelihood to men counted in hundreds of thousands, is slowly but surely mending the hard spots in our form of civilization. It gives a means by which the farmers may transport their products to the market, without having to rely upon the less direct and more costly methods.

The very opposition offered to the automobile as the reliable agent of men of affairs, which opposition is expressed by immaturely contrived and vicious laws, is one of its most pronounced manifestations for good; it exposes the pigmy mind, and tells the world at large of the legislator who formulates at the dictates of his own pocketbook, and blinds him to the fact that the automobile, because of its merit, is the chariot wheel to which he is tied, that will roll him into the sea of oblivion.

As Colonel Charles Clifton very aptly and appropriately reflected, the co-operation which has been thus far extended by the builders of automobiles in America, has merely results in the crystallization of effort, and the elimination of useless and ill-advised opposition. The inertia of thoughtlessness and prejudice has had its say, it has done its best to bar the onward march of the automobile, and the time has arrived when nothing remains but to continue along co-operated lines, looking at things broadly, and remembering that inherent worth must govern the combined effort of the co-operators, and this will only be possible if worthy effort obtains at the behest of the individuals in their several walks.

It was stated, among other things, that the cost of all the automobiles which are made in a single year is a lower figure than the cost of repaving the streets of a single large city in that time, and it was also pointed out that repaving is brought about in consequence of deterioration, which may be directly traced to the presence of horses as used for transportation purposes. This deterioration is direct, in so far as shod feet destroy asphalt surfaces, and indirect by the process which will be here described as the chemical reactions involved, due to the presence of litter on unclean streets. It was said that in the long run, when automobiles only are used on city streets, the cleaning problem will be reduced to the efficacy involved in a machine process, and the cost will be reduced to the level of an infinitesimal increment relatively, whereas the advantages will be so enormous that they will be difficult, if not impossible, to count.

One maker of automobiles claims the proud distinction of having started an addition to its plant every week in every year of its existence so far. Whether or not this company has done more or less adding to its plant, as compared with divers other companies, is not the question of the moment. Additions are being made at a terrific rate in all the automobile centers in this country, and thanks to the foresight of the directors of the respective plants, these additions are of a permanent character. The buildings are, for the most part, of reinforced concrete construction, taking pattern after the most scientific processes of the day, incorporating into the plan the idea that no artificial means can be regarded as the rival of daylight, and it is to be had with a saving which is equal to the cost of the walls which are too frequently placed to exclude it. The saw-tooth idea has its substantial adherents, but some of the conditions of manufacturing demand a measure of concentration, and this requirement leads to the construction of buildings at least two or three stories high, which is not found to be sufficient reason for the exclusion of daylight—in modern industrial plants the sun shines for all, even the workmen at the bench.

Detroit Makers Push Building Rapidly

EXPANSION is the order of the day among Detroit automobile manufacturers, who find themselves in many instances unable to meet present demands. As a result, building activities are reaching hitherto unheard-of proportions. Chief among the concerns which have outgrown their present quarters is the Warren Motor Car Company, organized something less than a year ago. Work is already under way on the first of a group of factory buildings, the initial structure to be two stories and 600 by 60 feet. Two others will follow, each approximately 400 by 60 feet, and it is expected to have the last of these completed before the first of next year.

The Grabowsky Power Wagon Company has also begun the erection of a new plant, the principal buildings in which will be 300 by 62 feet and 200 by 40 feet, the latter to be used as a body building plant. Reinforced concrete will be used throughout, and the structures will be models.

The Long Manufacturing Company, of Chicago, makers of automobile radiators, auto tubings and other parts, will erect an immense plant in Detroit. The main building will be two stories, 325 feet long, and so constructed that four wings can be added to the rear.

The Detroit Dearborn Motor Car Company, which recently increased its capital stock from $50,000 to $100,000, is building an addition to its plant that will double its capacity.

Plans for the new Lozier plant have also been completed, and are now in the hands of builders for the purpose of receiving contracts. Work will be begun as soon as possible, and it is hoped to have a portion of the plant completed by midsummer. Organization of the company has been perfected, with the following officers: President, H. A. Lozier; vice-presidents, Gilbert W. Lee and Fred C. Chandler; secretary, Cyrus E. Lothrop; treasurer, Charles H. Hodges.

Work on the Michigan No. 1, the first of the big balloons being constructed for the Aero Club of Michigan, is progressing favorably, and its delivery is looked for about May 15. It will be a 40,000-foot sack, capable of carrying a pilot and three passengers. Meanwhile, members of the club are planning for preliminary flights some time this month, under A. Leo Stevens

Proposed Reform for Stock Car Races

IN ORDER to insure the participation of bona fide stock cars only, in competitions designed for that class, Windsor T. White, president of the White Company, proposes the adoption of a rule similar to the selling and claiming clauses which are operative in the horse-racing world, with reference to selling races. These clauses provide that the winner shall be sold at auction to the highest bidder over the entered price and that the owner of any contestant in the race may lay claim to any other entry that finishes behind the winner by paying the entered price plus the amount of the first money awarded.

Mr. White says by the adoption of a rule allowing the owner of any car in a race to claim any other car by paying the list price of the claimed entry, that the suspicion which has existed for a long time that "stock cars" intended for racing are specially constructed and prepared would be nullified.

He declares that from the viewpoint of the public there is no good reason apparent why a "stock car" which competes one week in New York, should be rushed by express to New Orleans or Minneapolis to take part in races, if there was not some tangible basis for the public's suspicion.

He believes that the enactment of such a rule as he suggests would have an immediate and beneficial effect upon automobile racing and that its enforcement would mean the discouragement of building specially constructed cars for stock car contests

Coming Events in the Automobiling World

Apr. 9-16........Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.
Apr. 11-16........Harrisburg, Pa., Kelker Bldg., Automobile and Sportsman's Show, Harrisburg Automobile Dealers' Association. B. R. Johnson, Manager.
Apr. 11-16........Erie, Pa., Meyer Block, Automobile and Motorcycle Show.
Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
June 20-July 6....Detroit, Mich., Industrial Exposition, Detroit Board of Commerce.
Jan. 7-14, 1911....New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Apr. 13-17........Los Angeles, Cal., Inaugural Meet, Motordrome.
Apr. 30-May 2....Philadelphia Roadability Run to Atlantic City, Quaker City Motor Club.
May 2............Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.
May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.
May 9-11.........Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.
May 21-22........Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.
May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill; Automobile Club of Bridgeport.
June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.
June.............Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, through the Southwest.
June.............Worcester, Mass., Hill-Climb up Dead Horse Hill, Worcester Automobile Club.

Foreign Shows and Races

Apr. 2-24.........Turin, Italy, Automobile Show.
Apr. 27-28........Brooklands, England, Two-Day Meeting.
May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 25...........“The American Cup,” Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.
May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.
May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.
June 2-8.........Prince Henry (German) Touring Competition.
June 13-18.........Scotland, Scottish Reliability Trials.
June 20..........French Voiturette Race.
June 21..........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27..........Speed Trials at Kiev, Russia.
July 12-18........Ostend, Belgium, Automobile Week.
July 20-25........Boulogne, France, Automobile Week.
Aug. 1-15.........Ardennes, France, Meeting.
Aug. 15-Sept. 15..French Industrial Vehicle Trials.
Aug. 21...........Salon, France, One and Five Kilometer Trials.
Aug. 28...........Mont Ventoux, France, Hill-Climb.

Grand Prize Race Conditions Now Given Out

THE international race of the Motor Cups Holding Company for the Grand Prize of the Automobile Club of America has been announced for October 15, on the Long Island Motor Parkway. The gold challenge cup, valued at $5,000, is the chief award to the winner. All makes of cars are eligible, but no more than three cars of any one make may be entered. The length of the race is the same as the Vanderbilt, 278.08 miles, 22 times around a course of 12.64 miles.

Entrance fees are $1,000 a car, $1,500 for two cars of the same make and $1,750 for three cars of the same make. Regular entries close August 1, but until September 1 special entries may be made at an advance of $250 a car.

On account of the latitude allowed entrants, it is expected that there will be a big field, and under the rules some sort of elimination trials will be held if the number of competitors appears to be unwieldy.

AVIATOR LE BLON IN FATAL ACCIDENT

SAN SEBASTIAN, SPAIN, Apr. 2—The name of Hubert Le Blon has been added to the roll of aeronautic fatalities. He was killed here to-day while making an exhibition flight near the royal palace of Miramar. Owing to the stormy weather he had not been expected to ascend, and only a few persons had assembled to see the start. He was flying at a height of 140 feet when his motor broke down. He attempted to glide to the ground, but the machine was overturned by a cross current and dashed against a rocky cliff. Death was instantaneous.

Le Blon took part in the Vanderbilt race of 1906, and had many friends in America. He took up aviation last Summer as a pupil of Blériot, and distinguished himself at the Heliopolis meet in February by setting a new 5-kilo. record of 4 mins. 2 secs.

QUICK STARTS AT MEMPHIS AERO MEET

MEMPHIS, TENN., Apr. 9—Glenn H. Curtiss lowered his world's record for quick time in starting last Thursday, making the start in 5 4-5 seconds, as against his mark of 6 2-5 seconds, made at Los Angeles. At the same test he failed to break his short-distance starting record of 98 feet. After this flight the aviator took up his wife as passenger for her first ride.

Charles Willard, one of Curtiss's pupils, had engine trouble, and was forced to descend before completing one round. Friday he was still unable to get his machine in good order. J. C. Mars, another of Curtiss's pupils, made several good flights on both days. Friday Curtiss equalled his quick-start record.

AERO CLUB INSURGENTS RENEW FIGHT

The insurgent faction in the Aero Club of America, which brought injunction proceedings against President Cortlandt F. Bishop to prevent voting by proxy and thereby defeat his reelection, renewed their activity last week by the publication of an open letter demanding his resignation. The letter asserts that owing to President Bishop's poor management America is in danger of losing the international aviation meet, and demands some radical action to restore public confidence.

NEW AEROPLANE PASSENGER RECORD

CHALONS, FRANCE, Apr. 8—Daniel Kinet, a Belgian, broke the world's record for a flight with a passenger here to-day. With a companion he rose in an aeroplane and remained in the air for 2 hours and 20 minutes. The best previous record was made by Effimoff on a Farman biplane at Mourmelon January 30; his time being 1 hour and 50 minutes. Kinet is a comparative novice in aeroplaning.

AVIATION MEET AT MINNEAPOLIS

MINNEAPOLIS, MINN., Apr. 4—Arrangements for a three-day aviation meet have been completed and the event will take place June 22-25 at the State Fair Grounds. The program includes contests for both speed and distance.

FOR MILE-A-MINUTE STOCK CARS

One of the special features of the National Championship track races at Indianapolis May 30 will be event No. 14, a race the conditions of which have been framed to test the claims made by makers of stock cars that their machines can travel a mile a minute under touring conditions, carrying four passengers.

John A. Wilson, of Franklin, Pa., has donated a cup valued at $150 to the winner of such a race. Under the rules the competing cars will be required to race a mile in one direction and then traverse the same distance in the opposite direction. In order to win the successful car must average at most a mile a minute.

Torpedo bodies and baby tonneaus are barred and the entrants must not rate higher than 50 horsepower, according to A. L. A. M. standards.

FIRST ENTRY IN ATLANTIC CITY RUN

The first entry for the two-day automobile reliability contest from New York to Atlantic City and return, which will be held on May 10 and 11 under the auspices of the Motor Contest Association, was made less than one hour after the official entry blanks were issued, when Mr. Merrill named Lewis Strang as the man who would handle his Pierce-Racine in the contest. Before leaving for Los Angeles, S. M. Butler, chairman of the Contest Board of the A. A. A., granted a sanction for the Jersey contest, and entry blanks have been sent out to a large number of individual automobilists in addition to the firms in the automobile business.

UP-STATE RELAY RUNS PLANNED

SYRACUSE, N. Y. Apr. 9—Automobilists of Syracuse and Central New York generally, are interested in the preliminary plans for a big relay club run, the first time an undertaking on such a scale has been tried hereabouts. The plan is to start from Syracuse on Saturday, May 28, and to carry a message from some well-known person to the autoists of Central New York.

From here the message will be carried to Auburn, to Cortland, to Ithaca, to Watkins, to Elmira, to Owego, to Binghamton, to Oneonta, to Cooperstown, to Richfield Springs, to Utica, to Rome, to Oneida and back to Syracuse.

HILL-CLIMBING MATCH AT ATLANTA

ATLANTA, GA., Apr. 2—As an aftermath of Atlanta's recent hill climb, there will be a match hill climb, best two heats in three, on the Stewart avenue hill next Saturday afternoon. The contestants will be Billy Oldknow in his Buick and W. J Stoddard in a National.

PRIZE FOR GLIDDEN TOUR RUNABOUTS

Runabouts and miniature tonneau cars entered in the 1910 Glidden Tour will compete for a handsome trophy donated to that class by the Chicago Motor Club. The trophy will be awarded to the runabout or toy tonneau making the best score.

Alden Sampson Merged in United States Motor

TRUCK and commercial car building on a larger scale is indicated in the absorption of the Alden Sampson Manufacturing Company, of Pittsfield, Mass., by the United States Motor Company. The Sampson company has been operating under a license of much breadth and scope and its terms are so framed as to give additional latitude in manufacturing to the U. S. Motor Co.

The Sampson Company was founded by Alden Sampson many years ago. He was a man of wealth and a mechanical trend of mind, and he expended a vast amount of money and energy in prospecting the field of the commercial vehicle. The results of his work have been material and valuable, but when he was on the threshold of realizing them, he died, about a year ago. The active head of the company has been Guy E. Mitchell, general manager.

One of the secrets of the success of the Sampson truck is the fact that it has been kept entirely distinct from pleasure cars. The materials used have been special materials, fitted to the requirements of the truck in contradistinction to the pleasure car.

According to the announcement of President Briscoe, it is the company's intention to manufacture a wide line of commercial vehicles and in conformance with that policy, the Pittsfield plant will be considerably enlarged and improved.

Alden Sampson Plant at Pittsfield, Mass., Which Has Just Passed to U. S. Motor Co.

Auspicious Opening for Elmira's Automobile Show

ELMIRA, N. Y., Apr. 9—What is probably the last of the shows in New York State for this season, opened here this evening in the Third Regiment Armory, to run for a week. The show is directly held under the auspices of the Chamber of Commerce, assisted by the local Automobile Club. The opening was most auspicious, with a large crowd in attendance.

There are thirty exhibitors in all, showing a total of forty cars, with thirty-six different makes represented. In addition to this there is a good showing of accessories, motorcycles and bicycles.

Charles Teasdale of Elmira, is showing for the first time in public an aeroplane of his own invention.

List of Exhibitors:

Chenango Motor Sales Co., Speedwell; L. D. Woodward, Ford; R. C. Pierce & H. K. Spaulding, E-M-F, Flanders "20," Haynes; J. F. Rhoades, Jackson; O. D. Eisenhart, Winton; La France Motor Car Co., Velie, Hudson, Chalmers, Reo; International Harvester Co., I. H. C.; C. W. Bishop Co., Buick; Frank Record, White (gas); Elmira Motor Car Co., Maxwell, Empire, Franklin; Corning Auto Exchange, Peerless; Thomas Motor Co., Thomas; State Line Motor Car Co., Oakland; Roberts & Son, Rambler, Krit, Buffalo wagons; Corning Auto Co., Pierce-Arrow; Southern Tier Motor Co., Marion, Overland, Courier; F. C. Tomlinson, Insurance; J. M. Tillman, Accessories; W. B. Hallock, Clothing; Elmira Arms Co., Accessories; S. F. Izzard, Clothing; C. A. Georgia, Electric Supplies; P. B. Rutan, Motorcycles & Bicycles; D. S. Andrews, Trucks; Barker, Rose & Clinton, Tools & Supplies; C. W. Young, Bicycles; Leon A. Peters, Motorcycles; M. A. Van Brunt, Kellogg Pumps & Pressure Indicators; Roberts & Son, Accessories.

At Elmira's Show—General View on the Main Floor. At the Right, Scene Along One Main Aisle

Chalmers Thirty, Official Pathfinder for the Glidden Tour, Gardham at the Wheel, as It Appeared Before the Start

1910 Glidden Pathfinding Car Starts Trip

OFFICIAL pathfinding for the Glidden Tour of 1910, started Monday from Cincinnati. The pathfinding car, a Chalmers 30, is in charge of Dai H. Lewis. Joseph Gardham is the driver, and Lazarnick, the official photographer, accompanies the expedition.

The course of the tour through Lexington, Ky.; Louisville, Bowling Green, Nashville, Florence, Ala.; Memphis, Helena, Ark.; Little Rock, Texarkana, Dallas, Tex.; Oklahoma City, St. Joseph, Mo.; Wichita, Kan., through Iowa to Chicago, will require twelve days according to schedule, and will be approximately 2,500 miles long.

The tour upon which Mr. Lewis and his companions have started will require considerably more time than the run itself. This is due to the fact that the roads have to be carefully charted and mapped en route. It is expected that about three weeks will be spent on the road.

The selection of Mr. Lewis for this important duty came to him unsought. He is particularly busy at this time of the year with the affairs of the Buffalo Club, of which he is secretary. Four times prior to this year he had charge of the pathfinding trip of the Glidden Tour, and his labor in this respect has brought him much praise.

The Buffalo Automobile Club granted him leave of absence for this purpose on the highest ethical basis. The club realized that the performance of such a mission by one of its officers was a service to automobiledom generally, and was fully cognizant of the honor that must redound to the club for its part in furnishing such an important detail of the big tour.

INDEPENDENT AUTO SHOW ANNOUNCED

The Journal Company, of Troy, N. Y., by C. C. Conant, president, announces that the Eleventh Annual Automobile Show will be held at Grand Central Palace, New Year's Eve. 1910, continuing until Jan. 7, 1911.

According to the literature sent out by the Journal Company the show is intended to afford independent automobile manufacturers an opportunity to interest the motor-buying public. Space will be allotted in the order of the receipt of applications.

Referring to the announcement of an independent automobile show at Grand Central Palace at the opening of next year, Alfred Reeves, manager of the A. L. A. M., had little to say.

"Exhibitors of motor cars and motor accessories at the show outlined," said Mr. Reeves, "will be automatically barred from participation in the Chicago show and other exhibitions under the rules of this association."

CROWDS AT HARRISBURG OPENING

HARRISBURG, PA., Apr. 11—The first annual automobile show under the auspices of the Harrisburg Dealers' Association was opened in Kelker street Hall Saturday, with all space taken and 52 cars, representing 32 makers, on exhibition. The large hall has proved not large enough to accommodate the dealers, and several private displays are being held by agents who were unable to secure floor space.

NEW OFFICERS SELECTED FOR A.C.A.

Officers for the Automobile Club of America were elected Tuesday night at the annual meeting of the organization at the club house, 247 West Fifty-fourth street, New York city. There was only one ticket nominated, which was as follows.

President, Henry Sanderson; first vice-president, John E. Borne; second vice-president, Robert Lee Morrell; third vice-president, Edward Shearson; treasurer, Finis E. Marshall; three governors to serve four years, Dave H. Morris, Albert R. Shattuck and E. H. Gary; governor to serve in place of Cornelius Vanderbilt, two years, Alfred Ely; governor to serve in place of Horace Porter, three years, George Moore Smith.

ECONOMY RUN TO LAKE GENEVA

CHICAGO, Apr. 11.—Sanction has been granted the Chicago Motor Club by Chairman Butler of the contest board of the A. A. for an economy run April 28 over a route from Chicago to Lake Geneva by way of Halfday, a distance of 200 miles.

BENZ-FIAT MATCH RACE DECLARED OFF

LOS ANGELES, Apr. 13.—The match race between the Benz and Fiat cars, Oldfield and De Palma, drivers, has been declared off. The Fiat car broke a piston again, and announcement of the cancellation of the race was made at once.

NEW PIERCE-ARROW FACTORY ADDITIONS

(*Continued from page 709*)

Since the Fall of 1909 ground has been broken almost every month for some additional structure fitting into the total long ago provided by the designers. First to be completed was an addition to Machinery Hall, one story in height and 75 by 204 feet plan. Closely adjoining stands a new L-shaped building, one wing 61.5 by 305 feet and the other 50 by 100 feet, both four stories in height. On the first two floors raw material and some finished stock are stored, and the two upper stories are to be used for the assembling of motors, transmissions, rear axles, carbureters, pumps, steering mechanisms and clutches. The storage floors in this new building release one end of Machinery Hall which has been used for storing of raw material, and this space as well as the side of the hall, heretofore used for inspection work, will be cleared for the installation of new machinery. This will result in a machine room believed to be larger than any other under one roof in any industry in North America.

The upper stories in the new L at the same time place 50,000 square feet of floor space on one level at disposal for painting and assembling of chassis alone. This work has so far been done, together with the assembling of construction units in one great hall, 400 by 122 feet, and the removal of the unit work to the new L therefore serves both for enlargement and improvement of the system.

Two new wings, each 350 by 50 feet and four stories high, are approaching completion and are joined at one end by a building, 40 by 50 feet, three stories high. Added to the adjoining older structures, the whole complex measures a total length of 750 feet, and the new space is to be given over to the body makers, with a view to continuing the company's policy of placing a large number of different bodies, suited for all automobile purposes, at the disposal of motor car users. Not less than 7 1-2 acres of floor space will be available for body building when the new wings are completed.

Other additions to the Pierce-Arrow industrial city on Elmwood avenue are a nickel-plating house, 61.5 by 184 feet, four stories, now in course of construction, an addition to the motor-testing department, 55 by 200 feet, one story high, and an addition to the power house, 51 by 50 feet, one story high, together with a new smoke-stack, 150 feet high, and with the firm's name inlaid in colored brick, so he who motors may read it without stopping.

Two more buildings are planned. One of these will be used for the manufacture of the new heavy motor truck. It will be 184 by 300 feet and four stories, of reinforced concrete like the other new buildings. The other is to be an extension of the office buildings, 68 by 220 feet, and three stories high.

The total floor space of the enlarged plant will reach 1,000,000 square feet or 23 acres. The boiler capacity has been increased 2,000 horsepower, partly by the attachment of "economizers." One new 1,000-horsepower engine has been installed. Most of the new machine tools for the vacated space in Machinery Hall have already been put in place, and the force of 2,600 employees is being daily increased.

ADVANCED METHODS IN NATIONAL PLANT

(*Continued from page 711*)

ground. C, in the same illustration, presents a heavy and well-designed radial drill, which, together with its fixtures and jigs, becomes an important member in the train of machine tools employed in the aluminum crankcase work.

In a general way, the jigs and fixtures as they are employed at this plant, are designed on the same common basis. The idea is to afford to the workman a means by which he will be enabled to take the rough or partially machined parts, place them in the fixtures and proceed with the operations without having to go through the laborious process of setting up the work. Fig. 2 shows one of these fixtures as it is used on a heavy milling machine for the purpose of reaming out the two ends of the connecting rods. The jig G rests on the platen T and the reamer R is guided by the bushing B into the large end of the connecting rod C. The other end of the same fixture has a smaller bushing which registers with the gudgeon-pin end of the connecting rod. These hardened bushings are screwed into the fixture, and by changing the bushings it is possible to use the fixture, first for roughing out, and second for reaming, so that the amount of metal to be cut from the walls of the bore in each case is of equal radial thickness and the tendency of the reamer to back away at some one point in the diameter is thereby eliminated. The fixture is so designed that the workman is not held responsible for the accuracy of the undertaking, because the centers are fixed, and the reamers or other cutting tools are properly sized in the tool room, thus putting this part of the accuracy question up to experts who have no other duty to perform.

As an illustration of a more complex situation reference may be had to Fig. 3, which shows a fixture F on a horizontal boring tool with a platen P, which is provided with a cross feed, and the fixture in this particular case is one which holds the bevel-drive housing H for the rear axle. The illustration so clearly presents the situation that it seems almost unnecessary to go into a further description, excepting to point out that the horizontal boring mill is especially designed for the accommodation of work of this character; the alignment is most thoroughly established and the vertical distance from the face of the platen to the axis of the boring bar is dependent entirely upon the accuracy with which the jig was made. Here again is evidence of a plan which assures the greatest measure of accuracy. It is the accuracy which comes from utilizing toolmakers of accentuated skill in the process of producing the jigs and fixtures, which makes it unnecessary to consider the skill of the machinists who do the regular work, beyond the barest measure, which is involved in the mere use of the fixtures in the regular way, remembering that they cannot be employed, excepting as designed for the work.

POINTERS IN VALVE REPAIR WORK

(*Continued from page 715*)

trouble, and this may be proof of the lack of necessity of adjustments at this point. The ends of the valve stem and the lift were found to be substantially glass hard, and on the whole it seems that on a non-adjustable valve motion is capable of rendering service for at least three years, without seriously discommoding the owner of an automobile. There is no getting away from the fact, however, that when the evil day arrives the problem involved is one which is difficult to surmount. Fig. 8 shows a system for the valve motion in which provision is made for adjusting, and a non-metallic pad is placed in the head of the adjusting stud for the purpose of deadening the sound. The amount of noise generated by this system is relatively slight in view of the use of a smaller diameter roller, which has the good effect of reducing the clearance requirement. It is fairly appreciated in designing quarters that the diameter of the roller is the influencing factor when the amount of the clearance is to be determined.

The very fact that the wear is not equal, and that the valves do not grind down at the same rate, is ample reason for desiring an adjustment, if it is true that adjustments can be so made that they will not rattle loose. It is not easy to provide an adjustment which will serve for a reasonably long time without undoing, and many designers prefer to take their trouble the other way. It might be well to bear in mind, however, that the other way is the method by which the trouble is transferred to the owner of the automobile after the designer gets through with it. If, in the design, the trouble is three years remote, there is not so very much to complain about, but purchasers of automobiles at the present time are trying to reach the conclusion that the life should be more than that as indicated by a 33 1-3 per cent factor of depreciation. Ten per cent should be a large enough depreciation factor in modern manufacturing

AMONG THE GARAGES

Grabowsky truck, run by the Motor Car Maintenance Company, of New York City, in the service of the New York branch of the Continental Caoutchouc Company, loaded with rims

John W. Bate, designer of the Mitchell-Lewis Motor Company

An organization of garage owners and managers is being discussed with much interest in some parts of Automobile Row. In referring to the possibility of such a movement, Edward G. Koerner, manager of the Pyramid Garage, 36 West Sixty-second street, said that he was in favor of such an organization. Mr. Koerner said that there was too much irregularity in prices of storage and supplies and that better service could be furnished to the motoring public if an agreement could be reached about an equitable price level. A preliminary meeting at which the project will be presented may be called in the middle of April.

There is considerable agitation against an ordinance pending in the City Council relating to the future establishment of garages in Indianapolis. Should the measure become a law, except in a district bounded by Alabama, Georgia and New York streets and Senate avenue, a garage cannot be established in the same square with a church or school building, while in any other square the written consent of a majority of the property owners must be obtained and also the written consent of all persons owning property within 50 feet of the proposed garage.

Uniontown, Pa., is getting right to the front as a user of automobiles. About 200 are now owned in the town. There are four large garages in Uniontown, the Standard on Peter street, the Keystone on Mill street, the Central on South Gallitin avenue and the Uniontown on East Fayette street. It is estimated that fully $700,000 is invested in automobiles and garages.

The Greensburg Automobile Company now has the largest and most complete garage in Western Pennsylvania. The floor space of the company is over three-fourths of an acre and gives it extended show room. W. H. Sharpe is manager, Elmer Turner is sales manager and Curtiss Clawson is floor manager of the firm.

E. D. Crane & Company, of Atlanta, are building a garage in the rear of their present plant at 44 Madison avenue. The new building will be of stone and concrete and will add considerably to the efficiency of the concern in handling both gasoline and electric cars.

The Pilot Garage & Supply Company, of Worcester, which is one of the largest garages in Massachusetts, has made an assignment for the benefit of creditors. It is given out that the liabilities are $20,000 and the nominal assets are between $12,000 and $15,000.

Chauncey R. Benefield, Robert T. Lamb, Gordon Frierson and William Percy have organized and incorporated the P. D. Q. Company, of Shelby County, the company being capitalized at $6,000.

The garage of the Empire Auto Repairs Company at Spokane, Wash., will be ready for occupancy April 15.

It is estimated that the up-keep of motor cars in New York State in 1909 was about $97,000,000, and in the natural order of things it will be considerably more than $100,000,000 in 1910.

The Globe Garage & Auto School, of Pittsburg, has been organized by Ralph F. Worden, D. P. Reighard and A. J. Schmitt of that city and has applied for a Pennsylvania charter.

A modern garage will be erected in Spokane, Wash., by the Empire Auto Repair Company, on Second avenue, near Cedar street. It will be 50 feet wide by 100 feet deep.

F. D. Palmer, 239 West Fiftieth street, will add a line of second-hand cars to his garage and repair shop about April 10 and will take up renting on a larger scale.

At Circleville, the Spangler Automobile Company will soon open a garage on North Court street. The building will cover a half lot and will be two stories high.

Harvey Steel and Craig Humgardner of Punxsutawney, Pa., will build a garage 116 by 62 feet at once and have secured the agency for two well-known cars.

A concrete garage for the North Shore Garage Company, New York avenue, Huntington, L. I., is being built under the direction of Franklin Baylis, architect.

The Portage Motor Car Company, of Akron, O., was incorporated with a capital stock of $5,000 to operate a garage by Albert Buehrle and others.

Joseph C. Strout has bought the lot and building at 242 West Twenty-seventh street, New York city, and will alter the present building into a garage.

A. C. Woodbury, of Springfield, Vt., is building a garage 40 by 48 feet in that city. The improvement contemplates a repair and supply department.

At Massillon the English Motor Car Company has purchased the Loeffler block on South Erie street, which will be remodeled into a garage.

Harry Henderson has opened a new garage on Canal street, Greenville, Pa., and has secured the agency for two well-known cars.

Permit has been issued to the Northern Garage Company, of Philadelphia, to build a $6,000 garage on Cabot street.

The Philadelphia Construction Company has opened a garage at 227-229 Raymond court, Scranton, Pa.

The Washington Garage Company has been incorporated to conduct a garage business in The Bronx.

In Urbana, Ill., a new garage is under construction for the Illinois Motor Sales Company.

The Philadelphia Construction Company has opened a garage at Scranton, Pa.

WITH THE AGENCIES

Large shipment of Studebaker electric delivery wagons, made to the big department store of Gimbel Brothers, New York City, which will use these for delivery exclusively

Emerson Brooks, now president of Rothschild & Company

Boston's great show four weeks ago convinced the Standard Automobile Company that the Hub city needed Paterson "30's" and lots of them. The result was a large contract between that hustling agency and the manufacturers, the W. A. Paterson Company, at Flint, Mich.

Through a deal which was closed recently, the Studebaker branch of Columbus, O., has taken over the business of the Burdell Auto Sales Company, of North Fourth street, Central Ohio agents for the E.-M.-F. and Flanders "20."

The Grout Automobile Company, of Manchester, N. H., has been organized to handle new cars and a general garage business. The company will assume the agency for the Grout car throughout New Hampshire, exclusive of Cheshire County.

Charles E. Riess & Company, New York and New Jersey distributors of the Marion and Overland cars, have entered a 35-horsepower Marion Roadster in the 24-hour race that is scheduled to take place early in May at Brighton Beach.

H. M. Adams, sales manager for the Royal Tourist Car Company, Cleveland has just appointed two agents. These are the Lock Haven Auto Company, Lock Haven, N. Y., and the La Crosse Plow Company, La Crosse, Wis.

The New York allotment of Pope-Hartford cars has been practically sold for this season. At the company's garage it was said that only twenty cars remained to be disposed of. Trade in used cars is reported lively.

H. R. and L. L. Applebaum, agents for the Detroit Electric in Cleveland, have accepted the agency for the Herreshoff car. Applebaum Brothers moved to larger quarters in automobile row April 1.

James E. Graham has secured the Pittsburgh agency for the Coleman automobiles and has established headquarters at 807 Westinghouse building.

The Kittanning Automobile Company has been formed at Kittanning with a capital of $5,000 by James A. McMasters and others of that place.

The Western Sales Agency Company of Cincinnati, was incorporated with a capital of $5,000 by Max S. Goldsmith and others.

The Park Automobile Company, of Johnstown, Pa., has been formed by F. J. and E. L. Erwin and Bruce H. Campbell, of that city.

The Athens Automobile Company, of Athens, O., was incorporated with a capital of $10,000 by A. T. Lawhead and others.

The New England Garage Company at 232 Main street has taken the Hartford agency for the Cutting 40.

The East St. Louis Automobile Company, of East St. Louis, Ill., has taken the agency for the Jackson.

A Franklin agency has been established at Altoona, Pa., with Mozer & Lapp, a new firm in that city.

The Bayless Motor Car Company, of Lexington, Ky., will represent the Jackson in that territory.

The Cooper Automobile Company, of Birmingham, Ala., has taken the agency for the Jackson.

E. L. Beal, of Republic, Mo., will handle the Jackson for 1910.

Brief Personal Trade Mention

Emerson Brooks, for twenty years vice-president of J. M. Quinby and Company, Newark, N. J., has resigned and it is announced that he has bought a half interest in the Rothschild Company of which he will be president and general manager. It is said that the Paris connection will be strengthened and the business field of the company made broader.

Surrounded with floral beauties and in the presence of a large gathering of their friends and relatives, Miss Edythe May Meeks and Charles Ernest Easton, of Munice, Ind., were married recently at the Meeks residence in that city. Mr. Easton is advertising manager for the Inter-State Automobile Company. The young couple will be at home after May 1.

Lazarnick, the well-known automobile photographer, has been appointed to take the pictures on the 1910 Glidden pathfinding trip by the Chalmers Motor Company and the A. A. A. He has served in a similar capacity on five of the six preceding pathfinding trips. This work is particularly important and his past efforts along this line have met with approval.

Harvey H. Colbath, manager of the Philadelphia branch of Morgan & Wright, and Helen V. Cadwalader were married in Philadelphia April 7. After the ceremony the bride and groom left on a trip to Washington, D. C., and other points South.

A. D. Youmans, who was lately with Studebaker Brothers Company, of New York, as salesman in their commercial vehicle department, is now connected with Renault Freres Selling Branch, Inc., of New York City, in a similar capacity.

Ralph N. Harris, formerly connected with the Jeffery Manufacturing Company of Columbus, O., and now an attache of the city waterworks department, has applied for a patent on a new automobile bumper.

M. A. Weissenburger, for several years superintendent of large department stores in Cleveland, has accepted a position with the Regal Motor Sales Company, Cleveland, and will assist Manager J. C. Hipp.

A. L. Englander, formerly with the Buick Motor Company at Cleveland, has joined the sales force of the Cook Motor Sales Company, Ohio, agents for the Premier and Reo lines.

Gridley Adams, advertising manager of the Dayton Motor Car Company, in his flush-sided Stoddard-Dayton runabout

H. S. Firestone, president of the Firestone Tire & Rubber Co.

Ground has been broken for a large addition to the plant of the Locomobile Company of America at Bridgeport, Conn., which will mean the employment of 250 more hands and facilities for manufacturing 300 more cars each year. This structure will be erected just east of the present buildings and be known as Factory No. 3. This new building will be four stories high, 150 feet long and 50 feet wide. An addition of one story will also be placed over the forge shop in use at present. The contract calls for completion of the work in four months.

Work has been started on the first of the twin buildings for the Regal Motor Car Company, Detroit, which when finished will occupy an entire block. The structure now under way is 582 by 167 feet, two stories in height, of reinforced concrete, and contains many novel features. Among these is a circular driveway which goes entirely around the interior of the building on both floors, with elevators of sufficient strength to raise a loaded truck.

The Saurer Motor Trucks, organized to manufacture and deal in motor vehicles and accessories, has filed articles of incorporation at the office of the county clerk. The authorized capital is given as $1,000,000, of which $1,500 is paid in. The registered office is at Knollcrest, Hilton Park, West Orange, N. J. The incorporators are: William D. Sargeant, West Orange; George M. Judd and Edward H. Fallows, of New York.

Columbus stockholders in the Oscar Lear Automobile Company, of Springfield, O., have been informed that the receivership was dissolved and the new company, to be known as the Kelly Motor Truck Company, will have entire control of the plant. C. S. Kelly, president of the Commercial Club of Springfield, will be at the head of the reorganized company. The building of additions to the plant will be continued.

The board of directors of the General Motors Company passed a resolution of sympathy for the family of the late Harry G. Hamilton, a member of the board, who died at his home at Pontiac, Mich., last month. Broad tribute to the worth of Mr. Hamilton to the motor industry was paid in the resolution, which was ordered spread upon the minutes.

At a meeting of the stockholders of the Howard Motor Car Company recently the following were elected to the board of directors: Adam Howard, H. A. Pounder, W. J. Geer, H. Gottdiener, B. B. Gill, Frank Faber and Fred K. Beery. The site for the factory, which will be located at Galion, O., will be selected soon.

The Willard-Harlow Manufacturing Company, of Janesville, Wis., has elected these officers: President, R. Willard; vice-president, P. H. Korst; secretary, J. C. Harlow; treasurer, O. W. Athon. The company will manufacture spark plugs, meters, tops, canopies, awnings and other specialties.

New Zealand, Tasmania, and even the Fiji Islands are growing as a field for the automobile. The Hupp Motor Company, of Detroit, recently closed a contract to deliver 200 Hupmobiles to E. G. Eager, of Auckland, New Zealand, in 1910, several of which have been ordered by residents of the distant Fijis.

The James Kidney Motor Truck Company, of Cincinnati, was incorporated recently with a capital stock of $10,000 to manufacture automobiles, motor trucks and delivery wagons. The incorporators were: James Kidney, W. W. Ramsey, W. A. Stuart, Frederick E. Clarke and Joseph Wilshore.

Captain William Mitchell Lewis, president and general manager of the Mitchell-Lewis Motor Company, Racine, Wis., and candidate for Governor of Wisconsin, will make another European business trip at once. He will return May 25, at which time he will open a vigorous political campaign.

The Vickers Auto Car Company, of Coshocton, O., has completed its first car, which will be called the Vickers car, and the test will be made in a short time. Carl Vickers is at the head of the company. The demonstrator is a two-seated runabout with a four-cylinder, two-cycle, air-cooled engine.

At Millersville, Ohio, the Millersville Machine Company is erecting a new plant, just east of the old factory, which will be used to manufacture automobiles. Recently a 25-horsepower runabout has been placed on the market. New machinery is to be added to the present equipment.

The suit of the Hess-Bright Manufacturing Company against the Standard Roller Bearing Company, based upon infringement of patents covering ball bearings, was decided in favor of the complainant company in the United States Court at Philadelphia.

The Kurtzer Radiator Company, of Cleveland, was incorporated with a capital stock of $10,000 to manufacture automobile radiators and other accessories, by Hugo P. Kurtzer, F. N. Dunsford, G. M. Phillips, L. D. Litzler and William F. Kees.

The Hupp Motor Car Company, of Detroit, has increased its capital stock to $250,000. A factory agent of the company has been commissioned to attend the Brussels and Berlin expositions this Summer. He will establish agencies for the car abroad.

The Northway Motor Company, Detroit, will build an addition three stories in height, 225 by 90 feet, with two wings, each 175 by 60 feet. This will involve an expenditure of $100,000, triple the capacity, and permit the employment of 2,000 men.

The Schurmeier Motor Car Company, of St. Paul, Minn., recently has been organized with capital stock of $200,000, to manufacture automobiles and other vehicles. Frank I. Whitney was named as president of the company under its charter.

Vice-President and General Sales Manager Horace DeLisser, of the United States Motor Company, was the guest of honor at a dinner tendered by branch managers, salesmen and officials of the Ajax-Grieb Rubber Company at Delmonico's.

The Cleveland Speed Indicator Company, of Cleveland, has been reorganized, and J. W. Hopkins chosen president and G. W. Cook, secretary.

Exterior of the White Garage on West End avenue, New York City, both the six-story and the three-story buildings being utilized

Interior view, being a scene on the third floor, where cars are stored and some repairing is done. The machine shop is on this floor

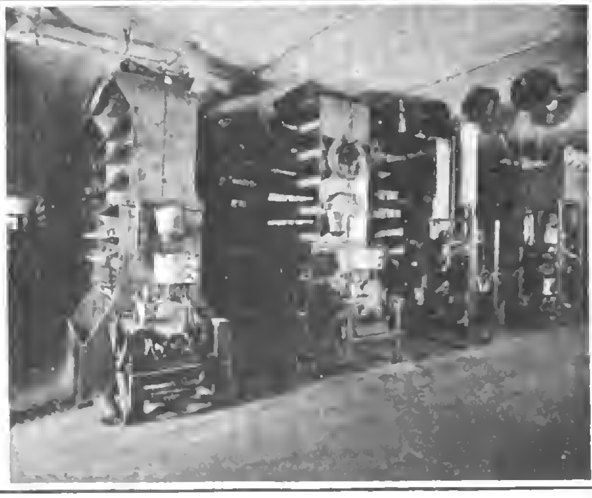
Prominent New York City Garages—White

THERE are many garages in New York City, but among those entitled to first rank, the garage of the White Company, located at 205-213 West End avenue, is as worthy of complete description as any. This consists of two buildings, used as one however, one six stories high and the other but three stories in height. Each building has a basement. The higher building measures 44 feet wide by 93 feet deep, while the lower one has a width of 49 feet and the same depth, all inside figures.

The space is well allotted to the various departments so as to secure the best results with the available floor space, the wbole capacity being well in excess of 125 cars live storage and 50 cars dead storage. The number of employees at the present time is in excess of 80, this figure including a staff of bookkeepers.

On the ground floor the whole space of both buildings is given over to live storage, with the single exceptions of the offices and check rooms for material or clothes left in the cars. The basement below is also used for live storage, except 20 feet width clear across the front, in which are the employees' lockers in one building, and the chauffeurs' rooms, in which are the lockers and a well-equipped poolroom. On the second floor the front end accommodates the accounting department, the one building the stockroom, and the other has live storage for 30 cars. Going on up, the fourth and fifth floors are exclusively dead storage, barring only a small testing room in the rear of the fourth, which also communicates with a testing room on the roof of the smaller building, where the generators are tested.

Machine shop of the White Garage, located at the front of the third floor, and well equipped with machine tools and workmen



View in the stock rooms on the second floor, showing the large number of White parts on hand and the orderly arrangement

Fig. 1—Parts of the synchronous coil of Bosch Dual Ignition System dissembled to show construction.

Bosch System of Dual Ignition for Automobiles

SOME years ago, in an endeavor to give their cars greater reliability, several automobile manufacturers equipped their engines with two complete systems of ignition. This practice did not become general, however, for through the heavy carbon deposits from the oils then in use, the lack of adaptability of the plugs for the service, and through individual characteristics of the engines, the set of plugs not in use showed a tendency to become foul and was not capable of operating when the necessity arose. The practical method of overcoming this difficulty was to arrange for both magneto and battery ignition, with a single set of plugs, and this was accomplished by the production of the Bosch "Dual" System.

In the Bosch "Dual" System, the magneto generates its own direct high tension current, while the battery circuit is entirely distinct, and utilizes a separate coil, but with individual breaker.

Except for the distributor and plugs, the systems are independent, with the result that the ignition will not be interfered with by an accident to either. On engines where but one spark plug location can be provided, and a timer drive cannot be arranged, the Bosch "Dual" System is producing results.

Recent years have brought great improvements in oils and spark plugs, with the result that ignition systems previously judged impracticable are to-day giving satisfactory results. Certain automobile manufacturers, who for technical and personal reasons, favor the use of two independent systems, have proved that under modern conditions, such an arrangement is entirely practical for engines in which a timer drive and location for a second set of spark plugs can be provided.

The Bosch battery system is used in connection with any of the standard Bosch magnetos, and consists of a combined timer and distributor, and a synchronous coil of special construction.

Fig. 1 illustrates the parts of the synchronous coil, which may be withdrawn by the removal of a single screw; these parts are the housing, the brass cover, the synchronous coil itself, the stationary switch plate, and the rear cover that protects the connections. The synchronous coil is similar in every way with the armature of the magneto, so that there is no difference in the ignition that they produce. The windings are of heat-proof enameled wire, the layers being insulated with a special fabric. The magnetic field is rendered more than usually complete by the use of laminated and divided soft iron end-plates. Built into the lower part is a heavy fibre block in which are imbedded the movable switch contacts, and in operating the switch, the entire synchronous coil is rotated inside of its housing. The switch presents four combinations; the off position, and three running positions which permit operation on the battery alone, on the magneto alone, or on the battery and magneto, together with both sets of spark plugs in use.

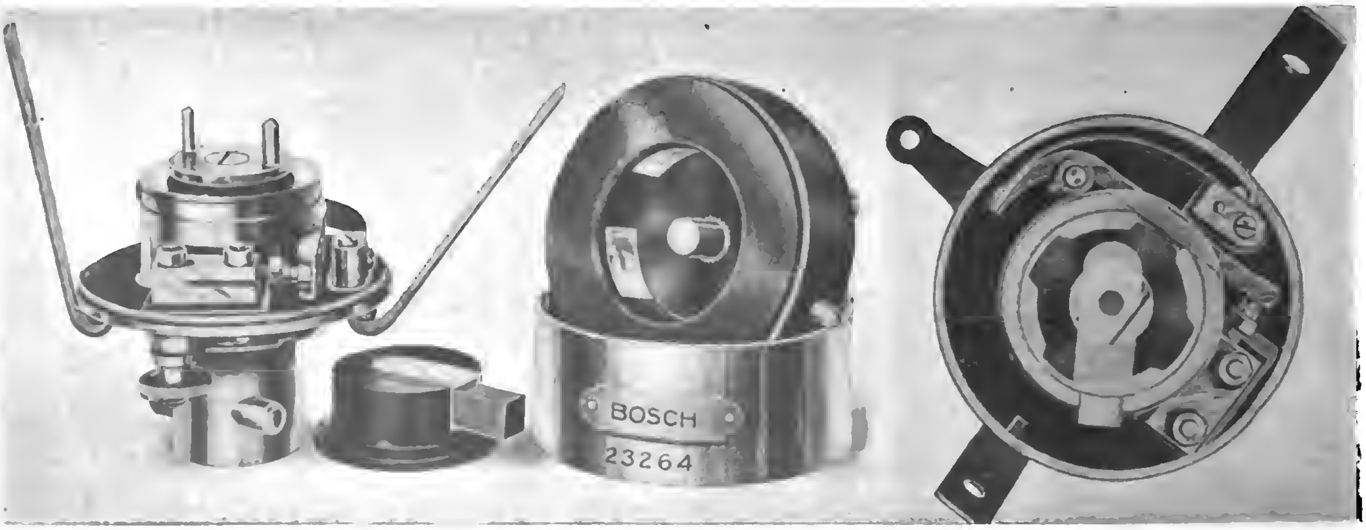


Fig. 2—Timer-distributor parts, partially dissembled. Fig. 3—Contact breaker and cam, with operating lever of sheet metal

THE AUTOMOBILE

THE OTHER HALF OF THE AUTOMOBILE

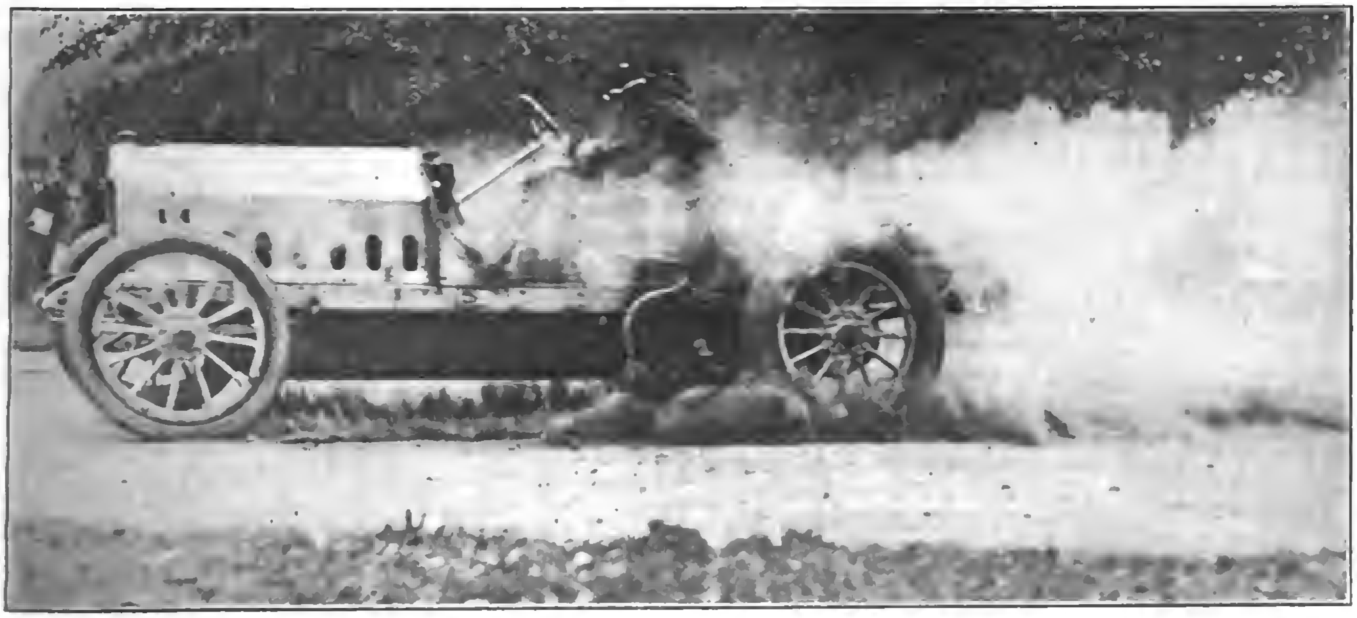
GENERALLY speaking, a medium for transportation comprises a vehicle and the track on which it rolls. Referring to a train of cars as drawn by a locomotive, it is a self-evident fact that the roadbed and the rails constitute a very essential proportion of the system. In railroad work, service is improved in proportion to the advances made in the qualities of the roadbed and the rails. Improving the trackage improves the service, and when it was found that locomotives had substantially reached the limit in response to human ingenuity and activity, further headway was obtained by increasing the weight of the rails per unit of length, and improving the qualities of the ballast used on the roadbed.

Likewise, in considering an automobile, the practical performance of the car will depend upon the degree of perfection of the roadbed. In a sense, increasing the utility of the automobile may be accomplished in one of two ways, i. e., adding to the roadability of the car, or improving the road. In view of these considerations, it is not far-fetched to point out that the roadbed is the other half of the automobile, so to speak.

Since the roadbed serves for a large number of the machinery components, wisdom would seem to indicate that it should be improved at any cost. Trying to make machines (automobiles) so that they will render good service on bad roads is an undertaking which violates every principle of national economy. It is perfectly foolish to suppose that the public at large may avoid paying for the extra work which will have to be put upon the automobiles to make them render efficient service on inefficient roads.

If it is assumed that automobiles (the machinery portion) can be built for $1 per pound, it may at once be said that the roadbed will cost but a minor proportion of this price per pound. The machinery portion is only available for one specific utility purpose, but, as before stated, the roadbed is available for the common use of all the automobiles. To sum up from this point of view, the public at large, who must pay for the automobiles and the roads on which they run, might better settle for good roads than to pay $1 per pound for automobiles.

If there are 300,000 automobiles running in this country at the present time, and if they weigh 2,000 pounds apiece, taking this as an average figure, the public at large must have expended $600,000,000 in the purchase of the automobiles. There are numerous important considerations which do not come out in the mere statement of the purchase price of a given number of automobiles. If the depreciation due to roads as they obtain at the present time is equal to 20 per cent. the public at large must pay $120,000,000 per year in the maintenance of 300,000 automobiles.



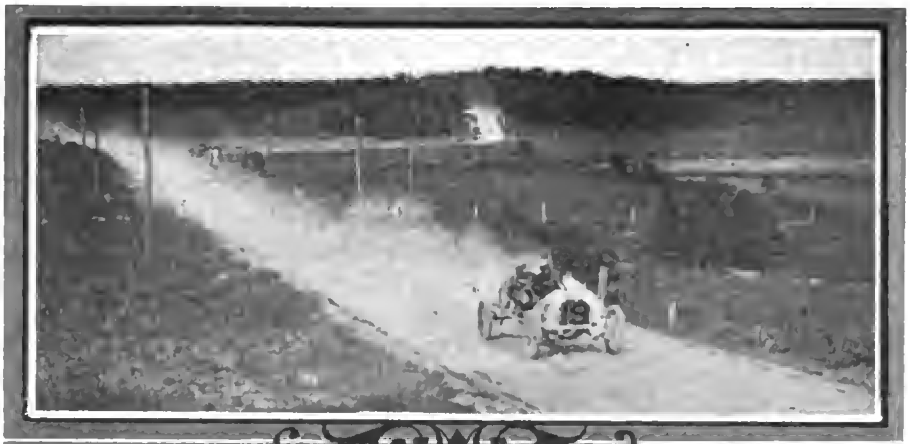
RACING SCENE SHOWING HOW CARS AT HIGH SPEED TEAR UP THE ROAD SURFACE

Improving the road has the effect of decreasing the first cost of the cars, and the further effect of decreasing the cost of maintenance thereof. It is useless to go into figures to express the savings which will result if the roads are made uniformly good, but the situation as here presented, while it fails to tell the whole story, very clearly indicates the advisability of improving the roads in order to save money on the whole.

The discussion may be advanced to a high economic phase in the simple process of pointing out that in the transportation of goods, if time can be saved, a saving of money will result also. If money is worth 6 per cent. per annum, and it must be, since most of us will take all we can get at that price, a saving of money will result if goods are transported at a saving of time. Goods tied up on the road represent money drawing interest; lowering the tie-up time reduces the interest charge.

There are secondary phases to this same situation. If the delivery of merchandise is delayed, opportunity for its proper disposition will be lost. Failure to conform to a delivery contract indicates failure of the whole undertaking, whatever it may be, since little or nothing can be done until the merchandise is delivered. In this way, all along the line, speedy and inexpensive methods of transportation provoke additional advantage, and in counting an advantage it becomes necessary to account for the loss, if the advantage is neglected.

It is extremely difficult to bring the citizen at large to a proper realization of the fact that a commodity is at his expense, even though it may be purchased and paid for by his neighbor. An automobile is a luxury in the service of a class, according to the average citizen, if he does not own one, and a certain prejudice is prone to interfere with the process of normal thinking under the circumstances. Let it be taken for granted that the owner of the car in any given case realizes the direct result, but this fact in itself does not fix the character of the service, which in the ordinary course, may be efficient or



A NUMBER OF RACING SCENES, ALSO SHOWING THE DESTRUCTIVE ACTION

Top, Scene in Cobe Cup Race in Indiana, Showing the Trail of Road Top Dressing

Simplex Racing Car "Eating" off the Road Surface at an Abrupt or 90 Degree Turn

Huge Chadwick Racing Car in a Hill-Climb, Showing How Speed is Detrimental to Roads

Skidding Around Abrupt Turns Does Much Lasting Damage to Top of the Road Surfaces

Bottom, at the Right, View of Bad Road Before Improvement Was the Order of the Day otherwise according to circumstances.

Indirectly, the service, if it is advantageous, becomes so for every one, or if it is inefficient, levies tribute from all. Broadly speaking, then, it is the duty of every citizen to wisely provide for the roads which will help in the process of transporting merchandise, and thereby reduce the total cost of the service as rendered, in order that the proportion of cost, a percentage of which is bound to fall upon every citizen, will be minimized.

Since the roadbed serves in common for all the automobiles available for use, it is ample indication of the necessity for doing the best possible work in its construction. An inferior road will induce excessive depreciation in a superior car, but it must be perfectly plain that even a well-built road is likely to suffer from the severe service to which it falls heir in view of its common use by all automobiles.

The front page illustration shows a racing car on a macadam road, and as a result of the superior ability of the car and the inferiority of the road, its performance denotes rapid deterioration, which is evinced by the cloud of dust raised. Contrary to the statements which are frequently made, even the front wheels pick up the top dressing of an inferior road when the speed of a car is high, although, as the illustration further portrays, the rear wheels have the most marked effect, which is no

HOW ROADS ARE IMPROVED AND THE GOOD RESULTS OBTAINED FROM THEIR IMPROVEMENT

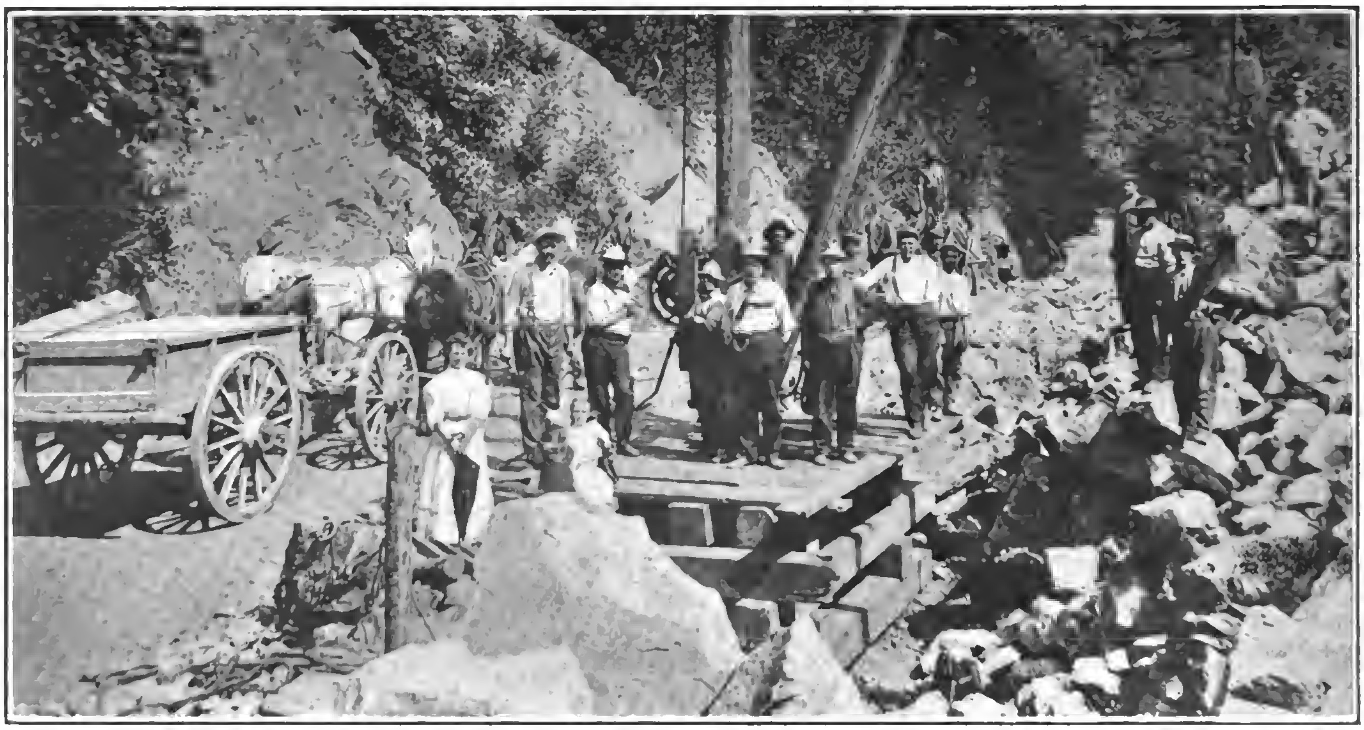
Rolling Down the Surface of Macadam Roads in Fairmount Park, Philadelphia, Before a Race

Making a Turn at a Speed of 25 Miles Per Hour on a Tar Treated Macadam Road Surface

A Dust Test on the Los Angeles-Pasadena Boulevard, Car Coming Towards the Camera

Another View of Dustless Los Angeles-Pasadena Boulevard, Car Going From the Camera

Bottom, at the Left, View of Bad Road from Slightly Different Position, After Improvement



Road Improvement In Progress, Showing Materials, Men, and Machinery Necessary to a Good Job

doubt due to the transmission of power at the point of load contact of the driving wheels.

From the point of view of the automobile proper, the amount of damage which can be done is proportional to the amount of energy which is wasted at the point of the transfer of same. When an automobile throws up a cloud of dust, it is claimed, as a rule, that it is destroying the roadbed, but looking at it from the other point of view, rather leads to the contention that it is merely disposing of the dust which must have been there at the time. What is wanted is a roadbed, the surface of which is so closely bound, and so thoroughly in keeping with the service conditions that dust will not be manufactured. The very binder which best serves for the purpose is the one which will abort dust formations. It will also defeat undue tire depreciation, because the transfer of energy at the point of contact of the tire with the road will be more efficient.

In a general way, the whole situation will receive an impetus in the right direction when roads are improved on a basis of the superior service which they will render with automobiles, rather than to continue to try to get along with roads which were formerly sufficient (if they were) under the conditions involving the use of animal-drawn vehicles.

Roman roads have lasted from a date 600 B. C., which goes to show that the Roman construction is more nearly in accord with our present needs than the macadam or telford work of our time. It is not necessarily the traffic which is at the bottom of the undue depreciation of the average road, and the very fact that some of our modern roads scarcely survive a single winter bears evidence of the ability of Jack Frost to upset the short-sighted plans of the taxpayer who grudgingly doles out the least possible amount of money for road building purposes, and in his disgust at having to pay anything at all, abandons the whole project, including his petty contribution, to the road building representative of the government, which in turn, becomes the victim of the contractor.

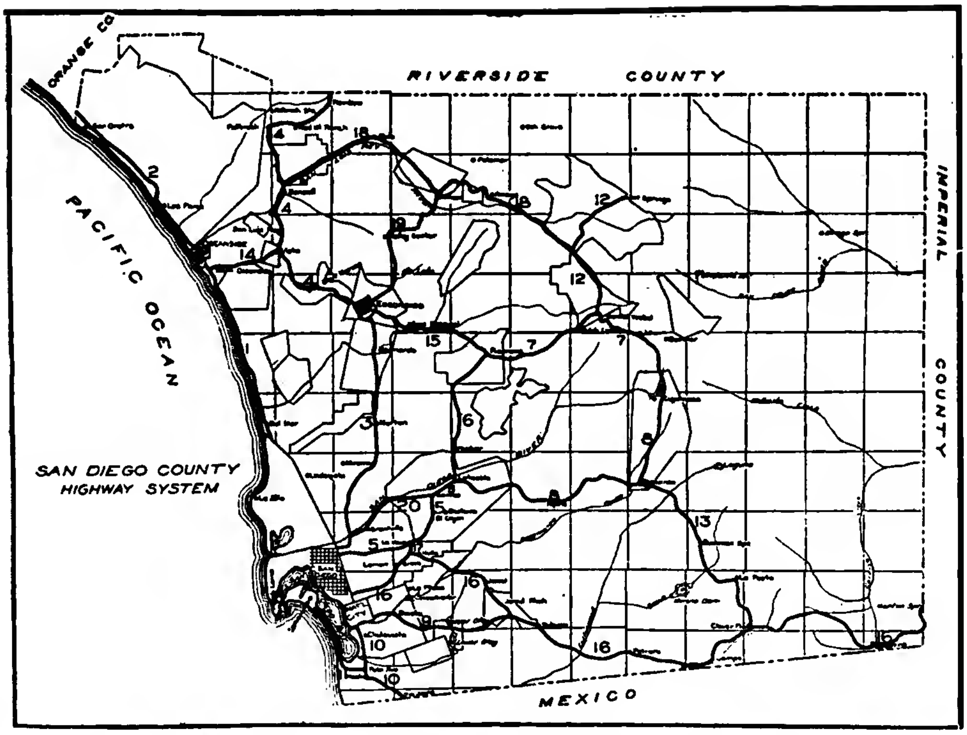
Taxpayers must first be made to realize that they will be the gainers if the roads are improved, and they must be made to understand that they must pay the cost of good roads; but these requirements will not prevent them from taking an interest in the further effort; they might just as well supervise the undertaking and see that the cost has an equivalent.

As a sample of the work being done in road improvement, a map of San Diego County, Cal., is presented showing the proposed new work there. The total covers some 448.5 miles, estimated to cost $1,250,000, an average of $2,800 per mile, which figure should produce an excellent road. The roads are all num-

Kind of Bad Roads Last Year's Glidden Pathfinder Found

Sample of Bad Roads Coast to Coast Racers Found In West bered, and among them it will be easy to pick out any one. Thus, the longest route is number 16, San Diego to Imperial County, 77.4 miles to cost $227,960, this being at the same time the most expensive of the twenty roads laid out.

In the old art of road building, purely mechanical solidification by wedge joints between the elements of construction, and the shedding of water, were the objects sought. To this the new art, rendered necessary no less by the increasingly exacting demands of civilization than by automobile traffic, adds the requirement of adhesion of the hard substances of the road in a softer matrix, to reduce wear and dust formations, help out mechanical solidification and permit loosened material to find new and secure lodgement in the roadbed by the action of the traffic or by simple, inexpensive repair work, and adds also the requirement that the adhesive material shall bind whatever dust is nevertheless formed and prevent it from being drawn or driven into the atmosphere by the action of wheels and wind combined.



Map of San Diego County, California, Showing Road Improvement Work

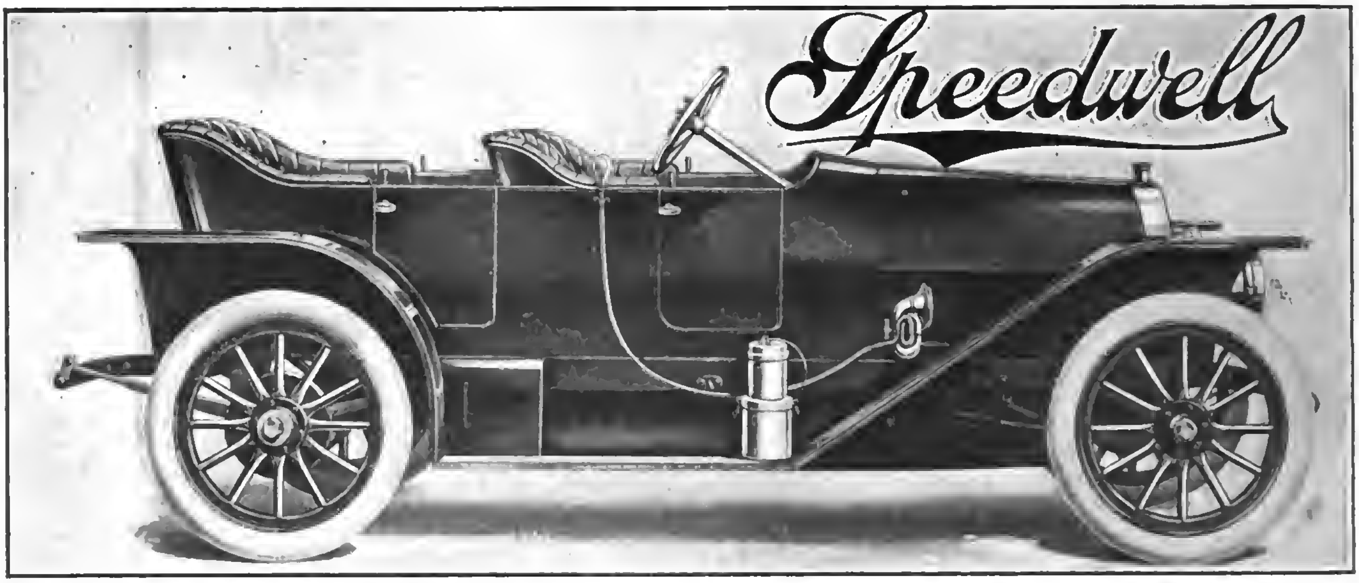
Oil treatment has been narrowed down experimentally to repeated sprinkling with oils of asphaltic base which leave a binding residue, while all oils with a paraffin or naphtha base have been eliminated, as causing more mud, more odor, less binding and less durability. Oil treatment is applicable to earth, gravel, sand and stone roads, but not to clay surfaces, unless much gravel is admixtured. One of the most thorough oiling methods, producing the "petrolithic pavement" involves elaborate mixing and tamping of the surface to a 7-in. depth.

Treatment with emulsions purports economy of oil by combining it with soapy substance and water, easy application, absence of objectionable odors and immediate effectiveness. A number of different emulsions are commercially controlled, and each must be considered separately with reference to its action on the kind of road to which it is intended to apply it.

Solutions in water of calcium chloride or nitrate of soda, salt and lime or sand and soda fused, afford substitutes for sprinkling water and bind dust for a much longer time; but have no effect to reduce wear or dust formation.

Coal tar, as a material applied to finished roads, has been extensively used for broken-stone surfaces. The methods of application by spraying involve the use of pneumatic pressure for the spray nozzles, rather than heating of the tar. The most economical, because most thorough, use of coal tar is for the building of new roads, in which use it is mixed, instead of water, as a binder for pillar material and a paint for all crushed stone. Coal tar can be applied with success only in dry weather.


Example of a Fine Road Surface, as Prepared for Massachusetts, Showing Separate Road for Heavy Traffic



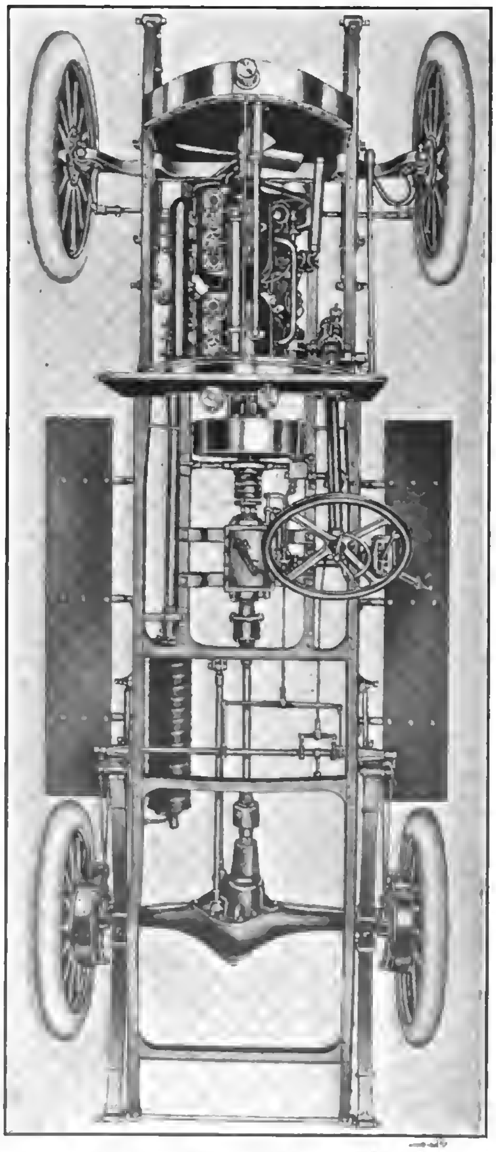
View of Torpedo Body Fitted to Speedwell Chassis, Showing Long, Rakish Lines

Manufacturers: Speedwell Motor Car Co., Dayton, Ohio

Motor, four-cylinder, 5 by 5 inches.
Cylinders cast in pairs, L type; valves on left side.
Water jacket heads separate, cylinder heads and valve chambers integral.
Crankshaft, drop forged alloy steel, with three plain bearings.
Camshaft, drop forged high-carbon steel, cams integral.
Crankcase, cast of nickel aluminum alloy, with wide flanges.
Ignition dual, Bosch high tension magneto and single non-vibrating coil; self-starter button on dash.
Lubrication of motor by gear-driven force-feed pump from 3-gallon reservoir in crankcase, by internal leads to all bearings. Circulating system with strainer.
Carbureter, Schebler Model L, hot water jacketed.
Gasoline feed by gravity.
Cooling by honeycomb radiator, gear-driven centrifugal pump and belt-driven four-bladed fan.
Clutch, leather-faced cone, with universal-joint alignment.
Transmission selective, amidships, three speeds forward and reverse.
Drive by shaft; two universal joints, double tubular torsion rod encased, and radius rods.
Rear axle, drawn steel type with floating shafts and removable differential; Timken bearings.
Brakes, four, internal and external on rear wheel brake drums.
Front axle, forged, I-beam section, knuckles mounted on Timken bearings; tie rod in rear of axle; reach rod above it.
Steering, by worm and full-circle spur wheel.
Front springs, semi-elliptic, 2¼ by 40 inches.
Rear springs, semi-elliptic, 2¼ by 56 inches, shackled at both ends.
Frame, pressed steel, channel section, narrowed in front, arched over rear axle; motor on subframe; cross members gusseted in one piece.
Wheelbase, 121 inches.
Tires, 36 by 4 inches, front and rear, Diamond or Goodrich.
Rims, Goodyear quick detachable.
Price from $2,500 to $3,850, seven styles.

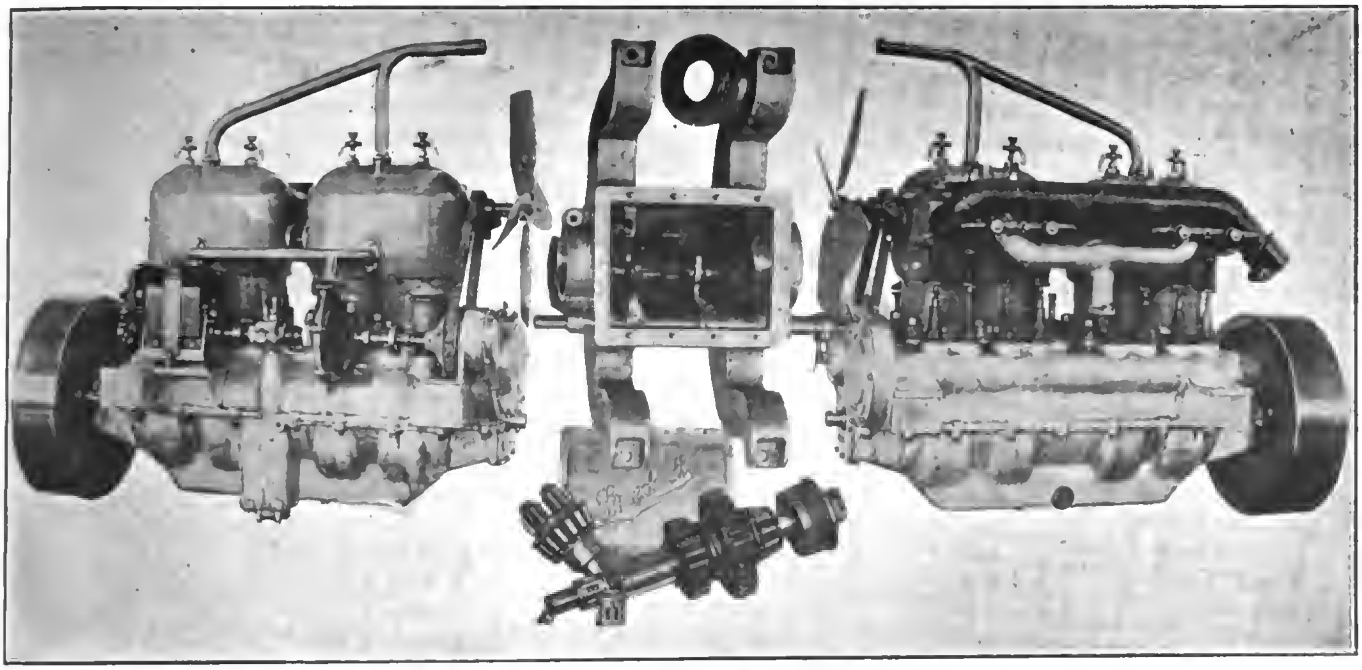
THE keynote of the construction seen in the "Speedwell 50" seems to be an extremely deliberate balancing of all considerations, with a tendency, in case of conflict between mechanical and commercial requirements, to safeguarding the engineer's solution first. The result has been a chassis provided with a robust, 50-horsepower engine, and to which it has been found possible to fit seven different styles of body without violating fitness, congruity and symmetrical appearance. In the seven-passenger touring car and the limousine, the springs are a grade heavier than in the other styles, and the tires are 4 1-2 inches wide instead of 4 inches wide, but otherwise the chassis is unchanged. It has not been possible to accomplish this remarkable result without the greatest care in the choice of materials and construction elements.

The motor is reduced to simplicity in operation and appearance by carefully designing away all superfluous parts. One of its attractive special features is the separate water jacket head for each part of cylinders, this construction assisting much to secure an even thickness of the cylinder walls; and, in case of accidental freezing of the cooling water, the damage is limited to the jacket head. The pistons are cast from reverberatory air furnace iron, the same as used for the cylinders, and are provided with oil grooves to help distributing the splash from the crankcase and four eccentric, lap-jointed expansion rings, three above and one below, are fitted to each piston. The enclosed camshaft, with integral cams, runs in three long phosphor-bronze bearings fitted with oil pockets, and is driven from noiseless bronze and steel gears, helically cut. The intake and exhaust valves are interchangeable.



Chassis of Speedwell Car from Above

The three bearings of the crankshaft are of white bronze, carefully scraped and fitted and proportioned in accordance with the stresses and the weight of the flywheel. The crankshaft, forged from alloy steel and heat treated, is finished in a special crank-grinding machine, insuring a micrometric accuracy which would not be obtained by other means, except at prohibitive cost, and then not with the same degree of certainty.

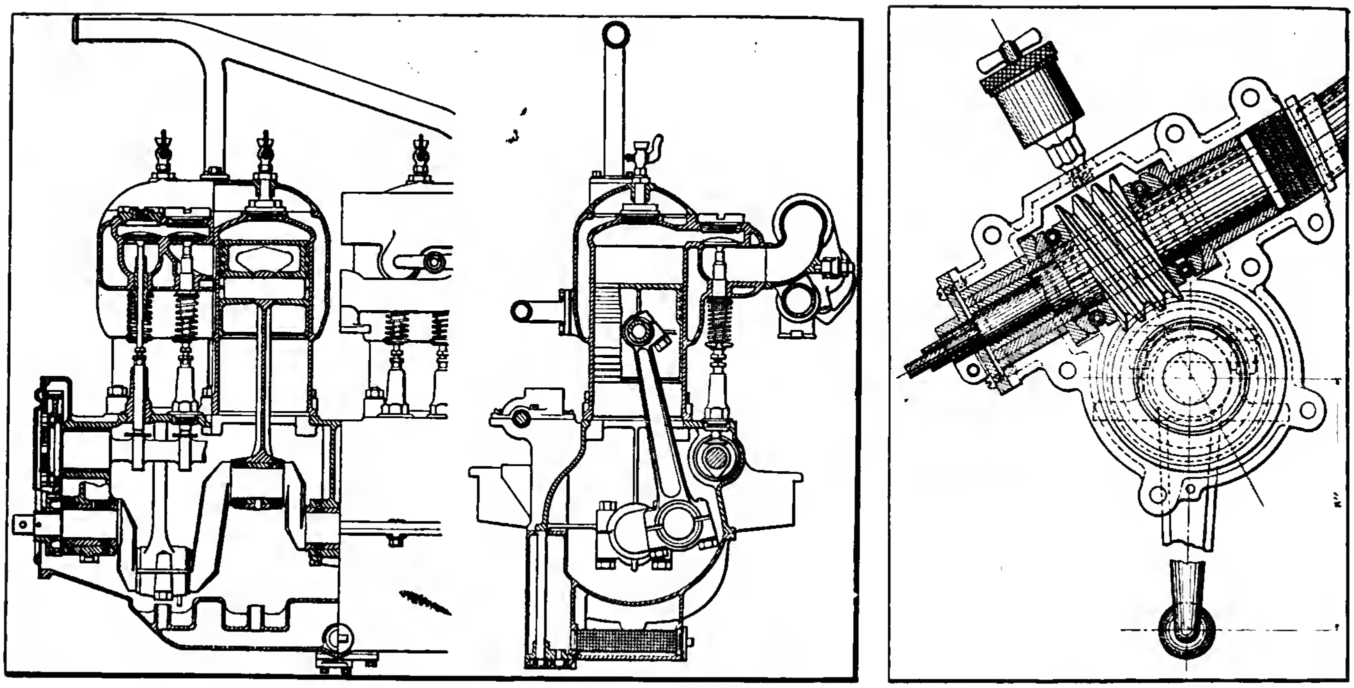


Two Sides of Engine, Showing Auxiliaries. Also, Transmission Showing Transmission Parts

The lubrication system throughout the "Speedwell 50" is very complete and, so far as the motor is concerned, practically automatic. More than forty grease cups are attached to various working parts, including the shackled joints of the springs, each of which is provided with a hardened bushing, and a large force feed grease cup takes care of the steering gear, while the change-gear and differential run in non-fluid oil and the universal joints are packed with consistent grease. Much care is manifested in the placing of the cups where they may be reached with ease. As most plainly shown in the accompanying sectional view of the engine and crank case, the motor is lubricated by a self-contained circulating system, comprising a three-gallon reservoir in the lower half of the crank case, from which the oil is drawn by a gear pump, there located, to a sight gauge on the dash, and thence by gravity or, if need be, by pressure to the bearings in the motor. The piston pin is reached in this way, both from the cylinder walls and by splash. A constant level in the crank case is maintained by an overflow pipe, which takes surplus oil through a metallic strainer back to the reservoir. The height of oil in the latter is read on a gauge conveniently located between the cylinders. The crank case is a sightly casting of nickel-aluminum, in which the crank wells are formed so as to constitute bulkheads, which equalize the amount of oil available for splash at each connecting-rod knuckle, independently of steep gradients of the road.

Cleanliness is taken care of in automobile construction mostly by preventing the lubricants from reaching parts where they don't belong and by reducing the handling of lubricants to a minimum. On the other hand, it is necessary to guard against the insecurity of lubrication which arises when it is attempted to lead oil from a single receptacle through several tubes to a corresponding number of bearings. Any one of the tubes may refuse to work for any trivial cause, while continued feed through the other tubes prevents the fact from being discovered till the dry bearing is scored and gives notice of an injury not easily remedied except by replacement. This matter has evidently been fully considered by the designer of "Speedwell 50." The crank case joint is broadly flanged and the bolts closely spaced, so that no oil will exude. In the change-gear, stuffing boxes on the drive shaft prevent all leakage. Other examples

Large Factory in Dayton, Ohio, Where Speedwell Cars Are Turned Out, Every Part Being Made Here



Sections Through Engine in Two Planes, Showing Details of Construction. At Right, Steering Gear

will appear in the following summary of the other features of the entire chassis, the résumé of the whole being given in the small type at the heading of this article.

The hot-water-jacketed model L Schebler carbureter is provided with three adjustments for low, intermediate and high engine speeds, and these adjustments have been fully verified through road tests of each carburetor at the Speedwell factory. The fuel feed to the carbureter is by gravity from the tank.

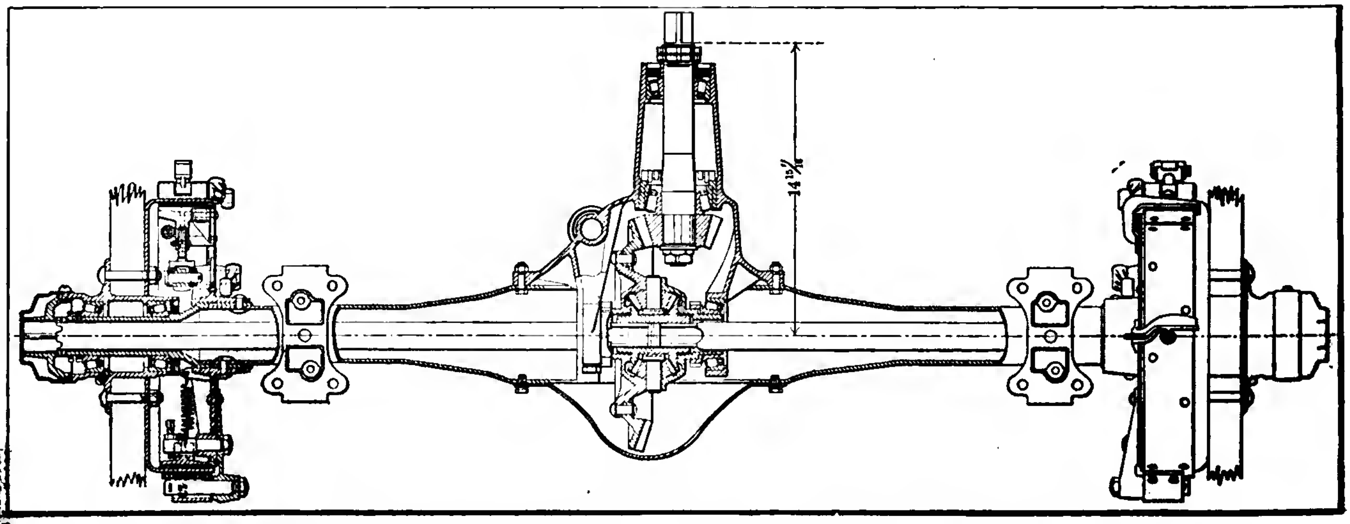
In the matter of ignition, the Bosch dual system has been adopted. The high-tension magneto and a set of dry cells both work on the same set of jump-spark ignition plugs, the dry cells operating through a single non-vibrating coil mounted on the dash in a brass casing fitted with a self-starter button. The circuit-breaker for the dry batteries is mounted on the armature shaft of the magneto, thereby dispensing with the timer.

In the change-gear, which is of the selective type, the driving and driven shafts are both mounted on Timken conical roller bearings, while the telescoping gear rotates on parallel unadjustable rollers. The shafts are of nickel steel and the gears of another alloy, usually designated as vanadium steel. Nickel steel is also used for the propeller shaft, which is forged in one piece with the retainer for the universal-joint cross. Under normal loads, the propeller shaft transmits power in a straight line from the change-gear, which is mounted amidships on a cradle in the subframe, to the bevel gear pinion and differential on the rear axle mechanism, and losses in the transmission of driving energy are further minimized by fitting this drive with two universal joints protected and kept clean by a tight metal casing.

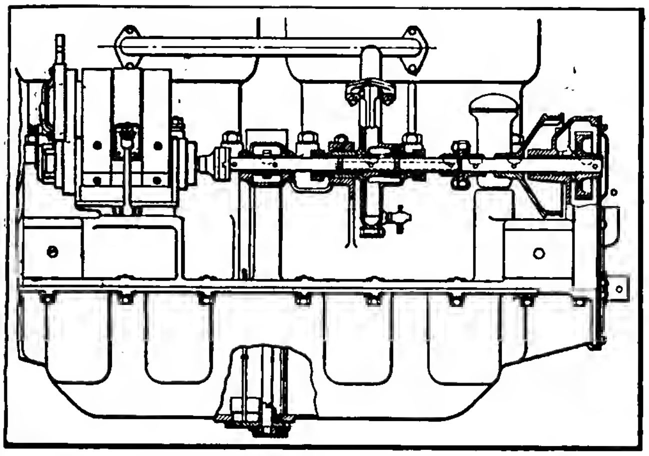
Starts and stops are cushioned by means of a torsion tube hung between oil-tempered springs from the midway cross-member of the frame through the intermediation of a dustproof casing, and the latter is connected with the rear axle by a double torsion tube. Radius rods are also provided to relieve the rear vehicle springs of driving thrusts, so they may be shackled at both ends and have free action, and the radius rods are secured to the frame reaches on each side by ball joints.

The rear axle is of the full-floating pattern, in which the shafts that turn the wheels have nothing else to do, and all weight and road shocks are borne by the tubular housing. Here the pinion shaft, bevel gears and differential run on Timken bearings adjustable for wear, and a large inspection plate permits adjustments and replacements.

The brakes are of the approved external-contracting and internal-expanding type, the service brake being the external one



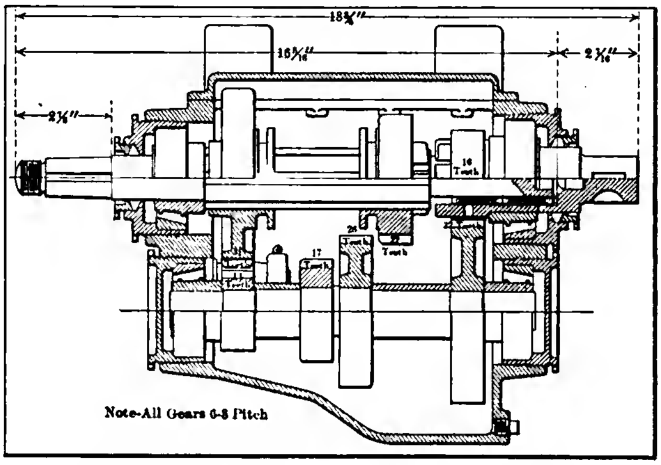
Rear Axle of the Full Floating Type Is Made by Timken, and Taper Roller Bearings Are Used Throughout



Side of Engine, Showing Auxiliary Shaft, Magneto Drive, Etc.

and actuated by pedal, while the emergency brake is operated with a hand lever. This control approaches closely to the generally accepted standard. The brake rods are fitted with equalizers distributing the pull evenly to both brake drums, regardless of small variations in the adjustments of the brake bands, the lining of which the makers guarantee against burning.

The construction of the self-contained cone clutch mechanism is shown very clearly in one of the accompanying illustrations. The end thrust of the clutch engagement is absorbed in a large row of steel balls, and the possible unalignment between motor shaft and transmission shaft, which in former days was the cause of practically all the troubles experienced with leather-faced cone clutches, is neutralized by means of the universal joint shown in the illustration, and the mobility of the joint is secured by keeping it packed in grease. The operation of releasing the clutch at any engine speed is facilitated by a ball-bearing thrust-ring in a dust-tight casing upon which the release-yoke acts.



Transmission Section Showing Liberal Use of Taper Roller Bearings

The cooling apparatus is commensurate with the high power of the engine, the radiator being of true cellular design and the centrifugal pump of large dimensions. This pump, the magneto, the oil pump in the crank case reservoir and the four-bladed fan driven by eccentrically adjustable belt, are all operated from the auxiliary shaft on the right side of the engine.

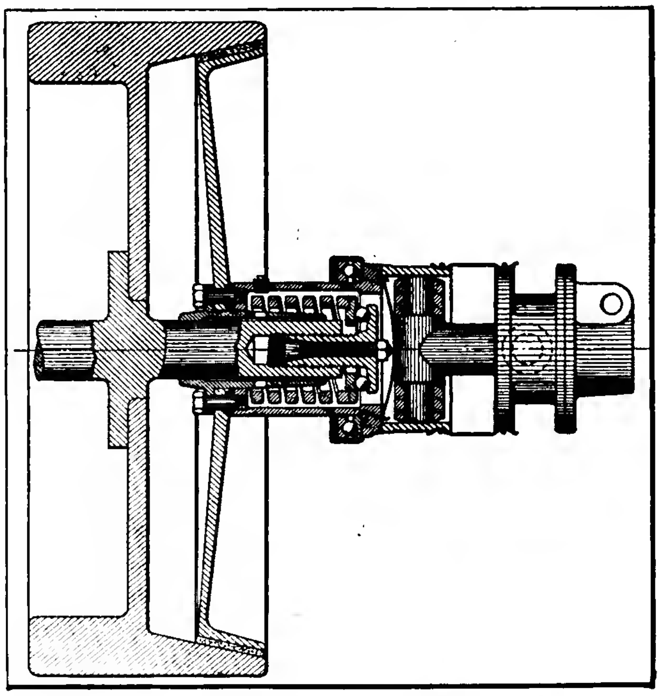
Throttle and timing control are operated in the usual manner through the steering pillar. The steering gear consists of an eighteen-inch wheel of wood on an aluminum web and spider, the tubular steering post, to which is secured a double worm of relatively low pitch, making the action merely irreversible, meshing with a complete spur wheel. The full steering swing involves only 90 degrees of this gear, so that four different portions of the gear will afford the user of the car assurance against loss in his steering mechanism for many years. The provision of a large force-feed grease cup, keeping all rubbing surfaces well lubricated, serves the same end and security against seizing as well. Both the worm and the spur wheel are made from hardened and ground alloy steel. The tie rod is placed behind the rear axle and the reach rod above it, giving the maximum protection against injury from boulders in the road and similar obstructions.

The front axle is an hydraulic forging of I-beam section, toughened by heat treatment and with integral spring seat broadenings of the top flange. The knuckles are mounted on Timken bearings at top and bottom, and the wheels likewise on their rock shafts.

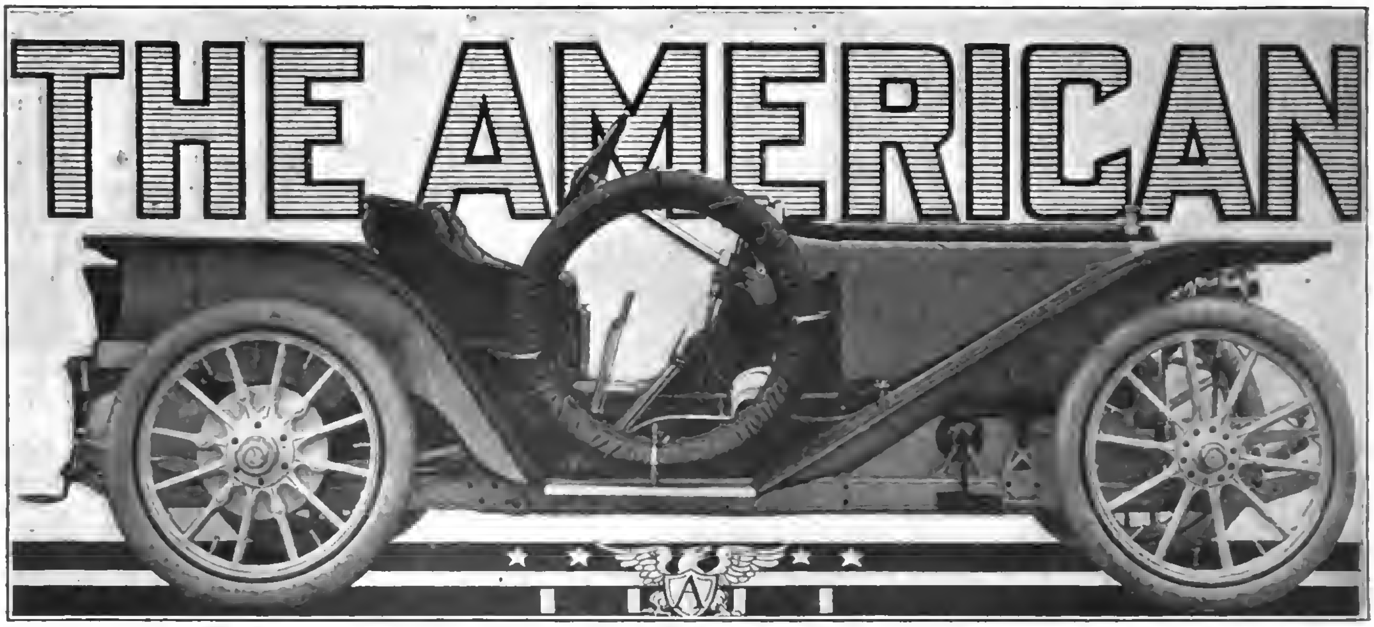
Front and rear springs of the Speedwell are all semi-elliptic and nearly flat, in accordance with modern practice. All eyes are lined with hardened bushings, and all leaves are lipped to maintain their alignment. The front springs are 40 inches long, the rear springs 56, and all are 2¼ inches wide. In the cars fitted with heavy bodies the thickness of each leaf is increased. So as to provide liberal spring action over the rear axle, the frame of the car is here arched, while in front it is narrowed in order to allow sharper turns of the front wheels. It is of channel-section pressed steel with a sunken sub-frame bringing the center of gravity close to the ground in conjunction with ample road clearance. The cross members of the frame are all made with integral gussets, giving a broad and secure attachment to the main frame reaches and reducing the strain on the rivets. The wheel base is 121 inches.

All wheels are of the same size, taking Diamond or Goodrich tires, 36 by 4 inches, with the exception that the heavy body styles, the seven-passenger touring car and the limousine are fitted with tires 4 1-2 inches wide. The body styles produced are the following: A four-passenger toy tonneau, a five-passenger touring car, a roadster or semi-racer for two, three or four occupants; a close-coupled tonneau for five passengers, all these costing $2,500; further, a seven-passenger touring car and a Speedway Special, with a body of striking design, reminding somewhat of the British Lancaster car, these costing each $2,650; finally, the limousine for seven passengers, costing $3,850.

With long wheelbases, wide tread—that is, standard—well designed and large-sized springing, the riding qualities are all that could be expected in a car of this size. The amount of power provided is also ample, either for steep and difficult hills, or for speed work on the level, such as all drivers want to indulge in at times when the spirit moves them.

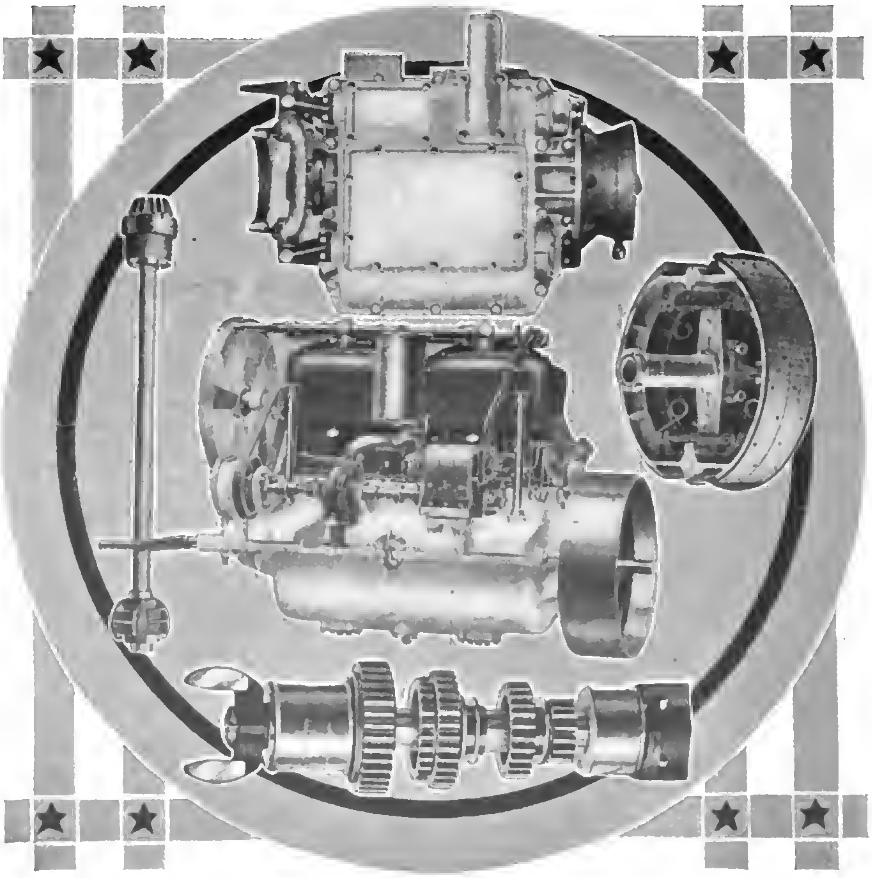


Clutch Is of the Cone Type, With Enclosed Central Spring



American with Traveler Body, the Chassis of Which is Underslung

JUST what importance should be attached to the features in which "The American" differs from all other American automobiles depends largely on the point of view. They produce a highly distinctive appearance and a remarkable steadiness of motion at high speed and turns, and this steadiness, of course, raises the average speed at which the car is operated by its owner and probably also increases his ability to handle the car skillfully at all speeds above forty miles per hour on the road and above sixty miles on the race course. The close hugging of the ground at rapid turns and curves keeps the driver's mind composed, which is the principal requirement for safety in driving at the ordinarily forbidden gaits. But cars habitually driven fast do not last long, unless their design, materials and workmanship help them out. Their tires, too, wear out and tear out quickly by the strains to which high speed exposes them. This is the general rule. But the American, though rather heavy among modern cars, offers the speed without all of its mechanical and financial penalty. The tires last as long as under cars of lighter weight and lesser speed inducements, and the mechanism, generally, "stands up" to its work well enough to keep it in the market year after year at a price competing only with the expensive cars of high renown. These peculiarities seem to be established as more than mere claims and suggest some inquiry and attention with regard to the exclusive feature of design to which they must be due. The underslung frame is the keynote in this design. By hanging the frame on springs secured under the axles instead of above them, the center of gravity is lowered and a change is effected in the direction of stresses arising from stops and starts and from the centrifugal action which tends to upset a car at rapid and sharp turns. The stresses referred to are especially those acting against yielding parts, such as springs and shackles, the frame itself, the tire fastenings and the tires. Owing to the yielding nature of these parts, the weight supported on the frame of an automobile is really shifted forward or backward at starts and stops, and sideways at turns. At a sharp turn the outside tires are loaded more heavily than the inside ones, and the latter are inclined to bound under the reduced load, if the load is lumpy in the least degree. The last-mentioned effect which is disquieting to the driver and wearing on tires is particularly reduced by low suspension of weights, though the strain on tire fastenings may be correspondingly increased.



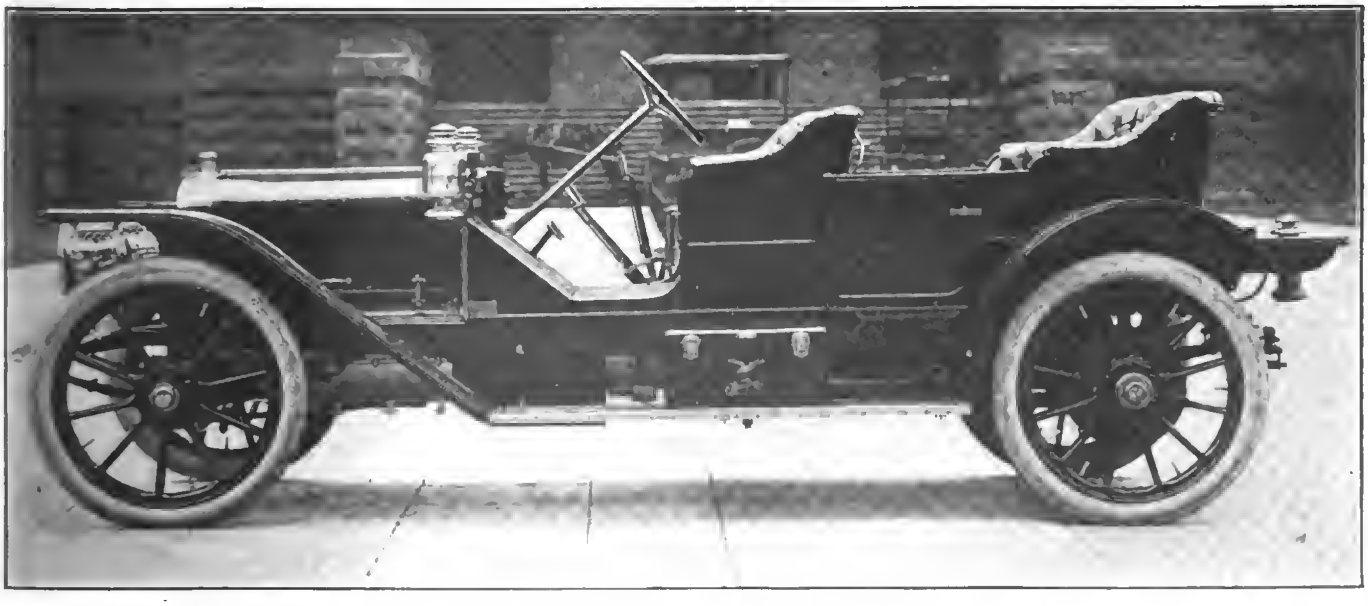
Engine and Transmission Parts, Main Driving Shaft and Expanding Band Clutch

In four out of the six models of the American, manufactured by the American Motor Car Company, of Indianapolis, the advantages of low suspension and low center of gravity are materialized, and by means of large wheels, taking 40 by 4-inch tires in front and rear, the underslung design has been reconciled with a road clearance of 12 1-4 inches in three of these models, and the advantages of wheels and tires of large diameters have been added. In the American Roadster Special the tires are 34 by 4 inches in front and 34 by 4 1-2 inches on the rear wheels, and road clearance is reduced to 9 1-4 inches under the whole length of the car, but the special features of low suspension and stability are accentuated.

Many of the general construction details of the American are shown in the accompanying illustrations, but cannot be described for lack of space. One of the improvements over earlier models consists in the adoption of the F. & S. annular bearings in most places where adjustable three-point bearings were used before. The passage of cooling air through the radiator and all the way through the bonnet is secured by using fan-blade spokes on the cone clutch as well as on the flywheel. Gasoline was formerly fed by pressure taken from the exhaust, but now a compressor pump gear-driven from the camshaft, close to the flywheel, supplies a steady pressure of 1 1-2 pounds from atmospheric air. The pressure can be adjusted to a maximum by adjusting the size of the compression chamber, while any surplus pressure automatically escapes. The universal joint on the propeller shaft is of improved type and the key plates driving the rear wheels are forged in one piece with the floating rear axle shafts. There is noted a convenience in the form of a pipe connecting the tank for lubricating oil with the crankcase, so that oil in the latter may be replenished by simply turning a stopcock. An internal gear pump feeds the oil to the engine bearings, but if splash is desired in addition, it can be had by raising the level of the oil.

In underslinging the chassis, some slight trouble was found in the engine crankcase shape and placing. This was easily remedied by placing the arms of the crankcase very low, and bringing the supports up very high to meet them, the latter being set well above the main frame of pressed steel, and being themselves of pressed steel. Even this placing of the power plant did not introduce any uncertainty of accessibility, for the arms divide right at the parting of the crankcase, so that the lower half is entirely below the subframe, and thus removable from below without disturbing the latter. So, it is, that despite the underslinging and very low center of gravity, the engine bearings are as accessible as any overslung car of the modern type. From the appended illustrations of various parts of the car selected at random, it may be noted that the whole design shows nothing of the freak, being designed—aside from the underslinging—strictly along conservative and approved lines, and following what few accepted standards there are in existence in the automobile business to-day.

End View of Engine, Steering Gear, Rear Axle, and Transmission Parts

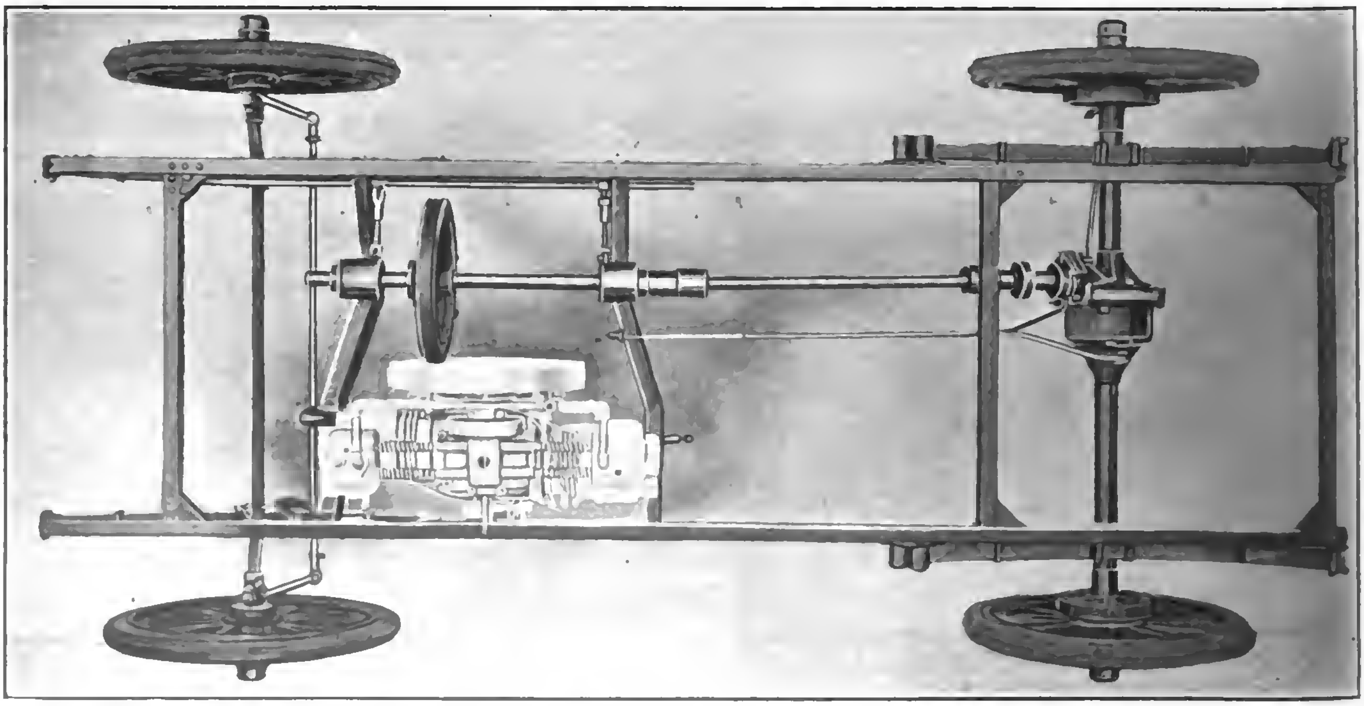


Touring Body on the Regular Model, Known as The Tourist, 50 Horsepower.

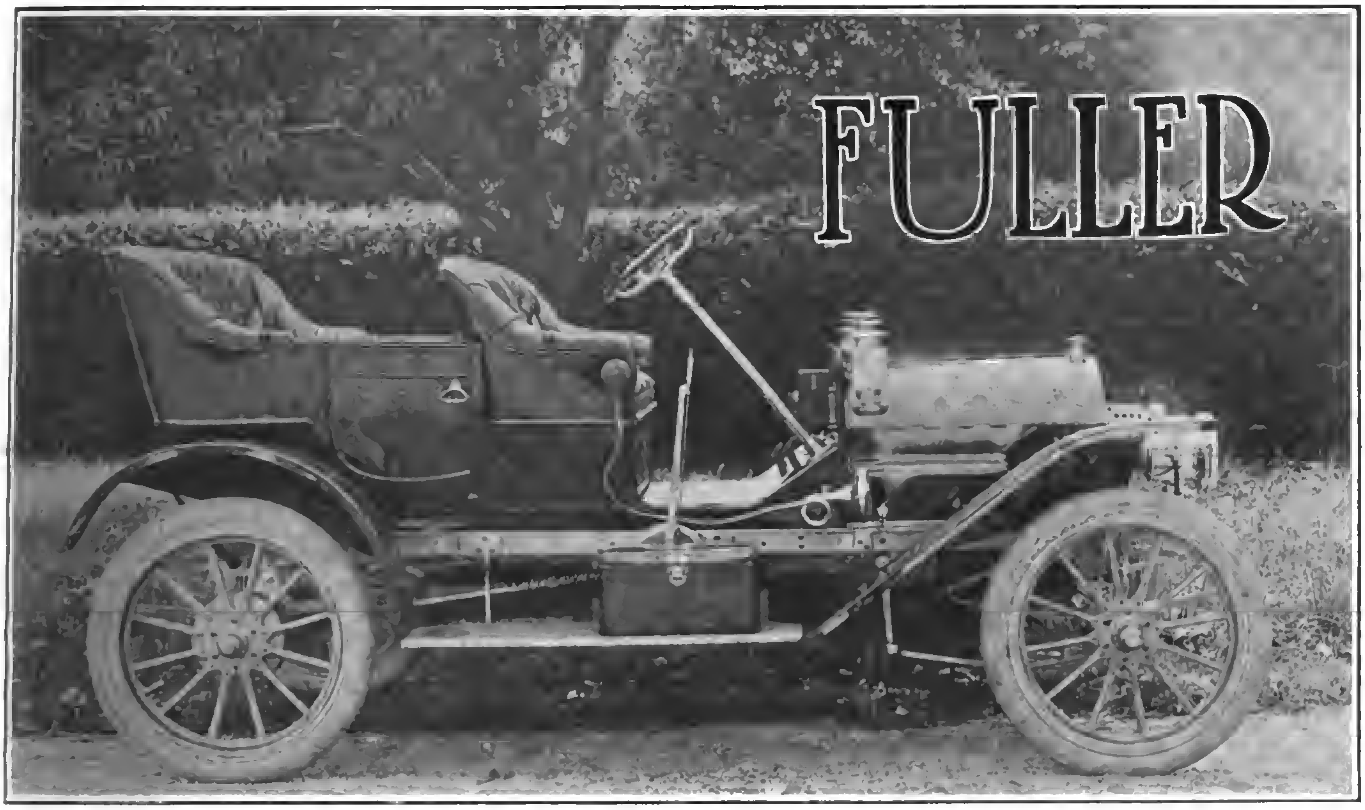
Delivery Wagon as Made by the Van Dyke Motor Company, of Detroit, Mich., a Newcomer

UTMOST simplicity of construction and the price of $750 for a complete delivery wagon, self-propelled, form the basis of comprehensive plans with which the Van Dyke Motor Car Company is entering the automobile industry, with temporary offices at 1221 Ford Building, Detroit, Mich.

The design, whose general features are sufficiently indicated in one of the accompanying illustrations, is due to the ingenuity of George P. Davis, of Detroit, and shows a well-defined purpose to take advantage of the advanced reliability of motors and parts for eliminating every element of construction which would add to the cost and trouble of upkeep and which may yet be superfluous for the successful transportation of light and bulky merchandise. George A. Trout, as general sales and factory manager, is to take care of those qualities of materials which will safeguard the results. Plans are under way for a factory with space for assembling, body-building and painting.



Chassis of Van Dyke Delivery Wagon, Showing the Two-Cylinder Opposed Engine and Friction Drive



Touring Car as Made by the Fuller Buggy Company, Jackson, Mich., a Newcomer, Has Pleasing Lines

IN the recent models of cars made by the Fuller Buggy Company, of Jackson, Mich., a number of changes are made as compared with the design shown in the accompanying illustrations, and all of them are in the direction of improved style in details and the correction of those minor imperfections which are inseparable from all beginnings. Among the leading features which remain unchanged, are the following: In the $1,500 model, the four-cylinder motor is 4-in. bore by 4 in. stroke, developing a little more than 25 horsepower, tubular radiator, planetary transmission armored wood frame, five plain bearings for the crankshaft, roller bearing axles, weight 1,900 pounds, tires 32 by 3½-in. front and rear. In the $2,000 model, the four-cylinder motor, 4½ by 5, developing 32 horsepower, the cellular radiator and a total weight of 2,100 pounds, constitute the principal distinguishing construction features, aside from the differences in style. Both types have double ignition, by magneto and dry battery, multiple disc clutch, lubrication by gear pump and two speeds and reverse by the planetary transmission. The drive is by shaft to the semi-floating rear axle, and the springs are full-elliptic in front and rear, protected by substantial radius strut rods from the rear axle to the frame reaches. A roadster type, Model 30, with rumble seat, has been added to the output of the firm. The development of the Fuller Buggy Company's production of automobiles has been so rapid, in response to the demands of the market, that great ability has been required in the mechanical department for keeping pace.

A Car with High Wheels and Solid Tires for the Country Folks Is Also Made by the Fuller Company

IN THE SOLUTION OF SOME RADIATOR PROBLEMS

FROM the radiators as used in the earlier makes of automobiles down to the types as they obtain at the present time, represent a long series of attempts to bring about the highest obtainable efficiency and great life of the radiators in service. Efficiency and life seem to oppose each other, it being the case that the methods by which efficiency is increased are those which are likely to produce a mechanically weak structure.

The power which may be taken from a given motor depends upon the fuel which is burned to carbonic acid and water in the process, but since the thermal efficiency of a motor is probably under 20 per cent. in the best types, and an average of perhaps 16 per cent. in good motors, it will be appreciated that as the power of the motor is increased the quantity of heat which must be absorbed by the water in the cooling system increases enormously. The only possible way that the power of a motor can be increased without seriously affecting the proportions of the radiator is that which involves an increase in the thermal efficiency. It took a great many years to bring the thermal efficiency of steam engines from say 5 per cent. at the start to 16 or 17 per cent. as they obtain in the best types at the present time. There is small chance of this type of engine being increased in point of thermal efficiency to any great extent. The internal combustion type of motor made a somewhat better thermal showing from the start, and it is reasonable to suppose that the thermal efficiency in the crude types of internal combustion motors approximated 10 per cent.

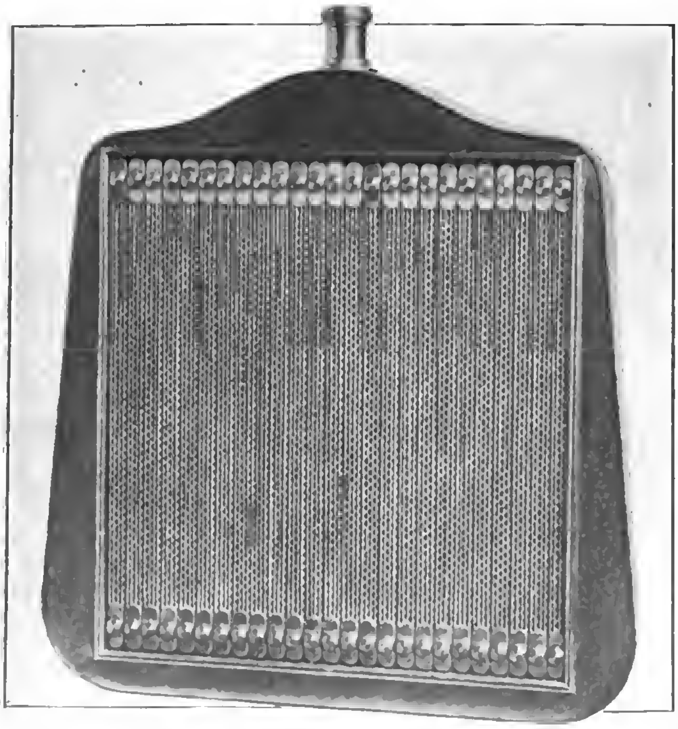


Fig. 1—Appearance of the finished radiator, ready for use, showing that it has an excellent appearance

During the last ten years the thermal efficiency of internal combustion motors due to their better construction as developed in automobile practice was increased from the low figure above given to approximately 20 per cent. in the very best types of the present time. This change had the effect of reducing the cooler requirement to one-half of that which obtained in the primitive automobile applications, but it still leaves an enormous amount of heat which must be taken care of either by the radiator or by way of the exhaust.

Attempts have been made from time to time to reduce the amount of heat which would have to be absorbed by the exhaust, which efforts involved the use of large valves, and a timing of them such as would give to the exhaust the widest possible opportunity to escape. It is possible that in some of these motors the heat which must be absorbed by the radiator falls to a point considerably below 50 per cent. of all the heat represented in the fuel used.

In everyday practice, considering the problem as a whole, the cooling situation is complicated by the fact that flexibility is desired, and it is further influenced in view of the practice of the average autoist who persists in slowing the motor down by the process which involves the retarding of the spark. It is on account of this cooling problem that most taxicabs, for illustration, are so designed that the spark is fixed but the average efficiency with a fixed spark, while it will not be the maximum obtainable, will be better than that which can be realized if the chauffeur lacks ability to reason, and drives his car on a basis of cause and effect. The chauffeur soon learns that the motor will lose power when the spark is retarded, and the car will slow down in consequence; if his knowledge does not grow beyond this point, it will take a very extraordinary radiator to absorb the heat which will be given off by the motor, without causing the water to steam.

An overheated motor is incapable of delivering its maximum power, and if the condition of overheating passes beyond a certain point, the amount of power may reduce excessively. The pumping losses in a motor increase enormously with increases in temperature beyond a certain point, which losses may be subdivided in the manner as follows:

(A) The increase in temperature rarefies the incoming mixture, and the weight thereof will be decreased accordingly, so that the possible power of the motor will be lowered in consequence.

(B) The higher range of temperature will introduce lubricating trouble, and the friction loss will be enormously increased.

(C) If the condition of heating passes beyond a certain point, the piston clearance will reduce because the piston will swell faster than the bore of the cylinder will increase, and this con-

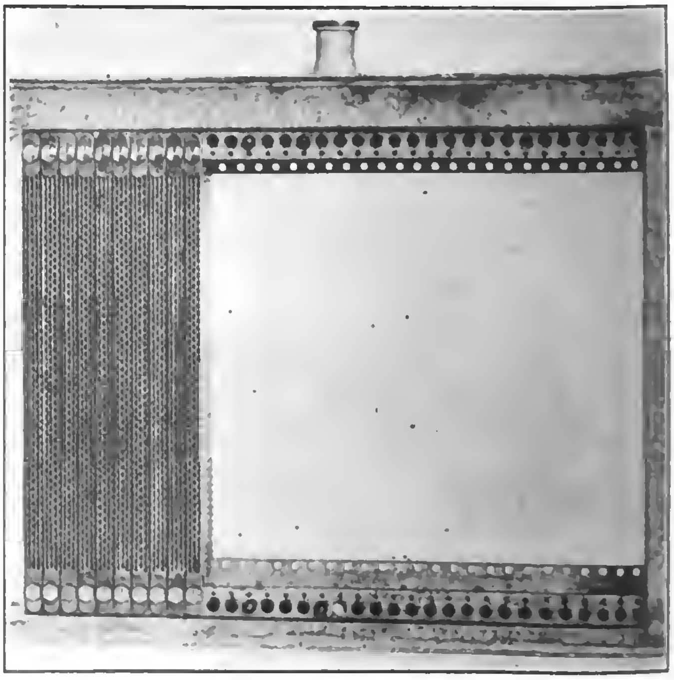


Fig. 2—Truck radiators are made like those for touring cars, the difference being in the size and shape

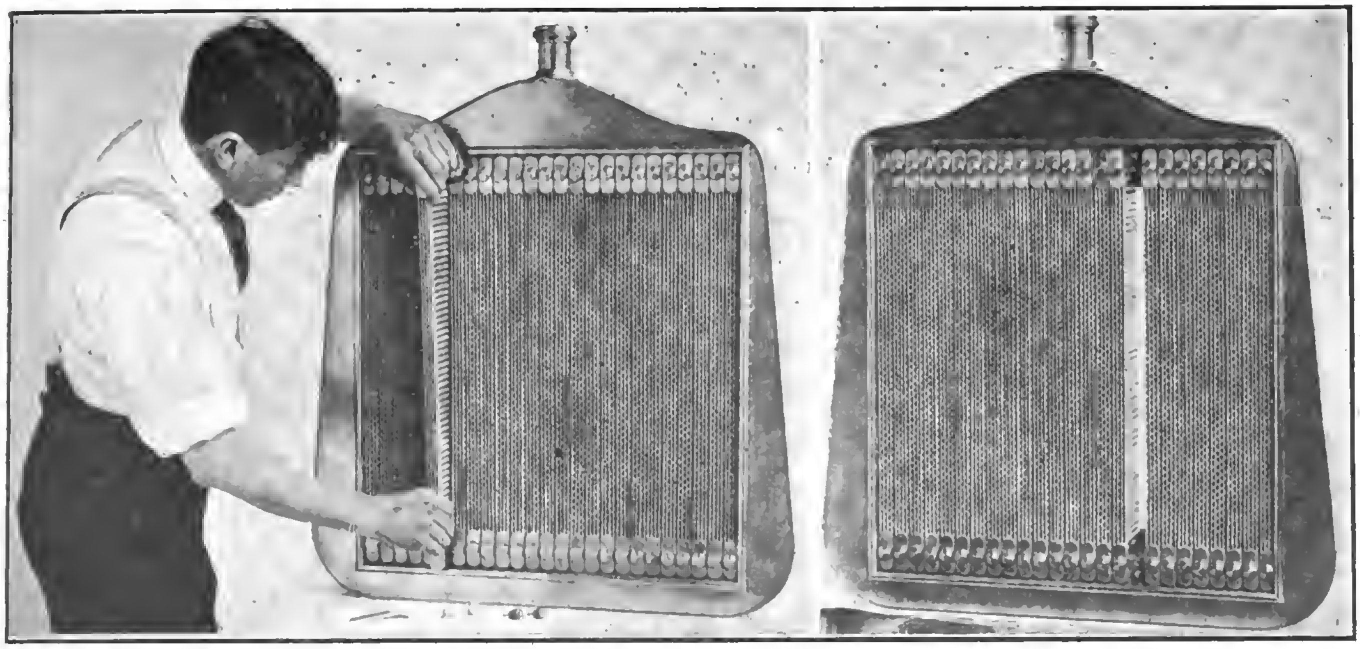


Fig. 3—Method of removing individual sections of the new radiator. At the right, appearance when a section is removed

dition may extend to a point of sticking of the piston.

(D) It is highly improbable that expansion due to heat will take place uniformly in all radial planes, and piston distortions will scarcely conform to cylinder distortions due to heat, so that there will be zones of excess pressure which will increase the pumping losses.

With these increases in pumping losses, the remaining sources of the same character of losses will be more or less influenced, and it is scarcely to be supposed that any motor will satisfactorily perform excepting when the temperature is properly regulated, and this condition will only obtain if the cooling system is maintained in good working order, provided it is properly designed in the first place.

Passing beyond the motor, the remaining important questions are tied up in the radiator and its construction, together with the means of water circulation. Considering a given motor, the size of the radiator will depend upon the rate of circulation of the water to a considerable extent, although it has been determined that the advantages derived by circulation cease after a certain point is reached. If the ratio of radiator surface to flame-swept surface in the cylinders is properly regulated, the circulation may be that ordinarily called thermo-syphon (natural circulation). Obviously, this character of circulation is relatively sluggish, and the ratio of cooler surface to flame-swept surface in cylinders must be adjusted accordingly.

If a pump is used, the size of the same may be anything, and the rate of water circulation may then be increased to any desired point, but, as before stated, it has been found that it does no particular good to increase the rate of water circulation beyond a certain point. As a practical figure, it may be said that 1 1-3 pounds of water per horsepower per minute will suffice for the average automobile if the radiator is well designed.

There is one point in this connection which does not usually receive consideration: if the amount of water present in the system is much restricted, steaming will transpire, due to the fact that the steam which is formed over the hot surfaces of the combustion chamber will not be afforded sufficient time and water in which to be condensed. Condensing takes time, and that steam does form over the dome of the motor cylinders has been shown. In designing a cooler, then, it is necessary to consider not only the surface exposed to the air draft, but the quantity of water which will be necessary as well.

In practice there is a further and disconcerting factor due to the deposit of foreign substances out of the cooling water, which deposit forms a coating over the wetted surfaces in the cooler, and this coating being almost a non-conductor of heat reduces the efficiency of the cooler enormously. The factor of inefficiency due to incrustation increases as the square of the thickness of the coat formed.

The idea of being able to demount the radiator seems to be a good one, since then the several sections may be treated separately, and by means of direct pressure it will be possible to eliminate the incrustation, and, as a further advantage, it will be possible to repair leaks which may develop in one or more of the sections. One of the important considerations is involved in the ability to remove a section with the car on the road and to plug up the openings, thus rendering the radiator sufficiently capable to serve for the purpose, even when one or more of the sections are disabled. This idea is here illustrated in which Fig. 1 shows the radiator complete, with means at the top and bottom of the sections by means of which they may be removed at will and through which they are held in tight relation at all other times. This type of cooler was developed by Rehringer Radiator Works, 83 Fulton street, New York City. Fig. 2 shows a form of this cooler designed for commercial car work, with all but 10 of the radiator sections removed, thus giving an excellent idea of the method in vogue. Referring to Fig. 3, the same cooler as illustrated in Fig. 1 is shown at the right with a section removed, and at the left with the process of replacement of a section under way.

The sections of this form of radiator are made up of flat copper plates corrugated to give strength and to increase service. Three of these ribbon-like water tubes go to make a section, and the means of holding the sections into place constitute a dowel pin at the top and bottom to the rear of the sections engaging a back plate. Water passes from the frame proper through the die formed, engaging terminals as shown in rows across the top and bottom of the cooler, and a tube inserts with a packing ring in concentric relation, so that the joints are made tight when the holding screws are pressed home. It is claimed for this new design of radiator that it has precisely the same radiating surface, volume of water, and other desirable conditions as will be found in the better types of radiators in general, and the scheme of design is such as to permit of the removal of any section at will, either for the purpose of repair or for the removal of incrustation. Every facility is offered for the quick removal of any one or all of the sections, and the means of packing at hand are such that tightness is bound to follow if the holding screws are pressed home, which is a mere matter of the vigorous use of a screwdriver in the absence of any great skill.

Aeronautic Progress Along Constructive Lines

By MARIUS C. KRARUP

LAST week a number of theses closely related to the construction of aviation machines were presented. Some of them were in agreement with accepted aeroplane theory and practice, but others were at variance. This rapid, introductory presentation of theories or statements all of which are not above debate, is continued in the following. The most unorthodox among them are capable of defense in the present state of technical knowledge of the subject. If some of them should provoke observing readers to the expression of contrary opinion, there would be gained an acceptable basis for a more thorough discussion, from which in the end a stock of real data on aeronautic engineering may be laid by. The many shortcomings still attaching to aviation machines make it a foregone conclusion that no set of theories which would at present seem acceptable to all, even the best informed, can have any chance of being found correct or complete later, in the light of the developments and improvements which are to come.

If the balancing and safety of aeroplanes were to depend on a watchful control action, necessarily following rather than forestalling the disturbing influence—since the latter always takes the form of invisible air currents or eddies—the chances for aviation becoming a practical form of transportation would be removed to a dim future, but the introduction of flexible elements in the planes will place this matter of safety on a new footing. As it has been shown that an aeroplane can be jolted out of balance by gusts, it is just as certain that it will require a flexible and resilient suspension, as that an automobile requires springs. But the reasons are more numerous and urgent, because the aeroplane "springs" will not only smooth the road and preserve the balance but will also harden the road; that is, make the planes more efficient as supporters of weight. The theories and mechanics on this point are intricate but interesting.

With the aeroplane machine a rigid construction, as it is today, any control device which shall give hope of enabling the aviator to right the structure after its equilibrium has been disturbed, must be extremely quick in action. The loss of equilibrium places gravitation in charge of the machine for the moment. Consequently, the control device must be actuated by something much quicker than gravitation, such as is brought into play by shifting of weights. Muscular activity is such a quick-acting force only if the recoil from the push or pull does not counteract the intended control movement by shifting the weight of the operator's body in the wrong direction. It is best to spend the reaction from a muscular control effort as a strain to separate two rigidly connected portions of the structure. In some machines these reactions from control movements are very properly spent in a strain reaching from the footrest through the aviator's body to the back of the seat.

But all control is still a makeshift. Quick action is sought in placing the control planes a considerable distance fore and aft of the main plane or planes, so as to give them long leverage, but the same provision also gives a gust of wind acting upon the control planes a long leverage to upset the machine.

It is doubtful if the balance of an aeroplane, once lost, has ever been regained by means of the control apparatus. The latter consists only of rudders, and the action of rudders depends on speed, and this speed must, moreover, be very nearly in the direction of the rudder's normal extension. If the upsetting force jolts the machine more than twenty degrees away from its normal poise in the atmosphere, while its momentum perhaps still carries it on in its previous direction, or if the jolt in any way stops its progress, the present control apparatus is useless. Automatic stability, probably by means of flexible and resilient elements in the planes and reinforced by a low center of gravity—though the latter is wholly superfluous during normal flight—is therefore absolutely predestined to engage attention.

The relative merits of biplane and monoplane are most clearly shown in the fact that nobody has succeeded in building a flying monoplane so large or so heavy as biplanes are frequently made, although materials and workmanship have so far been more select in monoplanes. To get both surface and strength in the monoplane it has been necessary to broaden the plane, fore and aft, and this produces irregular shifting of the centers of pressure or support, as planes are made at present.

To hold these broad planes to a regular tilt, despite their naturally fitful action, it has been necessary to provide long tails and to have these tails so heavy as not to be self-supporting in flight. This provision, again, has reduced the advantage which the monoplane would otherwise intrinsically have over the biplane by virtue of smaller air resistance per square foot, by compelling the monoplane to be operated at higher tilts. Probably the higher tilts are responsible for the impression that a monoplane can support more weight per square foot than the biplane.

On the other hand, if the tails are made nearly self-supporting by means of attached surfaces, they become a source of danger in blustering weather. If too heavy, they are dangerous if the motor is stalled. But all these relations between monoplane and biplane are subject to change the moment the stabilizing tail becomes superfluous; that is, when means are found for equalizing pressures under broad planes or planes placed tandem.

The principal requirement in this respect must be to break up the irregular eddies which are known to form under broad planes, or, rather, to cause them to be formed as a large number of small and well-distributed eddies of resistant air, instead of as unruly little tornadoes shifting from one point under the plane to another. And it seems instructive to note that irregularity is most pronounced under flat planes and under broad planes, while curved planes and narrow planes are more manageable. A strongly curved plane may be made broader than is advisable for a plane approximately flat. This has been abundantly demonstrated to hold good for present conditions, and furnishes a clue for the inventive faculty.

In the writer's opinion—and doubtless the same idea works under shroud of silence in many other minds—planes will eventually be made to consist of a rigid front portion, comprising about one-third of the plane's width, and a larger, more or less elastic rear portion, capable of yielding to excessive local pressures and causing the center of support to be maintained steadily under the rigid front portion, and that about one-half of the area of the planes will be covered with small, shallow air pockets, which will take the place of pronounced curving of the whole plane, without involving nearly so much air resistance against propulsion. A development of this description, while not plainly foreshadowed in the facts so far ascertained in connection with the flight of aeroplanes, is consistent with all these facts, inasmuch as none of them excludes it.

The monoplane when no longer requiring to be ballasted by means of a tail to prevent it from pitching, will be the natural small-size and light-weight flier. It may readily be made compact for storage, and fast, but no reasons have ever been offered for abandoning the belief that the biplane will always be the better carrier of weights. Bridge construction presents a parallel which few engineers would consider short of conclusive in this respect.

While on the point of probable improvements in the fundamental characteristics of planes, whether for monoplane or biplane machines, it seems necessary to call upon the soaring bird to furnish contributory evidence to the effect that some one law closely related to aeroplane action still remains unrevealed and unapplied. On the basis of accepted theories, only a rising air current can explain soaring, and the explanation is very lame at that, weights and speeds of birds and air currents all considered. But then comes, moreover, the fact that small birds cannot soar; that is, not without previously gained momentum. And, in small birds, the wing and tail area is larger in proportion to their weight than in large birds. Soaring should be easier for a small bird, such as the swallow, than for the buzzard or the stork, if the accepted explanation were complete. On the other hand, if the explanation is insufficient, fundamental improvements in planes, imparting to them something akin to capacity for soaring, must be possible, and must eventually be developed.

Most analogies between birds and aeroplanes are unscientific, as when the shape of a bird's wing is imitated in the planes. The lack of essential similarity in methods of flight and properties of materials vitiate the comparison. The dihedral angle, as in Latham's monoplane, is praised as safe on the ground that many birds sail with their wings held V-like. Dissection, however, lays bare, in some birds, a bony projection which offers a simple mechanical explanation of the V-shape as one which can be maintained without muscular effort.

The concentration of weight at the middle of an aeroplane seems to be an unconscious imitation of bird construction, since it is evident that the biplane truss, resting on air with its entire length, would be stronger, or could be built lighter, if weights were more evenly distributed, and that it would also be more steadily balanced in the atmosphere, as a gust of wind, attacking one end of the structure, would not find so long a lever for upsetting the machine.

The required strength of the machine, when resting or propelled on the ground, rationally calls for a construction balancing the weighty parts over the skids or carriage foundation. By broadening this base, the engine, fuel supply, passenger load and propellers could be disposed of, as now done only in Wright biplanes to some extent, so as to increase the strength or reduce the weight of the structure considerably, though the builder would also have to consider the uniform distribution of air resistances.

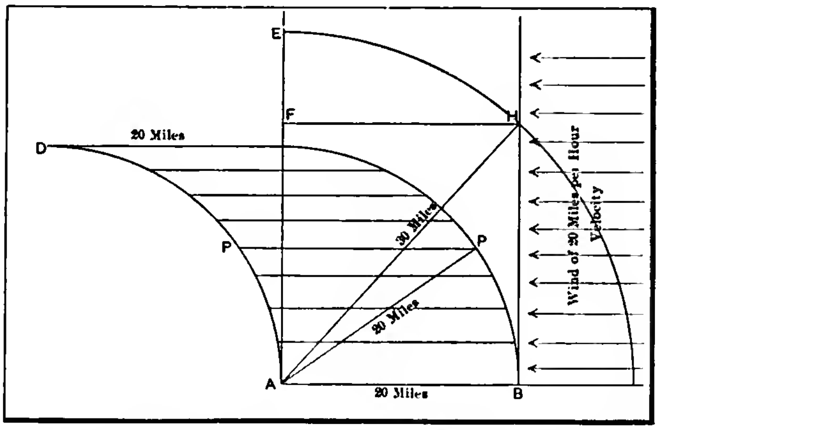
Fluttering or an apparently unstable or imperfect equilibrium during flight may be due to the use of flat ailerons for steering purposes, to lack of rigidity in the front edge of planes, to flat and rigid lift rudders, to lift rudders placed too low and out of line with the propulsion, to baggy planes, to operating flat planes at tilts above 15 degrees. Only under abnormally severe atmospheric conditions may it be due to a high center of gravity.

The Dirigible Balloon Without Gas

Every improvement of aviation machines which cleave the atmosphere alike to the bird, reduces the ultimate value of dirgible balloons, as the common-sense mind has already easily perceived without technical demonstration, but for the present the buoyancy of the dirigible still lends it certain advantages of safety under difficult weather conditions and possibly some superiority for reaching very high altitudes. These have endeared it to the military authorities, and its capacity for carrying considerable loads or a number of persons with much more body comfort than the aeroplane affords, has been so prettily developed in the Zeppelin type as to keep the question of the further perfecting and utility of dirigibles alive and open.

By arranging the great bulk of his buoyancy chamber in highly elongated form and adopting mammoth dimensions as the only means for attaining a rigid construction in combination with a low specific gravity, Count Zeppelin seems to have almost exhausted the possibilities of the dirigible balloon as a traveling machine, and by compartment division of his gas reservoir—much facilitated by its rigidity—safety has been much increased. It is hardly consistent for constructors of aviation machines to pooh-pooh the competition of the Zeppelin type of air craft, on the ground that it will never be able to navigate with any considerable degree of independence of currents in the atmosphere in which it is suspended and of which it forms a part by its bulk and buoyancy. It is easily demonstrated by a diagram that a Zeppelin machine capable of just holding its own against a headwind blowing twenty miles per hour cannot do any better against a sidewind of the same velocity, contrary to common opinion which credits it with a capacity for tacking up against unfavorable air currents. As the diagram shows, this capacity only begins when the speed of the machine is superior to the velocity of the wind. But a salmon, for example, that braves the currents of the Columbia River and even jumps against cataracts, affords a striking demonstration of ability to navigate though completely suspended in a medium of the same specific gravity as the operating machine. The questions involved are only those of power and strength of construction. The salmon has these properties in relation to water, and the dirigible balloon may acquire them in relation to air. If Zeppelin's propellers were twice as efficient as they are, his machine's ability to navigate against air currents would be immensely multiplied, provided the envelope of his reservoir would be able to withstand the much increased pressures to which it would be subject.

The engineering possibilities of the dirigible are, consequently, still attractive, and new ideas in this connection are not to be ignored. One of these relates to the use of a partial or nearly complete vacuum to take the place of gas. This budding idea is strictly a development from Zepperlin's success in attaining rigid construction without excessive weight. It is reasoned that it should be no more difficult to make the panetela-shaped reservoir strong and tight against an evenly distributed crush from the atmosphere—with diminishing pressure in the upper strata as an important incidental advantage—than to give it the properties required for holding hydrogen and at the same time rigidity against wind pressures. The vacuum would remove the danger of conflagration now due to the proximity of a hot engine, hot exhaust and possible gas leaks, and, most important of all, the buoyancy could be produced or enhanced by the engine power in any place, independently of such special facilities as are required for filling a balloon with illuminating or hydrogen gas. A semi-vacuum would be about equal to illuminating gas as a buoyant and would involve a pressure of only 7½ pounds per square inch. Leaks would be less liable to occur with pressures converging to the axis of the construction than in the gas balloon in which the pressures radiate from the axis and tend to expand materials. And a construction capable of withstanding 7½ to 15 pounds of pressure from without could probably be conveniently kept tight by repair work carried on while the structure is in the air, and any desired degree of vacuum, even varying according to the altitude, if desired, could be maintained by connecting exhaust pumps with the engines. From another source it is suggested that some of the methods employed for producing liquid air would be found of advantage for exhausting air from the reservoir.



Action of dirigible in side wind, of 20 miles per hour. Maximum speed supposed to be 20 miles per hour, and machine headed for any point as P in curve B C, but after one hour of travel it can do no better than reaching the corresponding point as P in curve A D. But when the speed of the dirigible is increased to 30 miles per hour, it can be headed for point H, and will land at F, after one hour; and F is in the desired direction of travel.

Adjusting the Carbureter—for the Novice

By HERBERT L. TOWLE

ADJUSTMENTS are many and various, hence it was an impossibility to close the subject out last week, in fact, it was cut off somewhat abruptly in the midst of a discussion of springs, spring winding and spring tensions. This subject is of vital interest, for not only does the amateur want to know about it for repair purposes, but a full knowledge of it will avail for correcting defects in springs sent out by the makers, as well as helping very materially in case of trouble, in that it allows one to make a better and more rapid diagnosis of the trouble.

In winding a new spring with more turns, it is best to start with too many and shorten the spring by degrees till it is right.

In the foregoing it has been assumed that the float has been correctly adjnsted. It is wise, however, to satisfy one's self on this point before altering the spring. A slight drop or bead of gasoline on the spray orifice is permissible when the car is at rest on a level floor. If the level is too low, extra suction will be needed to lift the gasoline. If, however, it is too high, the gasoline will drip. Changes in the float valve adjnstment must be very carefully made, as it is very easy to over do them, particularly when the float has a long leverage on the valve. Instead of adjnsting the needle valve to raise the gasoline level, one may add weights to the float. If the float is hollow copper or brass, it is easy to add a drop or two of solder. If the float is cork, a bit of lead or brass may be screwed to it and shellacked over to prevent gasoline from soaking into the cork. If the float is of snch form that a single weight will cramp its action throngh lack of balance, two or more weights equally spaced around it should be nsed.

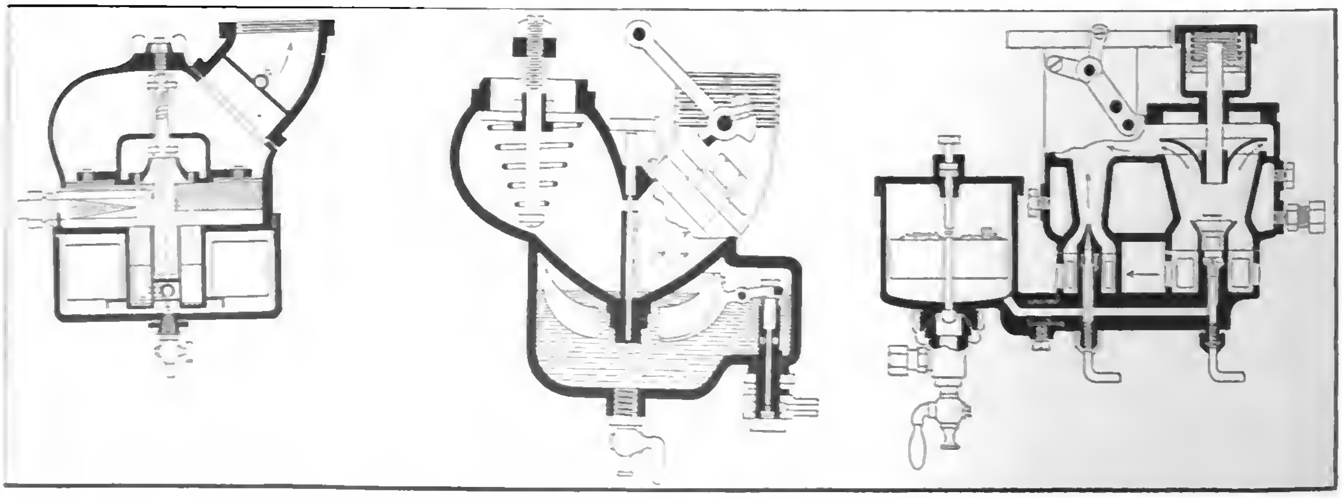
Many carbureters have the float annular and surrounding the spray chamber. The object of this is to prevent tilting of the carbureter on changing the gasoline level at the nozzle. Where the float chamber is offset from the spray chamber it is preferable to have the float chamber forward of the spray chamber, so that the gasoline level in the latter will be higher when going np hill. This will automatically increase the gasoline supply on grades when it is most likely to be needed and reduce it down hill.

To avoid the complexities of the automatic air valve, some carbureters are made with the diluting air inlet connected directly to the throttle, so that opening the throttle opens the pure air inlet. With this arrangement the pure air is not admitted till the throttle has begnn to open, so that with a low throttle opening all the air comes past the spray nozzle. Fig. 1 is an example of this type. The throttle serves a double function, nncovering the pure air inlet at one end. The air thus admitted goes through the body of the throttle, which is annular in shape, and mingles with the carbureted stream at the throttle opening. The difficulty with this type of carbureter is that it does not take account of the varying degrees of suction possible to an automobile without change of throttle opening. For example, one prefers the throttle wide open when going up hill, but to open it wide in the carbureter just mentioned would be to dilute the mixture excessively. Again, when running down a slight grade with the throttle barely open, the mixture would be too rich.

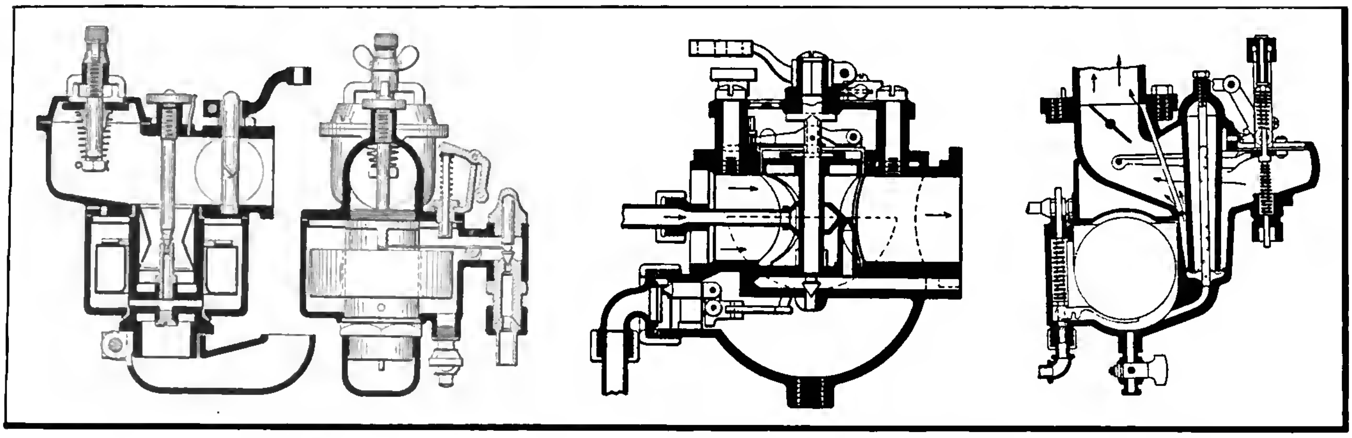
What is known as the puddle type of carbureter has been offered in the last two years, as an escape from the complexities of the air valve carbureters with three or four adjustments. In this carbureter the float is annular, and the mixing chamber is U-shaped with its lowest point constricted and depressed into the center of the float chamber. An orifice at the lowest point of the mixing chamber permits gasoline to come up into the latter, forming a small puddle when the engine is at rest, whence the name of the carbureter. A needle valve controls the orifice, and the float is adjustable to regulate the gasoline level, and therefore the depth and size of the puddle. There are no other adjustments, and all the air passes through the single U-shaped mixing tube.

The theory of this carbureter is that at low speeds no suction is required to feed the gasoline, since gravity tends to keep the puddle full. The liquid gasoline in the puddle is swept upward and along the walls of the induction pipe, and evaporated on its way to the engine. At medium speeds the pnddle is wiped out, but the flow is still assisted by gravity. At high speeds the action is practically that of the ordinary spraying type. In practice, carbureters of this type work very successfully through a limited range, which perhaps is as great as the range of the average engine. If, however, the engine is exceptionally flexible its demands may exceed the automatic range of the carbnreter, with the result that the mixture is strangled and overrich at high speeds. If a larger carbureter is substituted, it works well at medium to high speeds, but not at low speeds, owing to the gasoline and air not being sufficiently mingled. By attaching an auxiliary air valve to the intake between the carbureter and the engine this limitation is overcome. In other respects the carbureter is extremely simple and easily adjusted, although considerable nicety is required in getting the gasoline level exactly right.

The foregoing paragraphs have dealt only with the absolnte proportions of gasoline and air, and have assumed that whatever gasoline the carbureter delivered was diffnsed and burned. In reality both of these assumptions may be wide of the truth,



Group of Modern Carbureters, Showing the Variations in Construction. Duryea, Bennett and Willet



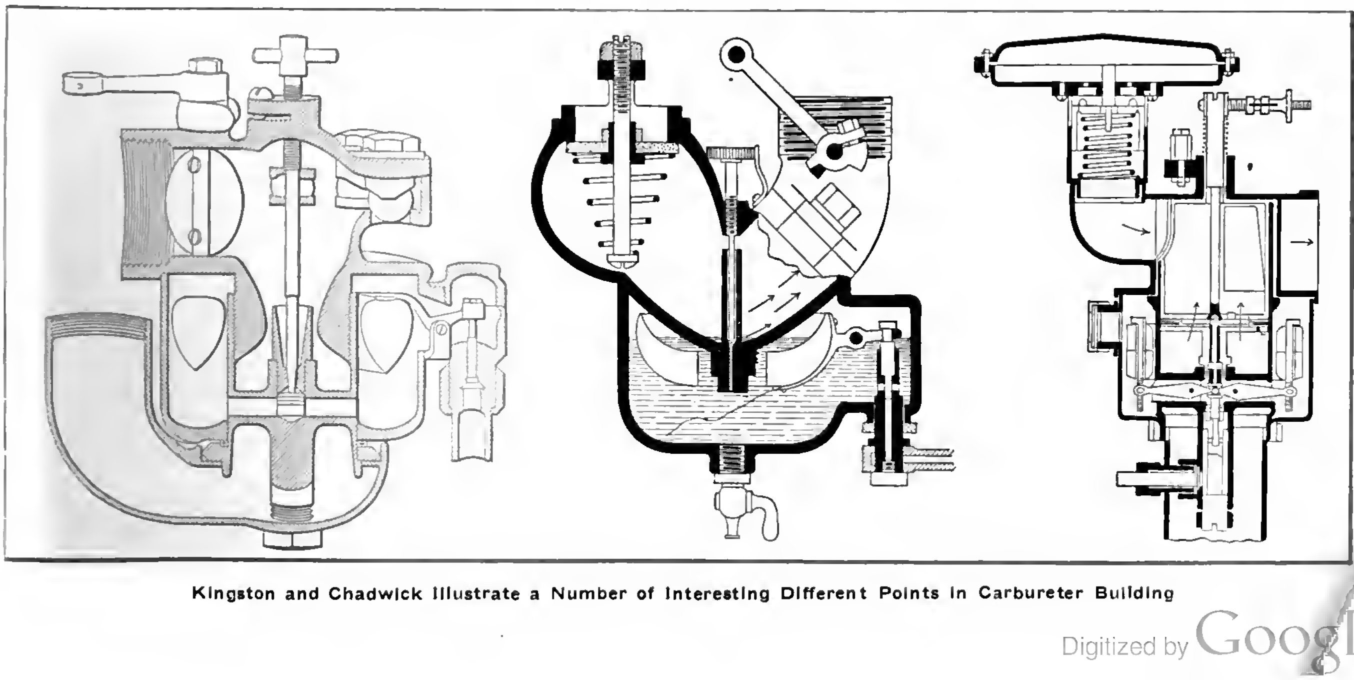
More Examples of Modern Carbureter Construction. On the Left Breeze. On the Right Carter. Between Anderson

especially in large carbureters with a single spraying orifice. At low speeds the gasoline may not be properly broken up by the air stream. At high speeds, while broken up, it may not have time to evaporate and diffuse. It is certain that with a large proportion of the carbureters in common use some of the gasoline fails to find its necessary quota of air for combustion, and therefore goes through the engine unburned. The first difficulty, that of atomization, is partially met by having two or more separate spray nozzles of graduated sizes, of which first one, then another, comes into action. Such a carbureter was shown in Fig. 4, last week, in which *A* is the main throttle and *B* the auxiliary throttle. The two throttles are linked together in such a manner that *B* remains closed till *A* has opened sufficiently to take as much mixture as the small spray nozzle can furnish.

The question of converting liquid gasoline into vapor and commingling the vapor with the air is not simply a question of atomization, but also of heat. Gasoline evaporates rapidly, but it absorbs heat on doing so. So far as it is in spray form this heat is readily supplied by the air itself; such, however, of the gasoline as forms a film on the walls of the induction pipe is best evaporated by heating those walls, and the conventional water-jacket of the carbureter itself is by no means sufficient for this purpose. Recently various automobile builders have adopted the idea of drawing the mixture through a cored passage in the cylinder casting on its way to the intake ports. A still better plan appears to be to introduce the diluting air after the gasoline vapor and primary air stream have been thoroughly mingled. This involves placing the auxiliary valve as close as possible to the cylinders, for example, at the branch of the intake manifold, with the throttle so placed as to compel intimate commingling of the pure and carbureted air streams. The pipe from the carbureter to the throttle is then hot water-jacketed, or else the primary air stream itself is highly heated and a very rich mixture produced. The diluting stream is then sufficient to cool the mixture so that power will not be lost by needless rarefaction of the charge.

The problem of atomizing the gasoline has been approched from another angle in several devices comprising essentially rotating fan wheels which were supposed by their rotation to commingle the air and gasoline. The early devices of this sort appear to have been failures, for the simple reason that while the fan rotated the air column passing through, it did not. It would have been more logical and effective to make the fan stationary. Recently, however, the fan has been used in a different way, as a means of imparting rotation to a coarse-wire screen through which the mixture passes, and which by its violent rotation breaks up any liquid particles of gasoline impinging on its meshes.

Whatever the ultimate solution of the carbureter problem may be it is certain that much less gasoline will be found necessary than is to-day required by the average car. Such feats as the running of a 35-horsepower six-cylinder car 20 miles in an hour on a gallon of gasoline have been performed. We all know when our cars are tuned in some certain manner, whose exact theory we may be unable to trace, they will perform prodigies of flexibility and hill-climbing feats within a certain range of speeds. The carbureter of the future will certainly duplicate those feats through a much wider range of speed, as wide in fact as the construction of the engine is calculated to permit.



Kingston and Chadwick Illustrate a Number of Interesting Different Points in Carbureter Building

BROOKLANDS EASTER MEETING

LONDON, Apr. 2.—The first combined motor and aero race meeting was held at Brooklands track on Easter Monday, the combination bringing out a large and enthusiastic gathering. The flying machines had only one event, it is true, but five aeroplanes turned out, including monoplanes, biplanes and a single triplane. The winner was Mr. Maunders, who covered the half mile with his Bleriot monoplane in 52 seconds. Rather an ignominious ending greeted his performance, for just after passing the post, he collided with a large garden roller and smashed his left wing.

Of the car events, the principal features were the high speeds attained by the small cars and the general tendency toward the use of special boat-shaped bodies, in order to diminish the wind resistance. It was essentially a day for light 4-cylinder cars.

There were seven races, including the first and fifth, which were for motorcycles. The second was the Easter Junior Handicap, distance 5 3-4 miles, for cars of 25-horsepower R. A. C. rating and under. Then there were the Raglan Cup, 16-horsepower and under, at 8 1-2 miles; the March Handicap, less than 18-horsepower, at 11 miles; the Easter sprint race, at 2 miles, for cars which have been timed to do laps at a rate of 80 miles per hour, and the first 21 rating race at 8 1-2 miles.

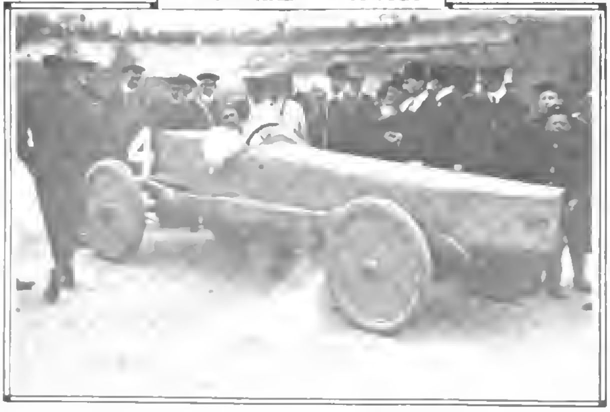
The 20-horsepower Vauxhall (with four-cylinder engine, 90-millimeter bore) carried off two of the races, its best speed being 81 1-2 miles an hour. The next fastest winner was a 24-horsepower Vinot, which could only record 67 1-2 miles per hour.

Racing cars were conspicuous by their absence, and the only big chap to put in an appearance—a 120-horsepower Mercedes—spoilt its chance each time by a fierce clutch, which stopped the engine at the start.

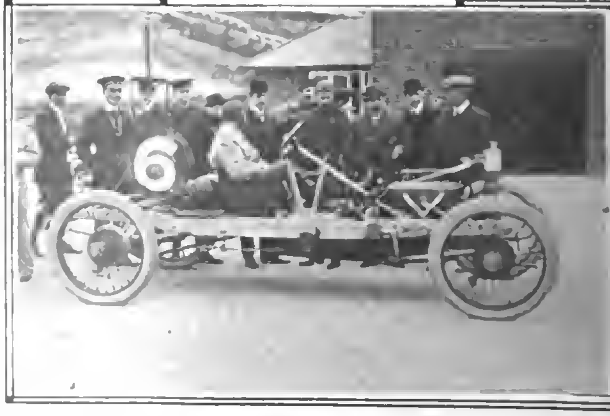
Dr J Warren Davis on His Jackson Car

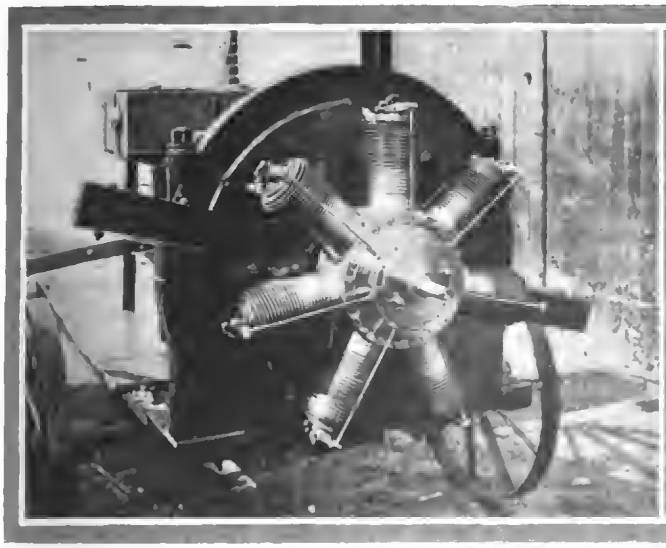
M Hancock and His Vauxhall Winner of 4th and 6th Races

Full View of Hancock and Vauxhall Winner



H W Bashall on 20 1 Vauxhall Winner 7th Race





Gnome Aeronautical Motor Being Tested Out of a Test Stand, Showing Peculiar Appearance at High Speed

A. C. F. Gives Up Its Aero Cla'ms

Paris, Apr. 4—After securing a date on the international program for a big aviation meeting at Rheims, together with a cross-country flying match from Rheims to Brussels, the Automobile Club of France has abandoned the entire project. It has decided, however to devote the $40,000 originally promised as prizes to the encouragement of aviation, the sum of $30,000 to be given to the first aeroplanist flying from Rheims to Brussels, a distance of about 180 miles, and $10,000 to the first airship making the trip from Paris to London.

It is not merely a change of program that the Automobile Club has made, but a practical abandonment of its claim to be an aeronautical authority. It fought hard to get a date on the international conference for what was practically a second edition of the Rheims meeting. England wanted the same date for a meeting at Bournemouth and secured it from the International Federation, but the French authorities tried to overrule the Federation, persisting in their date and menacing aviators with disqualification if they took part in the English meeting.

Difficulties arose a few days ago when it was discovered that the committee of the Automobile Club of France has not voted the sum of $100,000 originally spoken of as prize money. Indeed it appeared that while the other organizers had been obliged to give guarantees that they possessed the necessary prize money, no such precaution had been taken with regard to the Automobile Club, although the promises had only been made on the authority of individual members. A meeting with $40,000 prize money costs at least $50,000 to organize, with a doubt as to this sum being exceeded in receipts. The club was not disposed to risk such a big amount, and in order to save its honor proposed to offer $40,000 for the encouragement of aviation, without organizing an event itself.

The offer has not been received very graciously. If the Automobile Club can withdraw after giving a formal promise to hold a meeting, there is no reason why any other association having secured dates should not offer its total prize money in one sum for a trip from Paris to Pekin. The airship prize will not encourage anybody, for it will be taken by either Clément or Lebaudy, both of whom are building airships for England which must cross the Channel before being purchased. Without an organizer at the back of the Rheims to Brussels race the event is not of interest. To win it will necessitate a sum equal to the prize, for a 180-mile flight cannot be made without serious preparations.

Dubonnet, Pilot of a Successful Monoplane, Known as Cellier

Cellier Monoplane, Showing Panhard Engine

Traffic Problems in Big Cities

IN VERY big cities, like New York, Chicago, and London, many of the problems of traffic, street cleaning, sewerage, and the like, which are insignificant in smaller places, become almost insurmountable. So, it is, in particular, with the traffic problem. Of the cities mentioned, London has perhaps taken up the automobile to a greater extent than any of the others. For this and other reasons, anything pertaining to that subject is always interesting to those connected with the automobile business.

Consul-General John L. Griffiths states that a suggestive report has just been published by a section of the British Board of Trade on a subject of perennial interest—London traffic. This leads Mr. Griffiths to review the subject:

The primary difficulty in handling the enormous and constantly increasing traffic arises from the manner of London's growth through the centuries. It was not laid out as Washington was, for example, according to a definite plan, but developed in this direction or that in response to the immediate pressing needs, and until recent times with little regard to future requirements. The result is an extremely picturesque city, but not one altogether adapted to the transportation needs of its vast population.

It is proposed now to make an extensive survey of the traffic necessities of the city, taking into consideration its possible future expansion with the view of establishing great arterial traffic thoroughfares for the purpose of relieving the congestion at the center, and of furnishing adequate communication between the center and the outlying districts. To show the need of such thoroughfares it is only necessary to mention that while there are 102 miles of boulevards and avenues 98 1-2 feet or more wide in Paris, London has only 8 1-2 miles; and while Paris has 42 roads radiating into the country, London, with a population twice as great, has only 20, and ordinarily they are narrower than the French roads.

The proportions of the London traffic problem are shown by the fact that 87,934 new buildings were erected in the county of London (the city embraces the entire county and portions of other counties) from 1897 to 1908, and by the further fact that in the same period 148 miles of new streets were laid out.

Additional Population—Passengers Conveyed

It is estimated that by the middle of the present year the population of greater London will number 7,500,000 people, of whom 4,873,000 will dwell within the county of London proper, and 2,627,000 outside. Upon a conservative estimate an annual addition of 100,000 may be expected to this population.

The experience of London is similar to that of all other great cities in that for many years past the population of the outer area has been increasing much more rapidly than in the central districts, and the difficulties of the traffic situation have been thereby seriously augmented. The following table shows the number of passengers carried from 1903 to 1908, inclusive, on the local railways, tramways, and principal omnibus lines, together with the average yearly journeys per individual:

Year	Local railways	Tramways (approximate)	Omnibuses (principal companies)	Journeys per head
1903	290,722,680	394,356,531	287,386,471	142.9
1904	298,638,750	431,813,839	288,965,214	147.6
1905	305,052,495	477,944,684	290,665,051	152.2
1906	329,521,648	508,700,269	291,563,048	158.8
1907	356,233,666	589,745,792	275,479,000	169.3
1908	399,666,339	638,013,841	340,000,000	183.1

It will be seen that the total number of passengers conveyed in 1908 was 1,377,630,180, as against 972,465,682 in 1903. The total number of passengers carried in 1881 was only 269,662,649. These figures, however, are not complete for they do not include the cab traffic, nor all of the omnibus traffic, and neither do they cover the great suburban traffic of the trunk railways.

Suburban Movement—Residential Figures

The average length of the individual journey is increasing as people move farther and farther out. The development in the facilities of transportation have not kept pace with the growth in population, and the time is approaching, it is predicted, when the increase of travel and the outward movement of the popu-

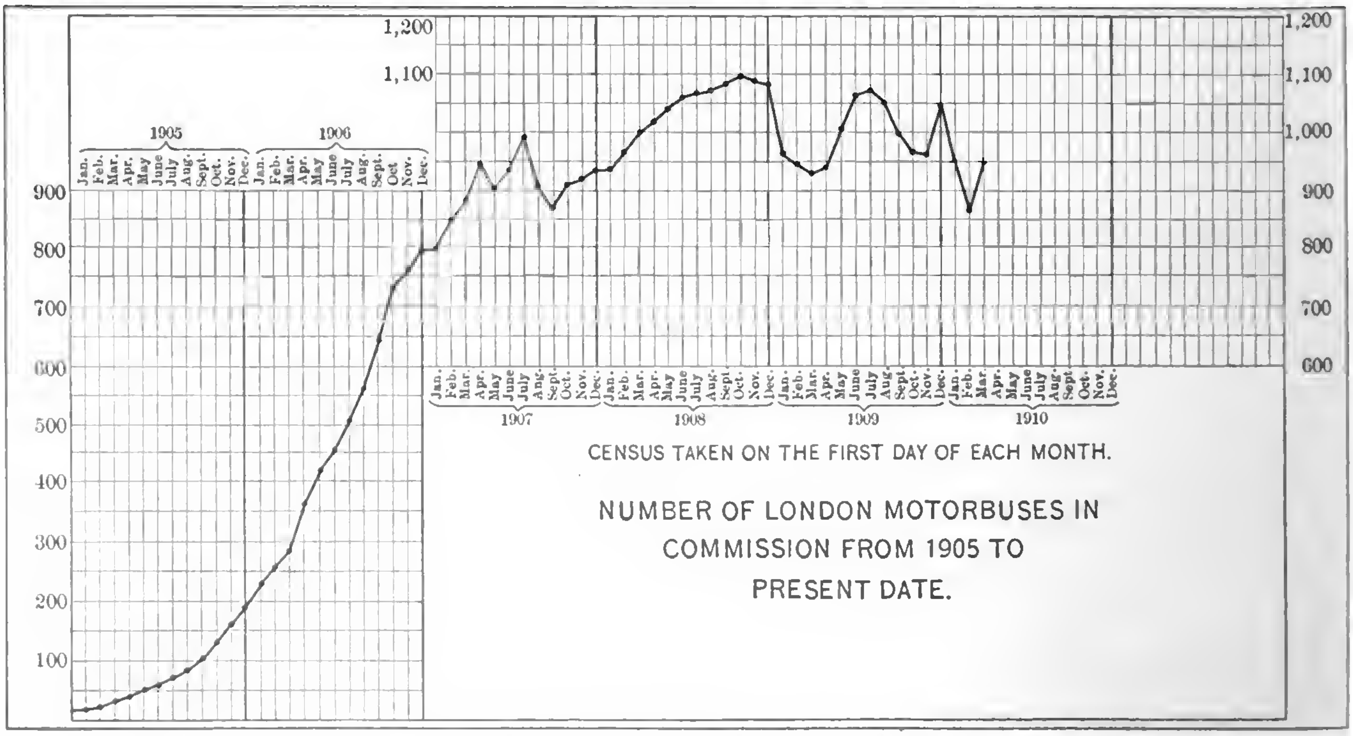


Diagram Showing Variation in Number of London Motorbuses in Service at Varying Times from 1905 to Date lation will each be checked unless provision is made to keep such facilities abreast with the growing demand.

While there were 43,538 empty houses and tenements in 26 of the 28 metropolitan boroughs of London in August last, there has been phenomenal increase in the population—in the past decade especially—of almost all of the outlying or suburban districts. The table below shows the shifting in traffic during the last few years, the figures given being those for eight selected points in a single day in a thickly populated residential portion of the city of London:

	1903.	1905.	1908.
Two-wheel cabs	5,114	5,260	5,042
Four-wheel carts	15,543	16,994	19,665
Private horse vehicles	43,790	47,833	29,967
Horse omnibus	32,790	32,661	15,216
Motor omnibus	......	537	10,914
Cycles	7,509	11,717	18,002
Private motor cars	1,064	3,260	6,961
Commercial motor cars	168	219	1,163
Taxicabs	......	......	19,718
Total vehicles	105,978	118,481	121,648
Foot passengers	354,983	309,137	329,985

The significant feature of this table is the striking increase in five years of the use of motor omnibuses, private motor cars, commercial motor cars, and the taxicabs.

Tramways Versus the Motor Bus

Tramways, as far as London is concerned, it is believed, have practically reached their limit of development, but the motor omnibus is probably only in its infancy. In narrow streets the speed of the tramway is greatly reduced, and municipal authorities, it is stated, have been compelled to appeal to ratepayers to patronize their own tramways. In the case of the omnibus, if a

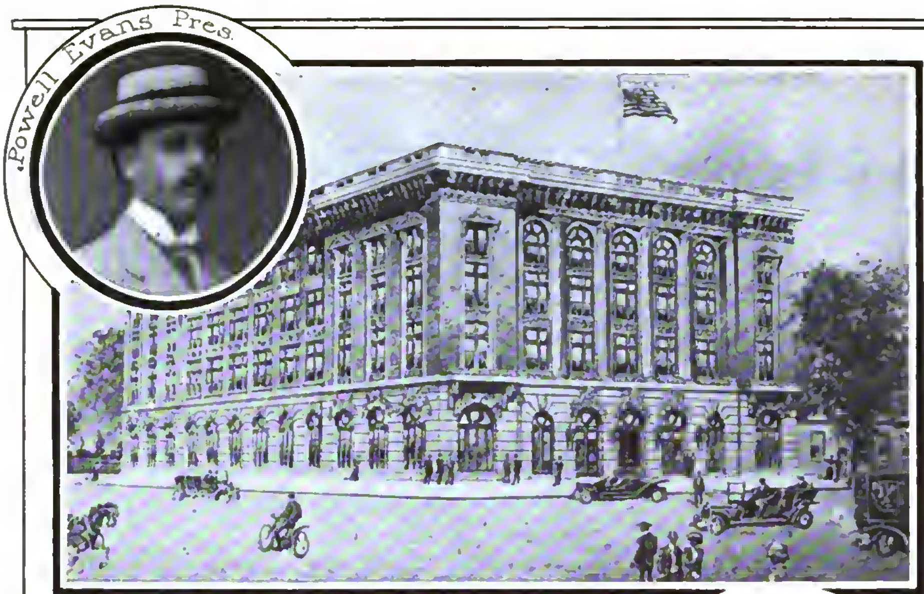
Data of Acceleratio

ENGINEERS are usually such busy men that little opportunity is offered them for original tests and other research work. So it is that there is a marked scarcity of data available on the pert subject of acceleration and braking tests of automobiles. For this reason any scrap of knowledge pertaining to this subject is carefully treasured, and with that as an excuse, the following remarks from an English contemporary (*Motor Trader*) are reproduced:

A correspondent has given some data from measurement tests of acceleration in starting and of retardation by braking that have some interest to the motor vehicle user. The writer tested steam and electric tube trains and tramcars, as well as motor buses and motor cabs. The readings were taken from an Elliott accelerometer and due allowance was made for gravity effect whether for starting or stopping. On the motor-omnibuses tested the starting acceleration varied considerably, but a typical case was 2.5 ft. per sec. per sec. on the first speed, 2.0 on the second, and 1.5 on the third. In each case the acceleration fell off quickly as the omnibus gained speed. Motor cabs, the author says, start at almost any figure, and the effect is more of the nature of a jerk than a steady acceleration. This is due to the sudden liberation of the kinetic energy of the rotating clutch and engine parts when the clutch is let in. The maximum steady acceleration observed was 4.0, but it rapidly fell to 2.0 and more slowly from that figure as the cab got up speed.

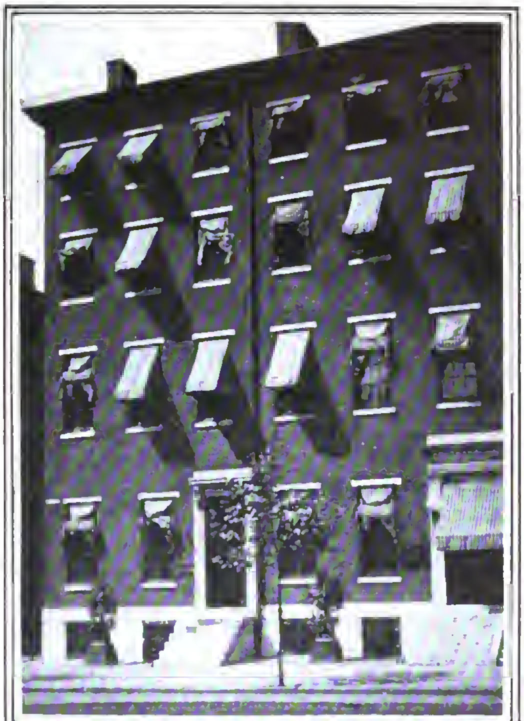
The starting acceleration of motor cars of high power was found to be more difficult to read. The acceleration was determined by measuring the time taken to get up to a definite speed (as read on the speedometer) and by dividing this speed (in feet per second) by the time taken in seconds. The resulting figure was the average acceleration in feet per sec. per sec. With a touring car fitted with a limousine body, the average acceleration at starting was found to be about 3.0, but on a light five-seated car figures as high as 7.0 were read,

AUTOMOBILE CLUB of PHILADELPHIA



Proposed Club House and Garage


Dr. D. Braden Kyle


Present Quarters


W. O. Griffith


J. J. Seeds

THE pioneer motoring organization of the Quaker City, the largest body of its kind in that part of the country and one of the largest in the United States, is the Automobile Club of Philadelphia. Without any fixed sporting feature, save the Brazier trophy run, which has expired by limitation on account of the permanent winning of the plate by one of the members, the club has rolled together a membership of nearly 1,100, and thus presents a formidable force in the field of influence as a legislative factor.

The club roster includes the names of many of the leaders of the Quaker City in finance, business, professions, and in the social world. Its single object is to advance the cause of the automobile as a pleasure vehicle, and under this general principle all the various heads and subdivisions of activity in the interest of the automobile are included.

The automobile trade is subordinated to the automobile in the life of the club, despite the fact that an appreciable section of the membership is identified with that trade. It is said that many of the members who are now engaged in the automobile business have become so since they became members of the club, and that it is their interest in motoring and their ownership of automobiles, rather than business considerations, that holds them. But the work of the club is strictly businesslike. The cozy little offices at Broad and Locust streets fairly teem with activity all day long. Obliging officers are on duty throughout the day to dispense route directions, touring data of detailed character, information as to accommodations of hotels and garages at any point within the sphere of activity of the club and also in issuing New Jersey licenses and permits that are recognized in other neighboring States. The present quarters are small, consisting of only three rooms, but the club contemplates building a home in the near future that will rival anything of the sort in the world.

In some central location, probably not far from Broad and Chestnut streets, the Automobile Club of Philadelphia is laying its plans to build a clubhouse and garage which will cost $400,000. Of this vast sum $200,000 has been provided by a tentative first mortgage and the remainder is to be raised by a bond issue bearing 5 per cent. interest, which will be sold to members of the club and others who may become members.

Already $66,000 has been actually subscribed, and practically all of the subscribers have expressed a willingness to double the amount of their bids. The bonds will be dated April 1, 1910, and will fall due October 1, 1940. The total amount of the issue authorized is $300,000, but it is provided that only $200,000 will be sold at this time. The bonds are coupon securities, the interest coupons being payable semi-annually. The denomination is $500. The club retains the privilege of redeeming the bonds April 1, 1915, at par and accrued interest.

The site of the new clubhouse will contain about 25,000 square feet of ground, upon which will be erected a five-story building in which will be embodied the most advanced ideas of construction. Space will be provided for 300 to 400 cars. The garage will be open continuously, and will be available at all times to members. According to the plans, the most modern equipment and machinery will be installed. Devices for measuring gasoline and oil, facilitating accuracy in accounting and rapid delivery, vacuum cleaning, storage of oils, compressed air for tires and other facilities will be included in the equipment of the garage.

Another feature of the clubhouse will be its chauffeurs' bureau. This enterprise has been started already, but in the new quarters it will be developed to a much higher degree. There is always a demand for trustworthy and competent drivers and chauffeurs, and it is the practice of the club to get the men to register and submit references. These references are carefully investigated and when the name of a chauffeur is listed by the Automobile Club of Philadelphia, prospective employers have the satisfaction of knowing that those men whose names are presented are thoroughly reliable. The drunkard and the careless driver who has been mixed up in joy-riding or who has capsized, damaged or destroyed a valuable car will be at a disadvantage in securing employment, while, on the other hand, those whose records are clean and show efficiency will have a much broader field.

A machine shop of the highest type will be provided for the use of members, where any sort of repair work, construction or experimental research will be undertaken at moderate cost. A feature of this department will be a section devoted to the members' chauffeurs, as a repair room.

The club's supply department, acting as agent for members, will provide all supplies at club prices, and will ship supplies out of town on order of any member requiring such service. The club garage will be run strictly on the "no-commission" basis, which will undoubtedly prove a refreshing innovation.

The reasonableness of the big plan has been amply demonstrated and worked out in detail by its projectors. It is estimated that there will be at least 300 cars stored in the garage by members. The present facilities for garage work in Philadelphia are lamentably deficient, and the club looks for even more business than is indicated in the foregoing estimate. But on that basis and charging the very moderate figure of $20 a month, the income would be about $72,000 a year. The estimated profits on repairs, accessories, oil and gasoline are placed at only $22,500.

That would give a total income of at least $94,500 a year, and the expenses of the garage would be about $40,000. Deducting the fixed charges for paying the bond interest and taking care of unforeseen contingencies as they may arise, the balance would be sufficiently large to provide a sinking fund of $25,000 a year to pay off the principal of the bonds.

Aside from the garage, the clubhouse will contain elaborate quarters and accommodations. These will include a ladies' room, common room, lunch room, shower baths, library, map room, lockers and every other good feature of the modern clubhouse. The building will be of standard, fireproof construction, and will be of permanent and artistic value to the city for many purposes. No insurance will be necessary except for the cars themselves. On the plan thus formulated, the cost of maintaining an automobile will undoubtedly be lessened materially to members.

It is expected that the financial details will be completed this spring and that actual construction will commence before the end of the coming summer. The club intends to hold its next annual meeting March 15, 1911, in its new home.

As has been mentioned, the club does not go in for racing to any marked extent. The Brazier trophy, which was donated by one of the members as an award for the winner of a 100-mile tour, was the only fixture of the organization that might be deemed to be a contest. But some time this spring or in the early summer, a three-day road tour for the members is being arranged. One of the most popular of the tentative routes under consideration is a triangular course from Philadelphia to Wildwood; Wildwood to Atlantic City; Atlantic City to Philadelphia by way of Lakewood. One day would be spent on each leg of this triangle, and a most enjoyable tour would be thus afforded. Suitable trophies are being prepared for the winners. It is likely that the tour will be held in the early part of June.

One notable service performed by the club has been its map and sign work. The territory under its immediate jurisdiction consists of twenty-one arbitrarily formed sections, each 36 by 42 miles, and extending to Frederick, Md., on the southwest, to New York State line on the northeast. In ten of these sections immediately adjacent to Philadelphia the map work has been completed, and the detailed information digested and tabulated by the club. Work on the remaining eleven sections is progressing, and much has been accomplished in the way of placing readable signs at appropriate places on the roads.

On account of the strangely muddled state of the automobile laws, there is more or less friction between motordom and the authorities everywhere in the world, and in view of this condition the Automobile Club of Philadelphia makes a specialty of its legal services to its members. S. Boyer Davis, secretary-treasurer of the club, is its counsel, and during the past year he has been called upon to go to court in 125 cases wherein alleged violations of the law were at issue. The result of these prosecutions and court proceedings has been generally favorable.

In handling these cases, Mr. Davis was aided in large measure by the fact that the Automobile Club of Philadelphia has always striven to inculcate the fundamentals of courtesy of the road in the minds of its members. For instance, under the unwritten rules of the club governing the running of the Brazier trophy contest, the participants were required to stop their engines when approaching a nervous horse. They were also cautioned not to kill any dogs and chickens, and to preserve a fine, careful attitude with regard to human life and comfort as applied to pedestrians and other users of the roads.

The public is becoming familiar with these rules, and each month finds the pathway of the motorist a trifle easier as a result of the more cordial understanding engendered thereby.

The club was incorporated November 1, 1900, and was formally organized May 25, 1901. It is thus the first of the Philadelphia motor clubs in point of seniority. Its quarters were located in the Land and Title Building for several years, and May 1, 1909, the present rooms were secured.

The officers are: Powell Evans, president; Stedman Bent, vice-president; S. Boyer Davis, secretary, treasurer and counsel. The directors are the officers and Henry P. Baily, Jacob J. Seeds, D. Braden Kyle, W. O. Griffith, Howard Longstreth, Herbert Morris, W. W. Atterbury and Robert K. Cassatt. The standing committees are presided over as follows: Club Relations, Stedman Bent, chairman; Law and Ordinance, S. Boyer Davis; Touring Information, W. O. Griffith; Good Roads, Howard Longstreth; Membership, Henry P. Baily, and Club Garage, D. Braden Kyle.

Membership in the Automobile Club of Philadelphia includes membership in the A. A. A. and the Pennsylvania Motor Federation, the state organization which has been so active in working for the betterment of automobile conditions in Pennsylvania.

Slide Valve Engines and Drill Sizes

Editor THE AUTOMOBILE:

[2,232]—I have been much interested in the articles appearing in "The Automobile" from time to time relative to the sliding type of valve, as the Knight. Please tell me the date of your paper in which there was a description of this engine. I have seen it but fail to find it now that I want to refer to it. Will you kindly tell me also the drill sizes of the A. L. A. M. taps?

New York City. ARTHUR L. CARRON.

The Knight engine has been the subject of several articles in THE AUTOMOBILE in the past. First, in the Oct. 22, 1908, issue it was described fully, with reproductions of working drawings of the engine. Recently, it was treated from another and more recent viewpoint. This was in the issue of Feb. 10, 1910. In the latter, the lubrication system was analysed, and power curves from several thorough tests were given, showing by comparison the power from a Knight slide valve engine and an engine of equal or equivalent size equipped with the ordinary poppet valves.

Drill sizes vary with the number of threads per inch, because the latter alter the bottom diameter of the hole or belt, small threads having a larger root diameter for the same nominal diameter than coarse threads. The A. L. A. M. screw threads being all fine threads, call for different sizes than the regular or coarse threads. The sizes to use are as follows:

A. L. A. M. Standard.		Bottom Diam. of Bolt.	Drill Size.	Drill Size for U. S. S. Std.
1/4	28			
7/16	20	.375	23/64	Q. S, or 11/32
1/2	20	.435	27/64	3/8, 13/32, or W.
9/16	18	.490	31/64	7/16 or 29/64
5/8	18	.5525	35/64	31/64, 1/2, or 33/64
11/16	16	.6065	19/32	9/16 or 37/64
3/4	16	.669	21/32	39/64, 5/8, or 41/64
7/8	14	.7815	25/32	23/32 or 47/64
1	14	.9065	29/32	53/64 or 27/32

Results of Changed Gearing

Editor THE AUTOMOBILE:

[2,233]—In your answer to letter number 2,161, among other things you say, "In making the change it will be found that the lessened speed is not any too agreeable, etc." Please explain through the columns of "Letters Interesting, Answered and Discussed" what you mean by "not too agreeable," and how this change is brought about by the change in question. I do not understand it. I am having the same experience with my car, which also is geared 4 to 1, same as the car of Mr. Power. While it runs perfectly on the level road, it lacks the stick-to-itiveness when it comes to sand or hills. A. E. HACKER.

Monrovia, Cal.

Reference was had in the answer to the letter above referred to to the fact that when one has become used to a certain speed of car from many months or years' use of it, a change introducing a different and slower speed causes trouble, in that the owner or driver can not immediately adjust himself and his ideas of speed formed during the past use of the car to the new maximum pace beyond which it is possible to go. In short, after being used to traveling at, say, 20 miles per hour, it is hard to get used to going but 16 miles per hour with the engine going just as fast as before, this being the result which a change from a 4 to 1 reduction gearing altered to 5 to 1 would give.

Connecticut Laws, Horsepower, Etc.

Editor THE AUTOMOBILE:

[2,234]—In looking over the pamphlet of the Secretary of State of Connecticut regarding the laws of the State pertaining to automobiles, I note a proportionate deduction for time on auto registration fee after June, but none is mentioned before. Why this should be I do not understand. I cannot see why a deduction for the three months after January should not be made as well as for the three months after June. Could it be that the statute should have read January instead of June? And if this could be established as the intention of the legislator who drew the bill, could the courts of this State remedy the self-evident injustice? Another feature that I note is that some cars are rated by the manufacturers at a higher power than by the State and by the A. L. A. M. rating. For instance, Buick is rated by the manufacturers as 22 horsepower, while the State makes it 16 horsepower. And the Ford N is rated at 15 by the company, while the State rates it at 22 horsepower. Now, can there be this actual variation of working power or cars? The Ford Motor Company rates Model S at 15 horsepower and T at 20 horsepower, while the State calls both 22. If there is this difference in the actual working power, will you explain why? It has been remarked to me that small cylinders clog and do not give the actual power indicated by the A. L. A. M. as well as large cylinders. Will you inform me if this is a fact? What should be the size of the exhaust pipe of cylinders 3 3-4-inch diameter and 4-inch stroke? Would a larger stroke need a larger pipe?

Nichols, Conn. W. T. K.

In the language of the registration act mentioned, the idea is quite clear. The bill says: "An applicant who does not file his application until after the first day of June shall be entitled to a pro rata reduction in the fee for such registration calculated to the first day of the month in which the application is made." The intention is that every owner and driver shall register on January 1, being thus able to use his car for the entire year. If, through late purchase or otherwise, the owner does not file his license until the year is half over, he will then have lost the use of the State roads for automobile purposes for that half of the year or longer. Recognizing this loss, the State partly compensates the owner for this by reducing the amount of fee to be paid for that year by an amount proportionate to the number of months lost.

As a basis for the taxation according to horsepower, the State has selected the A. L. A. M. formula for rating. You will find on looking up the list and the exact statute language that this is there so stated (Sec. 2, Chapter 221, Public Acts of 1909). Since not all makers adhere to the formula, the advertised rating and the State rating naturally differ. As long as makers continue to overrate or underrate their motors, this will continue to be the case. The confusion in the case of the Ford models is but natural. However, the same bore and stroke are used on the N, R, S and T, so that the State would rate them alike.

Small cylinders, or, for that matter, large cylinders either, do not clog up. If well constructed, the formula power should be developed at the rated piston speed. Exhaust pipe sizes are proportioned on the basis of cubical capacity and gas speed, a figure being set for the allowable speed of the gas. This will determine the pipe size, and any alteration in the capacity or speed, such as a longer stroke, will of course change the result. If in the instance mentioned the stroke was changed to 4½, the size of the pipe should be increased, or else the gas speed will be greater.

One Man's Idea of Car Assembling

Editor THE AUTOMOBILE:

[2,235]—It seems to me that it will be a great draw on our resources to maintain the automobile. Other lines are doing poorly now, while the automobile only makes living more expensive. The people taking to the automobile business "soak" you all they can. We are handicapped for men that can make repairs, without extortion as to the prices they charge, those that know get positions with the makers, leaving only inexperienced men to help repair the automobiles. This is a case of the blind leading the blind. Repair men are incompetent, and their prices are unreasonable. Builders are putting their automobiles together in a hurry, leaving several faulty places to be looked after by the buyer. I would want to see my next automobile assembled so that things were not rushed and that the pieces were a perfect fit. Piston rings leak oil, others are ground away, coil has tin in it. Dampness prevents it from working. What we need is a bond of indemnity with each and every machine. SAMUEL ASHCRAFT.

Swedesboro, N. J.

About That Radiator Trouble

Editor THE AUTOMOBILE:

[2,236]—We are the manufacturers of all of the repair parts for the Northern, Wayne, and Queen cars, and have purchased patterns, drawings, and gigs, etc., from all of the companies that manufactured these cars, and the writer has noticed from time to time that there are inquiries and answers relative to cars for which we are supplying and repairing parts.

We wish to refer you to an article which was a question put to you by R. E. Heinish, of Newark, N. J., with whom I have had considerable correspondence, especially relative to the subject on which he was asking for information in your copy of February 17. You answered his inquiry on page 374.

Now I disagree with your information relative to the trouble Mr. Heinish has had with the water circulation. The radiators on all Northern cars were theoretically designed to more than take care of the amount of water necessary for cooling the motors installed in their several different models. The one in question is a 1906 model of car, of which there are some nine hundred cars in continual service, and I absolutely know that 90 per cent. of them are giving no trouble whatsoever with the heating of the motor. I have found in my four years' experience that the overheating was due in nearly every case to the water pump being worn, or the internal impeller wheel or blades becoming detached from the driving member. I find a few other cases in which heating troubles occur when the inner lining of the hose connections had become rotten so that the inner lining of canvas would fall down and clog the passage of water. Large pieces of this lining also became detached, and with the flow of water were carried into the radiator tubes and logged there, causing stoppage.

I have explained the above in numerous letters to many of our customers and also Mr. Heinish, and I will positively guarantee that the type of radiator with the same size inlet and outlet connections can be made to cool the engine if the water pump and water lining of the hose are put in first-class condition.

So you see I very much disagree with your advising Mr. Heinish or any other person owning this type of car to purchase a new and larger radiator, which will mean added expense and delay and in the end not rectifying the trouble.

We would be pleased to have you explain this in the next issue of "The Automobile." Thank you for the courtesy of doing same.

Detroit, Mich. AUTO PARTS MFG. CO.,
L. A. AUSTIN.

Attention of all owners of Northern cars, as well as Queen, Wayne and De Luxe cars is called to the above, the company having made the deal which gave them the De Luxe patterns, jigs, etc., since the above letter was written.

In one slight particular it is necessary to disagree with Mr. Austin, in that the radiators could not have been designed to "more than take care of the amount of water necessary for cooling the motors." This is but another way of saying that the radiators are too big. If this were so, the engines would run too cold, which, as is well known, they do not do. There is a great deal of difference between having just the right radiator capacity and having too much capacity, so as to lower the efficiency by running the engine cold.

Dispute Over Long Race

Editor THE AUTOMOBILE:

[2,237]—Please decide for me the following dispute: In talking about the race last season from New York City to Seattle, I contend that the Ford Model T car won the race and was awarded the race; a friend of mine contends that while the Ford was the first car into Seattle, it developed that the driver of the Ford had changed engines at some Ford agency and later the race was awarded to another car. Please set us right on this, and if another car was awarded the race, give make of car. C. H. MOULTON.

Beach, S. D.

Your friend was right. The Ford was the first car into Seattle, but was afterward disqualified, and the race awarded to the Shawmut car, which came in second. It was proved that the Ford changed an engine, just as your friend contended, and so the car was disqualified.

The ultimate winner, the Shawmut, was made in Massachusetts, by a firm which is now out of business or else just undergoing reorganization. But a very few cars of this make were ever turned out, and there were no spare parts to be had. Under those circumstances, it was a very courageous piece of work to enter the hard race and, moreover, see it through.

Law of the Road, or Rules Governing Travel on Highways

By XENOPHON P. HUDDY, LL. B.

THE "law of the road" is constantly and more frequently being applied since the comparatively recent development of the automobile and the increase of motor vehicle travel on the public thoroughfares. Therefore it is proper that the automobilist should thoroughly understand what those rules are which make up the law of the road. We will first ascertain what the term the "law of the road" means.

DEFINITION OF LAW OF THE ROAD

The "law of the road" is a phrase used to designate all of the general rules by which travel on the ordinary land highways is governed.

ORIGIN OF THE LAW OF THE ROAD

Originally the law of the road constituted mere custom and it found its inception in custom. In England, for example, it became a habit for drivers of vehicles when meeting and passing to turn to the left, therefore, to-day there the rule is to turn to the left. This custom finally became so well recognized and established that it became a part of the common law, which later has been enacted into statute. In the United States, as everyone well knows, the rule is directly opposite to that prevailing in England, which is to turn to the right upon meeting and passing. Why, here in the United States, we adopted a different rule is not certain, although several explanations have been suggested.

It was out of custom, therefore, that this law of the road, embodying all of the rules governing highway travel, arose. Being the customary law it became the common law, and subsequently the States in this country expressly codified these rules to a certain extent.

RULES OF THE ROAD SHOULD BE SIMPLE

The law of the road is not complicated and should not be made too complex. If we are to make traveling on the public highways safe, the rules governing it must be extremely simple and easily and quickly to be applied. This is one argument in favor of automobile legislation which is not complicated. I am not now speaking of traffic regulations, which will be considered later on. One who drives an automobile should be so familiar with the rules of the road that they may be applied without thought. Still, thought should prevent their application when necessary, inasmuch as the law does not require the rules of the road always to be followed. In fact if a driver insists upon following the general law of the road when to do so would injure another, he is guilty of negligence, as it is his duty to deviate from the rule when occasion demands it; so it will be seen that the rules of the road are not fixed and, as an instance of this, I cite the case where one driver meets another and the one proceeds to turn out to the right to pass, but finds that the other driver is turning to the left to pass. In this case it is the duty of the former to turn to the left, if to do so will avoid a collision.

EQUAL RIGHTS ON PUBLIC HIGHWAYS

One of the primary rules to remember, and which is fundamental and at the basis of all rights on the public highway, is that all lawful users of the public highways have equal rights thereon. This means that the automobile, the horse-drawn vehicle, the street car and the pedestrian each equally has as much right to use the public highways as the other and each should respect the other's right. Neither has any superior right over the other and if one vehicle encroaches upon the rights of another it is done so unlawfully.

OVERTAKING AND PASSING

Another primary and general rule of the road is that overtaking vehicles should pass to the left of the preceding vehicle. As a corollary of this rule the preceding vehicle should reasonably and seasonably give way and allow an overtaking vehicle to pass to the left. The right of a preceding vehicle to pass one ahead is supported by a recent decision of the Court of Appeals of the State of New York, the first time this question has been squarely determined in this country. Quoting from the official report of this case, the following may be said to be the law:

"In the case of two cars traveling in the same direction the front one has the superior right and may maintain its position in the center of the highway if there is sufficient space on its left, as prescribed by the Motor Vehicle Law, for the approaching car safely and conveniently to pass. If the position of the forward car in the center of the highway does not leave room for passing, then it must, if practicable and convenient and upon request or equivalent notice, turn aside so as to make room. If at the time there is not sufficient space to do this, it may wait until a convenient place is reached. The circumstances might also be such that a jury would be justified in finding that it was extremely unreasonable for a slow-moving car to refuse to stop, if requested, and let the other pass."

Since the automobile has come into general use, other rules of the road have appeared, such as the necessity for giving a warning signal upon approaching a corner, particularly where the view is obstructed. Warning signals should also be given to call the attention of other users of the highways to the fact that the automobile is proceeding under circumstances where reasonable care demands the giving of signals.

STOPPING THE CAR

The law of the road has not solely to do with actual traveling. It is as necessary to be careful and cautious in stopping an automobile and remaining stationary as it is to proceed. There can be no monopoly of the public thoroughfares, therefore it is an infringement upon the rights of the public to stand in the street or on a road for an unreasonable length of time. Where traffic is thick the time is much shorter which is allowed for a vehicle to remain stationary. In leaving an automobile on the street, due care should be taken by the operator to leave it in such a condition that it cannot be started by intermeddlers. If due care is exercised in this respect no responsibility is incurred by the driver or owner of the machine if children come along and start the machine which, uncontrolled, runs into either a person or a vehicle on the public highway.

EQUIPMENT AN INTERESTING SUBJECT

Equipment also constitutes a subject which the law of the road controls. The equipment of an automobile must be lawful and to be lawful it must be safe. The statutes of the various States provide that brakes, lights, signaling devices, mufflers, etc., must be had. The term "equipment" was covered by the old common law by the term "good tackle," which was used to designate such articles of equipment as harness, buckles, shafts, whiffletrees, etc. A vehicle which is used and which lacks legal equipment or good tackle, if it collides with a person or other vehicle on the public highways by reason of it not having good tackle or legal equipment, legal liability will be incurred by the driver or owner. Proper lights should also be carried, not only on automobiles, but horse-drawn carriages should have them.

ROAD-WORTHINESS

Before leaving the subject of equipment and good tackle, it should be mentioned that the vehicle should be generally road-worthy. Road-worthiness covers in a general way the ability of the vehicle to travel and carry its load without danger to its occupants or others using the public highways. It has nothing to do with the ability of the vehicle to proceed. Whether or not an automobile is road-worthy is generally a responsibility which the manufacturer assumes toward the purchaser and it may be said that every manufacturer of motor vehicles warrants that the machines turned out by him and placed on the market are road-worthy. The warranty does not extend beyond the first purchaser.

WHAT THE LAW OF THE ROAD APPLIES TO

The law of the road applies to automobiles as well as horse-drawn vehicles. It does not apply in many of its particulars to street cars. They run on rails and cannot be steered away from the established track, but other vehicles must, however, pass street cars upon meeting and overtaking them, following the same rules that apply to other vehicles which have more freedom of control. Of course, an automobile should stop when the street car in front of it stops to let off passengers.

PEDESTRIANS, CHILDREN, ETC.

The law of the road does not, however, apply to pedestrians. They are not compelled to follow the rules which are embodied in the law of the road. People riding horseback also are not compelled to obey the rules of the road. Of course, the proper place for pedestrians to cross the street is at the regular customary crossing, although it is not negligence for a pedestrian to cross at other places, where it is reasonably safe for him to do so. It has even been held not to constitute negligence for a pedestrian to stand in the road and talk to the driver of a vehicle. In such a case it is the duty of approaching vehicles to look out for the safety of the pedestrian.

Particular care should be exercised by automobile drivers not to run down children who are playing in the street. It is to be conceded that children should not be allowed to play on the public highways; nevertheless, if they are there it is the duty of automobilists to look out for them, since their tender age cannot be held to exercise as high a degree of care for their welfare as in the case of adults. No amount of sounding the horn of an automobile or giving of any other signal will warrant or excuse running down a child or pedestrian.

The mere fact that the pedestrian is blind or hard of hearing will not excuse an automobile driver from negligently running into him.

Where an old man with defective eyesight was traveling south and met an automobile traveling north, and in attempting to get out of the way jumped toward the east and the machine turned toward the west, and the front hub on the east side struck the plaintiff, injuring him, it was held that the complaint was sufficient where it charged that they were riding in possession and control of the auto, and carelessly, negligently ran and operated the same at a high and dangerous rate of speed on the west side of the highway and knocked the plaintiff down and dragged him across to the opposite side of the highway and ran over him. It was also held that the complaint was not defective in not charging that they could see the plaintiff or that there was light enough to see him.

The rule that one must turn to the right on meeting another vehicle was held was not to obtain as to foot men. It was further held that it was not material on which side of the road the automobilists were driving. The evidence showed that they were aware of the presence of the plaintiff at a considerable distance from the accident; that they were driving at a high rate of speed, and that they did not change their course or slacken their speed.

To run an auto at a high speed toward a person, and so close to him that he is compelled or excited to flee from his path to keep from being run over, is an unreasonable abridgment of that person's right to the use of the road. It is claimed that one of the parties had nothing to do with the injury—that he was only riding in the auto and had no control of it; but the allegations of control in the complaint were not contradicted by the interrogatories and both parties were held liable. See Apperson vs. Lazro, 87 N. E., 97.

GENERAL RULES OF CONDUCT IN DRIVING

Aside from the express statutory rules governing travel on the public thoroughfares, there are general rules prescribed by the common law which should be followed. These rules are tersely and well stated in the following three paragraphs:

Every person driving upon the public highway is under a legal duty to observe, in the control and management of his vehicle, the exercise of reasonable care to prevent injury to others, and he is criminally and civilly responsible for the neglect or wilful failure to perform that duty. To create this responsibility, however, the law must cast upon the person sought to be charged the legal obligation to do the act or perform the service the omission of which is alleged to be the direct cause of the injury.

If persons having the control and management of a vehicle, in which they are riding along a highway behind another conveyance, knowing the danger of a collision with the forward conveyance and the probable consequences flowing therefrom, recklessly and negligently, or wantonly and wilfully, allow the vehicle to run down and collide with the other vehicle, without using such means as are reasonably at their command to prevent the same, they will be held criminally and civilly responsibile for the result of their negligence or wilful omission of duty. If it is the cause of death they may be convicted of manslaughter.

Where the driver of a vehicle is not guilty of negligence and a collision on the public highway is the result of inevitable accident, or resulted from the vehicle becoming unmanageable without his fault, and uncontrollable by the exercise of proper care, there can be no criminal or civil liability. See Belk vs. The People, 125 Ill. 584.

TRAFFIC REGULATIONS

In considering the law of the road we should not leave the subject without directing our attention to traffic regulations, which are more or less local in their nature, and govern the moving and progress of traffic more particularly in the large cities.

Municipalities possess the power to enact and enforce these regulations, since they are for the safety, welfare and convenience of all who use the public thoroughfares. Many of the regulations are merely declaratory of the ordinary rules of the road. As an example of a very good system of regulating traffic, I am inserting herein some of the regulations of New York City, which are as follows:

RULES FOR DRIVING IN THE CITY OF NEW YORK

All drivers of vehicles are required to comply with these rules in order to facilitate traffic, prevent blockades, avoid accidents and loss of life, and diminish the loss of time and money due to the lack of observance of rules for the regulation of street traffic.

A vehicle meeting another shall pass to the right.

A vehicle overtaking another shall pass on the left side of the overtaken vehicle and not pull over to the right until entirely clear of it.

A vehicle turning into another street to the right shall turn the corner as near the right-hand curb as practicable.

A vehicle turning into another street to the left shall turn around the center of intersection of the two streets.

A vehicle crossing from one side of the street to the other shall make a full 180° turn.

No vehicle shall stop with its left side to the curb except on established cab, hack and truck stands, and in streets where and when one-way traffic is directed by white arrow signs.

No vehicle except in an emergency or to allow another vehicle or pedestrian to cross its path, shall stop in any public street or highway, except near the right-hand curb thereof and so as not to obstruct a crossing.

SIGNALS AT TIME OF STARTING OR STOPPING

In slowing up or stopping, a signal shall be given to those behind by raising the whip or hand vertically.

In turning, while in motion, or in starting to turn from a standstill, a signal shall be given by raising the whip or hand, indicating with it the direction in which the turn is to be made.

Before backing ample warning shall be given, and while backing unceasing vigilance must be exercised not to injure those behind.

No vehicle shall be used on any street or highway unless provided with lights and sound signals as prescribed by law.

(*Continued on page 784.*)

THE AUTOMOBILE

Vol. XXII Thursday, April 21, 1910 No. 16

THE CLASS JOURNAL COMPANY
H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

The labor problem in the centers of automobile activity is becoming just a little more acute every day and strange to relate, strike features are not prominent among the points with which makers of automobiles have to deal. In Detroit, for illustration, while there is a slight undercurrent which has a certain union labor sound, the fact remains that wages are high, hours are well regulated and conditions of sanitation are excellent.

The problems of magnitude are from rather unexpected quarters. Housing the men is becoming extremely difficult. There are not enough dwellings in Detroit for the men now employed, and more men are flocking to this center every day. It is not now unusual for men to pay $40 per month rent for dwellings that do not rate higher than apartments such as may be had in New York City for $25 per month, and while relief is approaching, as the result of extensive building operations, the fact remains that the automobile industry is growing faster than the accommodations.

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There is another phase of the labor problem that will not "treat" so readily. Toolmakers are growing more scarce, relative to demand, every day. Machine tools are being ordered in excess of the rate of production thereof and a secondary complication comes in through the migration of toolmakers from the haunts of machine tools to the automobile plants. What really happens is this: Makers of automobiles order machine tools to suit their needs and rob the tool builders of their skilled workmen at the same time.

The railroad companies are now investigating Detroit in order to determine something of the freight-car requirement for this year. One commissioner, after going over the situation, stated: "If the tales I hear about production are half true there will be a freight-car famine." It is possible that the reports are half true because the commissioner's exclamation was premature; he became confused after visiting less than one-half of the live plants. It looks as if the transportation companies should do more building and less investigating.

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It is not uncommon to hear men say that the expansion of the automobile business is confined to low-priced automobiles for popular consumption. This version should be taken with a grain of salt; there are relatively new undertakings that pass the $4,000 level, and in the light of experience these new efforts compare very favorably with $10,000 automobiles as they were had a year back.

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Commercials are occupying a large amount of attention just at the present time. It is a healthy sign, and users of this type of car are beginning to see light. It is very likely that the commercial automobile will come into its own before the end of this year, and the time is near at hand when "ironclad" guarantees will not be exacted. It spells failure to guarantee service for the reason that commercials will be grossly abused by the very men who have nothing to lose when service is guaranteed.

As a further evidence of automobile prosperity, prompt collections and easy money must be taken. A close scouting of this phase of the situation in Detroit leads to the conclusion that the automobile commands the respect of capital. This situation is being bettered by the promptness with which makers of automobiles settle for materials and accessories.

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At this time of the year there is much building going on in the various automobile plants, and from these building operations much is expected, both in the way of larger outputs, cheapened production as brought about by more suitable facilities, or the reverse of this latter—better production at the same price.

In this building work much may be learned also. Thus, to borrow a single idea from the building contractors, much building is now done on the basis of agreement with the contractor that the latter charge the owner cost plus a fixed profit. In this there is an idea for something new in the selling of automobiles. If any automobile builder would say to the people, "I will establish factory branches in all the larger cities and sell my cars direct to the public at cost plus a fixed profit, naming that profit exactly, whether it be high or low," such a manufacturer, particularly if his product be a low or medium-sized car, would be swamped with business. Further, if this maker threw his books open, as must the contractor doing business on this basis, so that the truth of his assertions, both as to cost and as to profit, could be readily proven or disproved, he would not alone do a temporary business of a volume which would paralyze an industry used to big figures, but could also be sure of a continuance of this immense business year after year.

MAIL AUTOS IN NASHVILLE DISTRICT

NASHVILLE, TENN., Mar. 28—In consequence of very satisfactory experiments Postmaster A. W. Wills has forwarded to Washington recommendations that collection of mails in the suburbs of the city be by automobile service. With his report, proposals from several local auto concerns for the performance of the service were forwarded. Major Wills found that by the use of automobiles for the collection of the rural mails. delivery was advanced twenty-four hours. Under the present system the last collection is made at 3 o'clock in the afternoon.

By the use of one machine the final collection was begun at 5 o'clock in the southern and western suburbs, the machine then returning to the office. A round of the northern section was made and a return to the post office, after which a third trip was made through the eastern section, the entire time consumed being two hours and fifty-six minutes with about 3,000 pieces of mail matter collected.

NEW AUTOMOBILE CLUB FORMED

Automobile owners in Greene County are forming a permanent organization, and will have headquarters at Waynesburg. The objects are, first, road improvement, especially the proper repairing and keeping up of the roads, and, second, the making of a map of Greene and Washington counties and posting signs to direct motorists. The club will be known as the Automobile Club of Greene County, and has elected the following officers: President, R. L. Hoskinson; first vice-president, Charles E. Dittman; second vice-president, T. N. Millikan; secretary, Dr. Earl Miller; treasurer, S. M. Smith. There are about ninety automobile owners in the county, and the club will affiliate with the State organization.

MICHIOAN AUTO TRANSFER COMPANY

The Mason, Dansville & Stockbridge Auto Transfer Company has been incorporated at Lansing, Mich., for the purpose of establishing an auto line to be run on schedule time between the towns named. Communication hitherto has been slow and difficult between these places.

843 HOBOES RESCUED WEBB JAY

Webb Jay, formerly known as one of the leading automobile drivers of the country and who met with a well-nigh fatal accident while racing at Buffalo in 1905, has had a rather unique experience as a result of the smash-up

One day recently a tough-looking specimen of the common or garden variety of hobo approached Mr. Jay, extended his grimy hand and said: "Gee whiz, I never'd a thought I'd a seen you here now, when I pulled you out of that mud-hole up in Buffalo with your legs and arms busted and pretty near scalped."

Several by-standers heard the remark and greeting and were astonished and not a little displeased when Mr. Jay delivered himself as follows: "Here's a half a dollar; beat it. You are number 843." It was explained later by the former driver that he had kept count of his alleged rescuers that day in Buffalo, all of whom required some trifling financial assistance, and up to date the number had been 843.

COLUMBUS CLUB PLANS RACE MEET

COLUMBUS, O., Apr. 4—The contest committee of the Columbus Automobile Club, of which Perin B. Monypeny is chairman, is canvassing the situation as to the advisability of holding a race meet in Columbus during the summer. The tentative dates given the Columbus club by the A. A. A. were unsatisfactory and the matter has been taken up by correspondence and other dates will likely be secured.

Negotiations have bee nopened with noted drivers and ndications are bright for a successful meet. Last year a small profit resulted from the meet and it is believed that the conditions are better this year.

ABSENT TAIL LIOHTS EARN FINES

From four to a dozen arrests are being made daily by the Columbus, Ohio, police department under orders received recently from Director of Safety McCune, ordering that all motor cars operated within the city limits be provided with the necessary lamps. Most of the arrests have been made because of the absence of a tail light. Fines have been imposed in police court.

Coming Events in the Automobiling World

Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
June 20-July 6....Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.
Jan. 7-14, 1911....New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911..Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Apr. 30-May 2....Philadelphia Roadability Run to Atlantic City, Quaker City Motor Club.
May 2............Flag-to-Flag Endurance Contest, Denver, Col., to City of Mexico.
May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.
May 9-11.........Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.
May 19-21........Hartford, Conn., All-Connecticut Reliability Contest.
May 21-22........Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.
May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill; Automobile Club of Bridgeport.
June 4...........Worcester, Mass., Fourth Annual Hill Climb, Dead Horse Hill.
June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.
June 15..........Cincinnati. Seventh Annual National Reliability Run for Glidden Trophy, through the Southwest.
Oct. 1............Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley, and Massapequa Sweepstakes.
Oct. 15...........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races

Apr. 2-24.........Turin, Italy, Automobile Show.
Apr. 27-28........Brooklands, England, Two-Day Meeting.
May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 25............"The American Cup," Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.
May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.
May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.
June 2-8..........Prince Henry (German) Touring Competition.
June 13-18........Scotland, Scottish Reliability Trials.
June 20...........French Voiturette Race.
June 21...........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27...........Speed Trials at Kiev, Russia.
July 12-18........Ostend, Belgium, Automobile Week.
July 20-25........Boulogne, France, Automobile Week.
Aug. 1-15.........Ardennes, France, Meeting.
Aug. 15-Sept. 15..French Industrial Vehicle Trials.
Aug. 21...........Salon, France, One and Five Kilometer Trials.
Aug. 28...........Mont Ventoux, France, Hill-Climb.

Road Touring Test for Commercial Cars

Efficiency of trucks and traveling capacity of commercial vehicles are likely to be given a real test in the near future, if plans which are now being formed to hold a touring contest for such vehicles develop the way they are expected to.

Over a score of Western manufacturers have expressed themselves as desirous to enter such a contest and W. Irving Fickling, of New York City, has undertaken to conduct the preliminary work. So far, two American makes of commercial automobiles have been pledged to enter the contest if the proper organization takes hold of it and two foreign makers have also agreed to enter. These cars are the Rapid, Reliance, Panhard and Saurer. In addition it is hoped that a dozen other varieties will be attracted, contingent of course upon satisfactory rules, dates and routes.

According to tentative plans already submitted, the contest may extend over a week or a month. Charles E. Stone has formulated the following ideas upon which to base the tour: Each entrant may nominate one or more cars and shall have the privilege to name a technical expert to serve upon the committee who is not in any way affiliated with any competing company.

Vehicles should be required to carry the maximum catalogue load in sand bags supplied by those in charge of tests. The weight of the body should also be considered in the final reckoning. All vehicles should be fitted with some form of recording instrument showing speed, trip and total mileage.

Vehicles, on favorable roads, should be required to maintain the maximum catalogued speed. All vehicles should be fitted with lamps, horns and such tools and spare parts as catalogue calls for, but none other. Each vehicle should be in charge of a driver and if desirable a helper who must do all the work of adjusting and repairing, and, in addition, an experienced unbiased observer to note the performance of all work done upon his truck and to keep a thorough record of same.

At the various stops, which will amount to a "control," the machines may be exhibited to interested people, but no work or adjustment of any kind allowed, all of such must be done upon the road. The running schedule of each car should be rigidly insisted upon and no credit given for reaching "control" ahead of its particular schedule.

All gas and oil tanks as well as radiators should be carefully measured previous to the start of the run, in order that each official observer may be able to keep careful record of all gasoline, oil and water used during the test. The circumference of each tire should be ascertained by means of a steel tape previous to the start of the test, in order that the wear may be determined at the completion of the run.

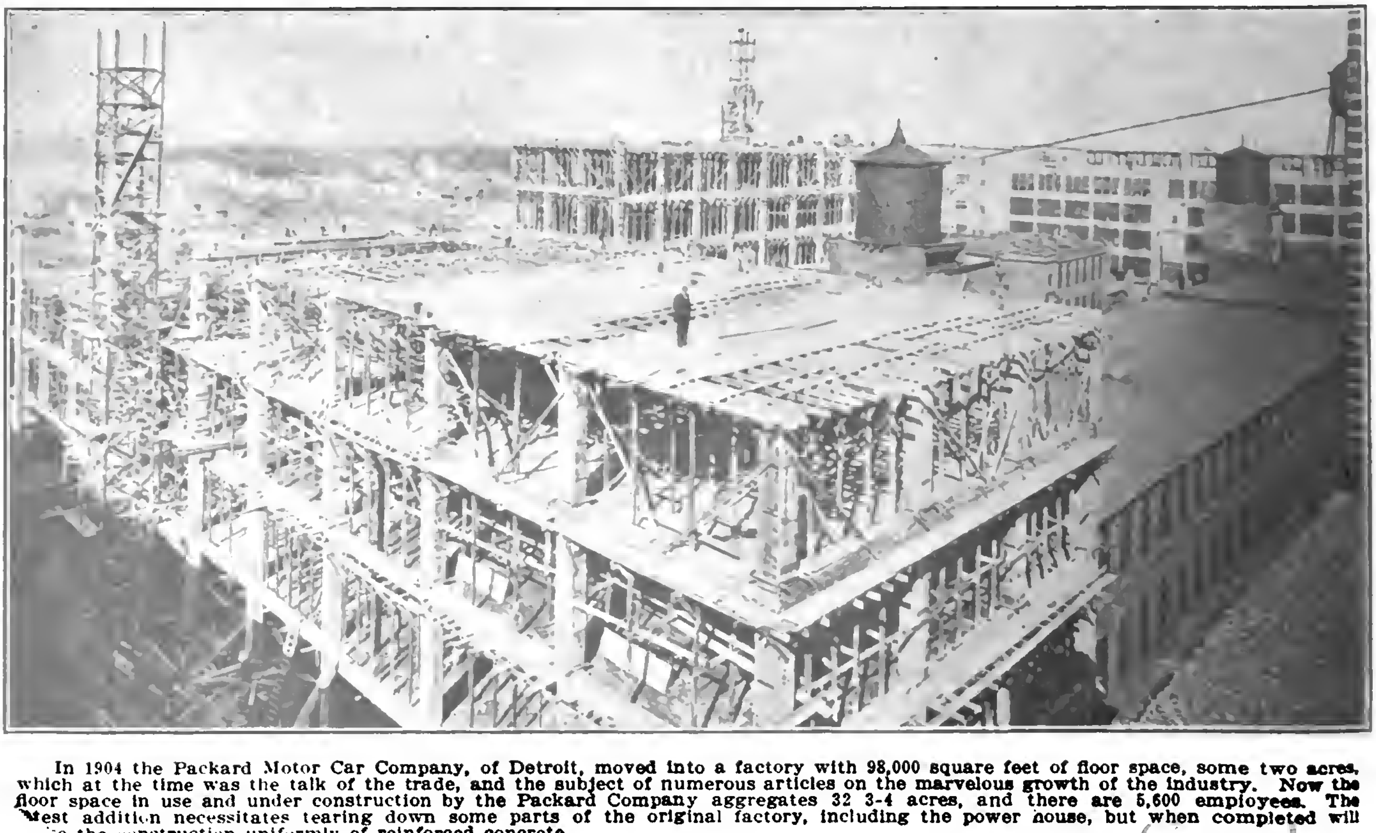
At the completion of the test, the official observers will turn over to those in charge all of their data and awards for reliability and efficiency should be based upon the weight of load carried plus weight of body; gasoline, oil, grease and water used, nature and number of adjustments and replacements made as well as any other trouble together with the mileage and running time. Other regulations may be devised if the situation so indicates.

PLOW FACTORY MAKES ROOM FOR CARS

In order to provide more room for a motor car factory, the Hartford Plow Company, a concern which contributed to the foundation of the Kissel Motor Car Company, of Hartford, Wis., has been sold to the David Bradley Manufacturing Company, of Bradley, Ill. All of the employes of the Hartford Plow works will remain as employes of the Kissel Company.

PLANS FASTER STANLEY STEAMER

Worcester, Apr. 7—The Worcester Automobile Club to-day sent out notices to automobile manufacturers and dealers calling attention to the annual hill climb on Dead Horse Hill, Saturday, June 4. Freeland O. Stanley, of Stanley Brothers, builders of steam automobiles, was in Worcester this week relative to plans for a new racing car.



In 1904 the Packard Motor Car Company, of Detroit, moved into a factory with 98,000 square feet of floor space, some two acres, which at the time was the talk of the trade, and the subject of numerous articles on the marvelous growth of the industry. Now the floor space in use and under construction by the Packard Company aggregates 32 3-4 acres, and there are 5,600 employees. The latest addition necessitates tearing down some parts of the original factory, including the power house, but when completed will make the construction uniformly of reinforced concrete.

Jersey Club Lays Out Interesting Route

PARTICULARLY interesting is the 150-mile course laid out for the road contest of the New Jersey Auto and Motor Club of Newark, which will take place in the early part of June. The pathfinding party went over the route last Sunday and their report on their experiences shows that, in any weather, the course selected will test the stamina of any car. While the weather in June is generally fine, the hills found along the way were steep enough to give the cars an adequate try-out, even in the best of weather.

As it was, the pathfinders had a rather exciting time of it on the slippery dirt roads. One-third of the route is over such going, but the remainder of the trip is over good macadam pavement. The run will start from the clubhouse at 6 o'clock and will extend over 15 hours of running time. While this makes a long day's work for the contestants, it is expected to turn out all right. The route selected is as follows:

The course starts at the clubhouse at Newark, goes out Central avenue to Grove street, over to Plainfield avenue, then through Plainfield, Montclair; at the top of the Montclair hill turns to the right and goes through Pompton, and turns to the left at Newfoundland; then over past Green Pond to Rockaway, Dover; through Dover to Budge Lake, and then to Hackettstown, which will be one of the controls; from Hackettstown the course is laid through Washington, New Hampton, Clinton, Glen Gardner, Flemington, White House, Somerville, Dunellen, Plainfield, Scotch Plains, Springfield and back to the clubhouse in Newark.

MANY ENTRIES IN PRINCE HENRY TOUR

BERLIN, Apr. 1—Entries for the Prince Henry Tour number 50 so far and a large additional list of cars will undoubtedly enter before the books close. William Opel, winner last year, has sent in an entry, making nine Opel cars to participate. A like number of Austrian Daimler cars have been entered. Eight Benz machines and eight Mercedes will take part.

The Berlin Motor and Aero Club's show is attracting an immense amount of attention. The Emperor and royal house are exhibitors, as the auxiliary boats, attached to the royal yachts, are being shown. Two airships and a number of fast motor boats are being exhibited.

NEW REPAIR SHOP FOR WINTON PLANT

Work is being pushed on the new building of the Winton plant at Cleveland, which will be occupied exclusively as a repair shop and parts departments when it is finished. It will be 308 by 70 feet, and of steel and brick construction. Several of the present buildings will be relieved by the new structure, and the facilities of the plant will be materially increased.

REPRISALS ON NEW JERSEY TOURISTS

BOSTON, Apr. 9—If a measure now under consideration by the committee on roads and bridges of the Legislature goes through, Massachusetts will be the first State to retaliate upon New Jersey and other States which do not grant the same privileges to Massachusetts motorists as Massachusetts grants to motorists from those States. It is proposed to limit the time a non-resident can drive in Massachusetts to ten days in any one year and to extend this courtesy only to such States and countries as extend similar privileges to residents of Massachusetts.

SENTINEL TOUR ARRANGED FOR JULY

George A. West, chairman of the contest committee of the Wisconsin State Automobile Association, has sent out a circular to owners and dealers in Wisconsin in regard to the first annual tour for the Milwaukee *Sentinel* $1,000 trophy. The contest will be held during July, and will be under A. A. A. sanction.

"The principal objects of the tour," says Mr. West, "will be to stimulate motoring interest and establish a closer affiliation among dealers and owners throughout the State.

Additional floor space in their factory, to the amount of 70,000 square feet, will be gained by the erection of another big building by Wheeler & Schebler, makers of the Schebler carbureter, at Indianapolis. The building is now in course of construction. It will be three stories, of reinforced concrete and will give facilities for 200 more employees, raising the total product of the company to 1,000 carbureters a day. The company has now installed gas engines developing 350 horsepower.

Elgin Has a Natural Race Course to Consider

CHICAGO, Apr. 18—A stock chassis road race run by the Chicago Motor Club is one of the possibilities of the present season, the first step in that direction being taken last Friday night when a committee from the club attended a meeting called by the citizens of Elgin, Illinois, for the purpose of considering the proposition. Elgin has a natural course which was discovered by Frank Wood, manager of the Chicago Knox branch and a recent inspection of it by the motor club brought about a desire on the part of its officers to use it for racing purposes. Elgin citizens spoken to in regard to the matter were favorably impressed and the meeting was the result.

Big enterprises like this are not put through in a day or even a week, and therefore the meeting did not make any decision in the matter. The Elgin citizens listened to the talk of the motorists as to the advantages the town would derive through having such a big event run at its very doors, seemed impressed with the idea and wound up by appointing a committee consisting of M. M. Cloudman a leading coal dealer of the town; W. W. Willson, publisher of an Elgin paper; and Fred W. Jenks, manager of the opera house. This committee has undertaken to canvass the situation thoroughly and secure from the business men of Elgin a guarantee fund of $15,000 with which to promote the race. This committee has promised to report by May 1 and from the talk of the evening it was believed that the report will be a favorable one.

According to the plans outlined at the meeting, the Chicago Motor Club favors holding the race the latter part of August or the first part of September, possibly asking the contest board of the American Automobile Association to make it a national stock chassis event now that Lowell, Mass., has decided it will not promote that classic this year. It is figured that the expense of putting on such a race would not be great because of the natural advantages offered by Elgin, which is only 38 miles from Chicago and with excellent transportation both by electric trolley and by railroad. The course itself is at the end of Highland avenue and exactly one mile from the business center of the town. A trolley runs to within 100 feet of the course, while at the northwest corner of it is the McQueen railroad station. The course itself is gravel the entire distance, and the exact distance around is 8.4 miles. At the present time the road is in need of scraping, which would not involve a very great expenditure of money. Scraped and oiled, it would be as fast a circuit as Riverhead, Long Island, it is believed, and it ought not to cost much more than $8,500 to put it into racing condition.

It is almost certain that the Chicago Automobile Club will not promote a road race this year, which would leave an excellent opening for the Chicago Motor Club which already has planned a strenuous campaign for 1910, including an economy run on April 28; a demountable rim test, in May; the annual hill-climb at Algonquin in August; and the 1,000-mile reliability in October.

TESTING TAXIMETERS FOR ACCURACY

WASHINGTON, D. C., Apr. 18.—Col. W. C. Haskell, Sealer of Weights and Measures, is the greatest friend the taxicab rider ever had. The picture portrays the Colonel in his original act entitled "Testing a Taximeter." The device by which the Colonel makes the test is an invention of his own, and is probably the only machine of the kind. By attaching the flexible wire of the taximeter to the large wheel the Colonel can find out in one hundred turns of the big wheel whether or not the taximeter is cheating the rider or the chauffeur. One hundred turns of the wheel represent a quarter mile riding by taxicab. Every taxicab in the District has to carry a tested taximeter, and every one of them is tested on Col. Haskell's home-made taximeter tester

Col. Haskell and His Taximeter Testing Device at Work

DEATH CLAIMS AUTOMOBILE MAKER

Thomas M. McLean, president of the Embree-McLean Carriage Company, of St. Louis, died at his home April 9 after an illness extending over several months. He was born at Hollidaysburg, Pa., in 1846 and removed to St. Louis after the great fire in Chicago in 1871 which destroyed the plant of the concern for which he was working. He engaged in the hardware business until about twenty years ago when with James G. Embree he founded the present company. Recently an automobile department was added to the concern and Mr. McLean devoted his most enthusiastic efforts to it.

ELECTRICS ON SHOW AT NASHVILLE

NASHVILLE, Apr. 17—An event of interest to the Nashville public and autoists in particular is the exhibition of the Rauch & Lang Electric Automobile Company of many kinds of handsome cars manufactured by that company. The show was held Thursday, Friday and Saturday of last week. The local agent of the company is A. R. Whiteman. Runabouts, stanhopes, victorias and coupes were on exhibition and demonstrations were given of the "Exide" battery and the mercury arc rectifier, upon the charging of cars.

FIVE ENTRIES FOR GLIDDEN TOUR

Entries for the Glidden Tour have been made by the Premier Motor Manufacturing Company for two cars, which will be numbered 1 and 2. The Moline Automobile Company have entered three cars for the Chicago trophy and they have been given numbers 101, 102 and 103. At least fifty cars are expected to enter.

A. C. A. FINANCES GARAGE PROJECT

Justice Blanchard of the New York Supreme Court granted permission to the Automobile Club of America to mortgage its Fifty-fifth street property for $400,000. Quarter of this will be used to retire a previous mortgage and the rest will be utilized in the building of a luxurious clubhouse and garage.

Endurance Tour To Scranton Will Be Arduous

NORRISTOWN, PA., Apr. 11—A score of local clubmen and Philadelphia newspaper men spent three days last week in spying out the land for the coming third annual endurance run of the Norristown Automobile Club, May 18-19. The six carfuls of pioneers successfully "pathfound" the 327-mile route to Scranton and return, and reported the trip one of the finest in point of scenic attractions and one of the most strenuous as regards physical difficulties ever planned for the club's annual fixture.

The cars which carried the exploring party were an American, an E-M-F, an Otto, a Selden, a Knox and a Premier.

All the preliminaries in the way of securing garage accommodations at the overnight stop and the establishment of intermediate checking stations were attended to, and the running schedule adopted will be close to the 24-mile-an hour maximum allowed by the State law. The itinerary for the two days is as follows:

First Day

	Miles
Norristown (Hotel Montgomery) to Reading (Mansion House)	37.4
To Pottsville (Allen House)	35.6
To Hazleton (Central Hotel)	33.2
To Wilkesbarre (Hotel Sterling)	26.6
To Scranton (Hotel Jermyn)	18.6
	151.4

Second Day

	Miles
To Stroudsburg (Hotel Fulmer)	46.2
To Easton (Hotel Karldon)	27.2
To Allentown (Allen House)	27.3
To Philadelphia (Auto Trade Assn.)	52.4
To Norristown (Hotel Montgomery)	22.5
	175.6

There will be a large proportion of low-gear mountain work from Pottsville to Wilkesbarre on the first day, and from Scranton to Stroudsburg on the second, but the magnificent Pocono scenery and the beautiful Delaware Water Gap section will doubtless be much enjoyed by the travelers.

TIMERS AND SCORERS FORM CLUB

Expert timers and scores of Philadelphia, to the number of twenty-two met last week at the rooms of the Quaker City Motor Club and formed an organization known as the Timers and Scorers Club of Philadelphia. Much difficulty has been experienced in the past in Philadelphia and in fact nearly everywhere on account of amateur work in timing and scoring road and track events, and it is the avowed purpose of the newly formed club to obviate difficulties of that kind.

Prior to the running of such an event as the Fairmount Park Road Race, the club will meet and go over the situation with care, arranging the details so that all contingencies may be met.

They will install automatic electric timing devices and in the Fairmount race they are preparing a score board of an improved type. For the club's roadability tour April 30 to Atlantic City synchronized clocks at Philadelphia and Atlantic City will settle any possible disputes as to running time. E. S. Nyce has been named chairman of the timing committee.

The officers of the club are as follows: Paul B. Huyette, president; George E. Potts, vice-president; A. Paul Oliver, treasurer; I. C. Minford, secretary; Thomas F. Meehan, assistant timer; W. C. Jackson, chief scorer; S. W. Waddington and L. W. Williams, assistant scorers.

ALL-CONNECTICUT RELIABILITY CONTEST

Definite announcement of the details of the All-Connecticut Reliability Contest has been made. The run will start May 19 and will extend over three days, covering about 600 miles. The affair will be conducted by the Contest Committee of the Automobile Club of Hartford, assisted by the automobile clubs of Bridgeport, New Haven, Litchfield County, Willimantic and New Britain.

PREPARE FOR ORPHAN'S DAY

Thursday, June 2, will be Orphans' Automobile Day in New York City. The place as usual, for the day's outing, will be Coney Island, although the exact amusement resort has not as yet been selected. This was decided upon at a well-attended meeting of the Orphans' automobile day committee of N. Y. Col. K. C. Pardee presided, with Alex. Schwalbach as secretary.

MAC MANUS-KELLEY MOVES TO DETROIT

In order to be close to the seat of greatest activity, the MacManus-Kelley Company has removed to Detroit. This big concern, which has a large and important clientele, is now located in the Ford Building, in the Michigan metropolis.

OWEN ON BOARD OF REO COMPANY

Raymond M. Owen, head of R. M. Owen & Company, general sales agents of the Reo Motor Car Company, has been elected vice-president and director of the latter company, having purchased the interest of R. Shettler, retiring vice-president.

In 1901, Mr. Owen was instrumental in placing the largest order on record up to that time for automobiles when he and his partner ordered 1,000 Reo cars for their New York territory. Three years later he arranged to market the entire product of the Reo company and since that time, largely as a result of his business foresight, over 30,000 Reo cars have been sold.

WINNERS IN SAVANNAH ROAD RACE

SAVANNAH, GA., Apr. 18—Winning cars in the three classes that competed in the recent Savannah-Jacksonville road tour were as follows:

Class A—Stevens-Duryea, 24-horsepower, driven by A. Solomon; perfect score. Class B—Cole, 30-horsepower, driven by R. S. Brown; perfect score. Class C—Maxwell, 12-horsepower, driven by Mrs. L. W. Hazard, and Hupmobile, driven by Chris Jacobs. They were tied with a perfect score.

BUICK WINS MATCH HILL CLIMB

W. J. Stoddard, of Atlanta, was obliged to act as host at a dinner party held at the Hotel Piedmont of that city as the result of a hill-climbing contest in which his car, a National 40, met defeat in the match event on Stewart avenue. A Buick 16 proved the winner. William Oldknow was the driver of the victor, as well as guest of honor at the dinner.

William Oldknow in Buick, Winner of Match Hill Climb at Atlanta

County Bridge Between Middletown and Shelbyville, Ky., Where Louisville Enthusiasts Met the Glidden Pathfinder

Glidden Pathfinder Has Varied Experiences

EVERY variety of automobile experience was enjoyed during the first week of the 1910 Glidden Tour, pathfinding expedition. All kinds of weather conditions have prevailed, except sandstorms and blizzards, but aside from delays, caused by washouts and swollen streams, satisfactory progress has been made.

Scout Lewis and his party have had a rather strenuous time in spots, but, as a whole, the trip has been enjoyable so far.

From Cincinnati to Lexington the roads are fine, having a limestone foundation and kept in excellent repair. From Lexington to Louisville the same delightful road conditions prevail, or at least they will prevail when the tour proper commences. A series of terrific rainstorms has swept the valley recently and, as a result, little streams boom along with a picturesque savagery that will undoubtedly be tamed by the middle of June.

The run to Nashville was generally pleasant, but in spots the pathfinders had to lend a shoulder or do some wading. A big welcome was given the car at Nashville. This city prides itself upon its progressive spirit, prosperous commerce and pretty girls, and the reception was particularly warm and hospitable. Nashville will be a night control of the tour and the advent of the pathfinders had the effect of arousing such a furor of automobile enthusiasm, that it is quite likely that before the tourists arrive there will be a full-fledged automobile club to act as hosts.

E. L. Ferguson, tour manager, and Mr. Lewis, scout, were called upon for advice as to the formation of the club. They recommend a democratic body with a low entrance fee and a wide scope of activity. The city has over 800 automobiles in use.

From Nashville the car crossed into Alabama where swollen streams and deep roads resulted in considerable hard work and more delay.

The weather began to clear and the going proved easier just before the close of the first week, but the Alabama rivulets effectually prevented anything like good time. Across the Mississippi River, the Arkansas roads are reported swampy and the trip across that State and on to Dallas will doubtless consume more time than was anticipated in making the preliminary schedule.

WILDWOOD CLUB LAYS PLANS FOR RUNS

PHILADELPHIA, Apr. 11—At a meeting last Wednesday night, the plans of the North Wildwood Automobile Club for the coming season were officially decided upon. They include the usual July 4 meet on the Wildwood Speedway, preceded by a club run from this city; a similar meet on July 30; a motorcycle meet on August 6, and the Labor Day wind-up on September 5, when an effort will be made to have all the national cracks on hand for a series of short-distance events on the Speedway.

The club's $12,000 club house, located on the Speedway, has been refitted, and the membership, now numbering 104, will, it is believed, be increased to upwards of 200, before Independence Day.

Arrangements were made for the entertainment of the contestants in the endurance run of the Motor Club of Harrisburg, who are scheduled to spend the night of May 10 at Wildwood.

A score of ladies, who compose the Ladies' Auxiliary were present at the meeting and the supper which followed.

ELKHART'S PLEA FOR GOOD ROADS

ELKHART, IND., Apr. 18—Co-operation of farmers and residents in the bettering of conditions of country roads is asked by the Industrial Association of this city. In an endeavor to prove to every resident of the northern part of the county the benefit to be derived from good roads, the association will shortly send out pamphlets to 10,000 persons giving statistics and facts to prove the need of such improvements. The book is entitled "Elkhart's Plea for Good Roads."

GARAGE OWNERS FORM ORGANIZATION

Garage owners of New York formed a preliminary organization Tuesday for the purpose of effecting a number of general reforms in that line of industry. The meeting was held at Reisenweber's and was attended by over a score of leading members of the business. The objects, as stated at the meeting, are to eliminate the criminal element among chauffeurs; to provide for concerted action and to foster the best automobile interests.

Durant and Morgan Deny Merger Reports

REPORTS circulated rather vigorously during the past week to the effect that J. P. Morgan & Company were preparing to merge several large automobile interests, have been met with sharp denials. The chief of these rumors was that the United States Motor Company and the General Motors Company, with all their ramifications, were to be amalgamated. J. P. Morgan, Jr., entered a positive denial of the alleged merger as far as the great banking house is concerned, and W. C. Durant of the General Motors Company was equally forceful in stating the position of his company.

"So far as they refer to General Motors," said Mr. Durant in speaking of the reports, "there is not a word of truth in them."

"The General Motors Company is not interested in any merger, pending or prospective, and I wish to state that the published and reiterated reports that J. P. Morgan & Company had any part in the formation of the General Motors Company is without semblance of truth. I might add that J. P. Morgan & Company have no interest in General Motors at present as far as I know.

"For over a year," continued Mr. Durant, "this company has carefully refrained from denying fanciful and baseless stories published about its antecedents and activities. Such denials would congest news space in many publications and if we had attempted to make them, the work involved would have proved burdensome. Another viewpoint from which this situation might be examined is that the public is likely to look upon denials of news and alleged news as a variety of undignified publicity.

"The company wishes to avoid giving ground for such an impression, which ought to be sufficient reason for our silence during a long period of misrepresentation. The company is not for sale."

A. L. A. M. SUING AND ALSO SUED

Litigation of the cross-fire order, based upon the Selden patents has been started for and against the Association of Licensed Automobile Manufacturers. The association recently filed seven suits at Detroit, naming as many unlicensed makers as defendants. These companies are: Owen, Abbott, Demot, Warren-Detroit, Paige-Detroit, Velie and Parry motor car companies.

Wednesday advices from Milwaukee tell of the filing of a suit for $500,000 damages by the Velie Motor Company of Moline, Ill., against the A. L. A. M. In the complaint it is alleged that the efforts to enforce the Selden patents works as a restraint of trade, within the purview of the anti-trust act.

MAKING PROGRESS IN SELDEN CASE

Judge Hough of the United States Circuit Court on Monday heard arguments with regard to a supplementary bill filed by the complainants in the suit of The Electric Vehicle Company and Selden against the Ford Motor Company, Panhard et al., to substitute the Columbia Motor Car Company for the Electric Vehicle Company, as party complainants. This action would have been unnecessary if the proceedings under the original suit had been followed out, but at the last moment the Ford company declined to accede to the substitution and the supplemental bill was resorted to.

The court allowed the attorneys until Wednesday to submit briefs covering the law points involved.

Los Angeles Meet Proves Success

ONE of the most spectacular race meetings ever given in this country was concluded when the motordrome meet at Los Angeles was finished last Sunday. The races demonstrated that the track is fast and comparatively safe and records fell like tenpins before the rush of the flying motors. Many of the contests were won by narrow margins and accidents were remarkably few.

The summaries:

April 13—First heat, ten-mile, free-for-all, Darracq (Kerscher) first, Fiat (De Palma) second. Time, 7:01.

Five-mile, free-for-all handicap, Stoddard-Dayton (Livingstone), 12 seconds, first; Marmon (Harroun), 10 seconds, second; Isotta (Marquis), 11 seconds, third. Time, 3:50.55.

Fifty-mile free-for-all, Fiat (De Palma) first, Stoddard-Dayton (Livingstone) second, Marmon (Harroun) third. Time, 37:55.53.

April 15—Ten-mile, stock chassis, 161-230 cubic inches, Buick (Nikrent) first, Cole (Endicott) second, Firestone (Miller) third. Time, 8:40.17.

Ten-mile, free-for-all, Fiat (De Palma) first, Fiat 90 (Bragg) second. Time, 7:11.62.

Ten-mile, free-for-all, stock chassis, 600 cubic inches, Fiat, (De Palma) first, Knox (Oldfield) second, Marmon (Harroun) third. Time, 7:38.23.

Ten-mile stock chassis, 451-600 cubic inches, Knox (Oldfield) first, Fiat (De Palma) second. Time, 7:22.92.

Fifty-mile, stock chassis, 390-450 cubic inches, Marmon (Harroun) first, Marmon (Wade) second. Time, 39:53.55.

April 16—Five-mile, stock chassis, 301-450 cubic inches, Buick (Nikrent) first, Marmon (Harroun) second, Marmon (Wade) third. Time, 3:56.68.

Ten-mile, stock chassis, 451-600 cubic inches, Knox (Oldfield) first, Stoddard-Dayton (Livingstone) second. Time, 7:20.66.

Two-mile match race between Fiat (Bragg) and Benz (Oldfield), won by Fiat. Time, 1:28.73.

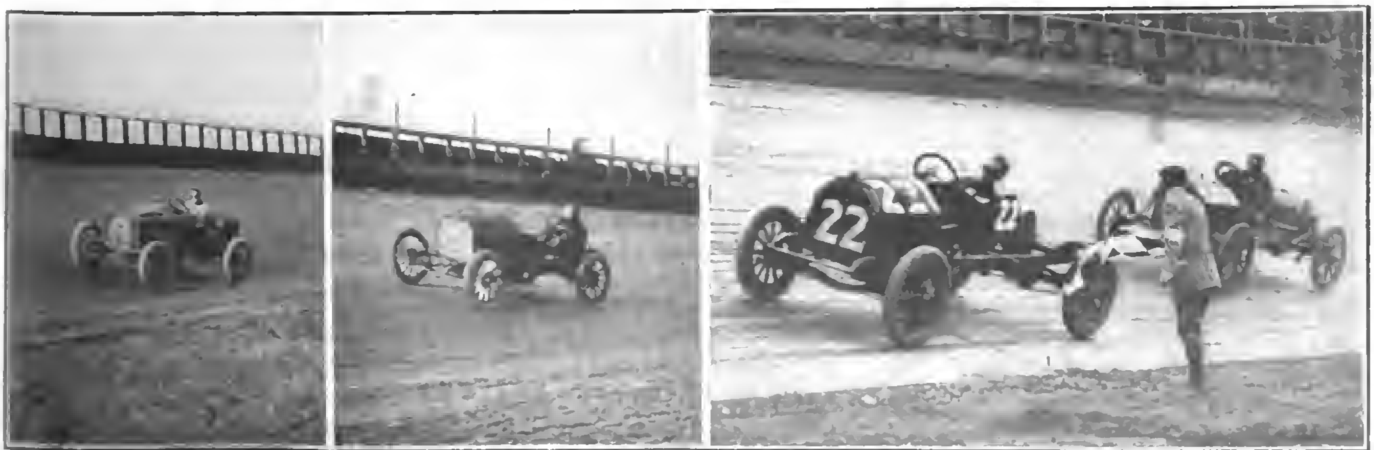
April 17—Ten-mile, 161-230, Cole (Endicott) first, Warren-Detroit (Miller) second, Buick (Nikrent) third. Time, 8:46.74.

Three-mile, stock chassis, Three Fords, driven by Pratt, Stearns and Olsen, finished in order. Time, 4:62.

Ten-mile, 301-450, Buick (Nikrent) first, Marmon (Harroun) second, Marmon (Wade) third. Time, 7:36.61.

Two-mile, second heat of match race, Fiat (Bragg) first, Benz (Oldfield) second. Time, 1:19.48.

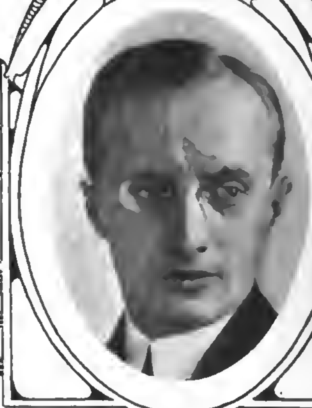
One-hundred mile, stock chassis, under 600, Marmon (Harroun) first, Buick (Nikrent) second, Knox (Oldfield) third. Time, 1:16:21.80.



Kerscher in Darracq, Robertson in Simplex, and Endicott in Cole Winning Ten Mile Stock Chassis Race at Los Angeles

Among the Garages

Fleet of White Taxicabs owned and operated in Boston by Saunders & Butler. This form of conveyance has become deservedly popular in the Hub



Frank G. Van Dyke, president of the Van Dyke Motor Car Company

Ground has been broken at Newport, R. I., for the most elaborate private garage in America for Mr. and Mrs. Edward J. Berwind, close to their estate on Bellevue avenue, and it will cost about $150,000. Of limestone and fireproof material, the building will measure 125 by 70 feet. It will be two stories high and will have sunken wells for gasoline. The main part of the building, with its wings, will have in the center an immense ring, where Mr. and Mrs. Berwind or their guests can try out new machines. The garage will be roomy enough for storing eight machines.

John Conway, T. W. Orbison and others on Washington street, Appleton, Wis., have become associated for the purpose of building a large fireproof garage at a cost of $25,000. The garage will be leased by Harry Griffin and Chester Scott, who have been operating a garage in connection with the agency for the Kissel, Buick and Cameron, in the former Ullman livery stable. The garage will be 50 by 125 feet, one story high, of solid brick and concrete. Fire walls will separate the garage from the repair shop at the rear, making it possible to do repair work at night by artificial light, without danger.

The Penn Auto Supply Company which recently opened a branch at 1407 Filbert street, Philadelphia, opposite the City Hall and Broad Street Station, has inaugurated an innovation by making the branch an "open-at-night" establishment, and the first week of the experiment has proved so successful that President John W. Lee contemplates making it a permanent feature. The same idea will be followed out at the company's Atlantic City branch during the Summer season.

The Van Da Grift Auto Car Company will open its new garage in Louisville about May 15. The plant will be fireproof, steam heated and modern in every respect. Both gasoline and electric cars will be handled and a complete machine shop in connection will furnish the means of reconstructing cars from wheelbase to canopy.

Howard G. Robinson, for several years garage manager for the Rauch & Lang Company, and A. J. Mills, who has had ten years' experience with gasoline cars, have opened a garage on Emily street, Cleveland. Before formally opening the new garage the two men had practically contracted for enough cars to fill it.

G. H. Luck & Company, Keene Valley, N. Y., have just completed their new fireproof garage on Market street. It is up to date in every respect. A first-class repair man will be kept, and any job outside a factory can be done. A full line of automobile supplies will be kept.

The Bound Brook Garage, Bates-Wilder Company, at North Scituate, Mass., is making an addition of about 1,500 square feet to the fireproof garage and is building a new office. The company is local agent for the Maxwell line.

Gadsden, Ala., is rejoicing over the starting of work on the garage of the K.-E. Auto & Electric Company on Broad street, between Fifth and Sixth. The building will be 50 by 100 feet, one story in height and fireproof, designed especially with view to occupancy as a garage.

The Toledo Garage & Supply Company, of Toledo, Ohio, was incorporated with a capital of $5,000 by George T. Browning, F. M. Bushong, E. E. Sheppard, Charles A. Langdon and Alvin C. Jones.

The Portage Motor Car Company, of Akron, Ohio, was incorporated with a capital stock of $5,000 by Louis P. Dettling, Emma C. Dettling, Albert Buehrle, B. Buehrle and Albert J. Engle.

The Howard-Cregor Company, of Nashville, will move into its new garage within the next week. The location is ideal, on Broadway, and the building is well adapted for its purpose.

The Rhinelander Iron Company, of Rhinelander, Wis., has started construction work on a new repair shop, 30 by 50 feet. The new building will have ample garage facilities.

Charles D. Fenn, of Antigo, Wis., has started the erection of a garage of solid brick, 26 by 75 feet in dimensions.

Brief Personal Trade Mention

H. A. Brown, Jr., formerly on the staff of the Hyatt Roller Bearing Company, has accepted an offer from the Holcomb Steel Company of Syracuse, N. Y. Mr. Brown's headquarters will be in the New York branch of the concern which makes a full line of automobile steel.

Harvey H. Colbath, manager of the Philadelphia Morgan & Wright branch, was married last Wednesday in the Protestant Episcopal Church of the Annunciation, to Helen V. Cadwalader. They are now enjoying their honeymoon in the South.

Alexander Winton, accompanied by Mrs. Winton, sailed for a trip to Europe on the *Mauretania*, April 13. After a short visit in Scotland, Mr. Winton expects to take delivery of his Antoinette monoplane at Paris.

George A. Horner was promoted to the post of general manager of the Rapid Motor Vehicle Company, of Pontiac, Mich., April 1, vice Harry Hamilton, who died recently.

C. Booth Tomlins, of Chicago, has been appointed manager of the motor car department of the W. H. Hobbs Supply Company, of Eau Claire, Wis.

F. A. Flint, assistant sales manager of the Moon Motor Car Company, was married on April 14 to Miss Nellie Allie Harper, of St. Louis.

H. J. Newman, designer of the Coates-Goshen Automobile Company, of Goshen, N. Y., resigned his position April 1.

With the Agencies

Group of finished Kisselkars, which were formed in line and driven from the factory at Hartford, Wis., to Chicago on account of shortage of freight cars there

S. H. Mora, president and general manager, Mora Motor Car Company

By a decision rendered by Attorney-General Denman of Ohio, it is held that all dealers in motor cars must take out licenses as such. The term agent means one who either handles automobiles for himself or for someone else. The licenses that are to be given agents are the same as those given manufacturers of automobiles.

A branch of the Franklin Automobile Company has been formed at Baltimore with Edward W. Orr as manager. The company has established headquarters at Maryland and Mount Royal avenues. The Franklin car was formerly in the hands of the Mar-Del Company, now exclusive agent for the Packard cars.

J. T. Sweeney, until recently purchasing agent for the Times Square Automobile Company of New York and Philadelphia, has organized the Sweeney Automobile Company and opened salesrooms and offices at 208 North Broad street, where he will deal in high-grade used cars exclusively.

F. C. Reamer, Jr., and Carroll A. Haines, with headquarters at the Park Garage, 2214 Spring Garden street, have been awarded the Philadelphia agency for the Baker electric, which was bandled in the Quaker City some years ago by the Foss-Hughes Motor Car Company.

E. R. Jackson, who formerly managed the White branch in Baltimore, and later connected with the Studebaker branch in Philadelpbia, has transferred his allegiance to the Longstreth Motor Car Company, Philadelphia agents for the Pullman and Alco.

The Hokanson Automobile Company, of Madison, Wis., bas established a branch at Monroe, Wis. Temple Robson, of Benton, Wis., and William G. Breessee, formerly associated with the Holloway Auto Company, of Monroe, are managers.

Frank Lawell, manager of the Franklin Motor Car Company, of Columbus, has taken the Central Ohio agency for the Inter-State. The agency will be handled from the office of the Franklin Motor Car Company, North Fourth street.

A partnership consisting of E. E. Minick, H. S. Pitz and Dr. Sniveley has been formed to take over the Central Ohio agency for the Cole "30," which has been handled by John T. Gill. The agency covers six counties in Central Ohio.

Ralph P. Dowse and L. H. Christian, of Detroit, have taken over the agency of the Car Makers' Selling Company in the Southwest, and will handle the Anhut, De Tamble and Cutting cars from Kansas City headquarters.

August Huerth, of Madison, Wis., and Jobn Knipschield, of Merrimac, Wis., have opened a garage and repair shop in the Gaukel Building at Sauk City, Wis. They will represent the Oldsmobile and Buick.

F. S. Hyatt, purchasing agent of the Columbia Motor Car Company at Hartford, and its predecessor in business, the Electric Vehicle Company, has resigned and has been succeeded by Lyman Smith, of that city.

Fred. E. Devlin, formerly connected with the Pierce-Arrow agencies in Baltimore and Pbiladelphia, has been appointed manager of the Hills Motor Car Company, Philadelphia agents for the Royal Tourist.

Dr. Wadsworth Warren, Detroit pbysician, bas joined the forces of tbe General Motors Company, and will have charge of the racing team which will be put out by the Buick Company this Summer.

Benjamin O. Willebrands, until recently general manager of the Willebrands Machinery Company, is now associated with John P. Schneider, veteran automobile dealer, in Detroit.

The Ford Motor Company has leased a large four-story brick building at 5929-5931 Baum street, East End, for five years and will remodel it for its permanent city headquarters.

On page 533 of The Automobile, published March 17, the picture of a fire department automobile which is credited to Taunton, Mass., should be credited to Tampa, Fla.

The Burton-Littlewood Company, 112-114 East Wilson street, Madison, Wis., has been made sales agent for the Studebaker line in a large territory of Western Wisconsin.

D. Tbomas Kennan has been appointed manager of the branch of the Swinehart Tire and Rubber Company just established in Philadelphia, at 1437 Vine street.

The agency of the Mea Company, high-tension magnetos and the S. R. O. ball-bearings, has removed to larger quarters at 1777 Broadway, New York.

H. L. Hoppe, former agent of the Hupmobile, has taken the Hartford agency for tbe Warren Detroit, another of the Western newcomers in that section.

R. D. Rockstead, 323 East Wilson street, Madison, Wis., has been appointed southern Wisconsin representative of the Warren-Detroit.

The Swinehart Tire & Rubber Company has opened a Boston branch at 727 Boylston street. A. J. Greene is in charge.

The Deere Implement & Vehicle Company, of Montgomery, Ala., will handle the Jackson this year.

Dinsmore & Calkins, of Delavan, Wis., have been appointed agents for the Maxwell and Overland.

W. J. Cochrane & Son, of Fox Lake, Wis., are new agents for the Jackson and Fuller lines.

E. E. Houk, of Nashville, Tenn., will handle the Jackson line of automobiles the coming year.

Making a Demonstration

A

B

C

D

A—Alco Car in Fire Department Service at Schenectady, N. Y.
B—Palmer-Singer Car in Which Lewis J. Lampke Made Trip to Coast
C—Lozier Lakeland Model Used by Joseph M. Gilbert of Tire Fame
D—Hupmobile Which Will Prove Strenuous Ability in Flag to Flag Race

(A) In view of the well developed inertia of the average municipality, those who have occasion to note the progress which is being made in the adaptation of automobiles for fire department service are much inclined to the opinion that it will be but a matter of a year or so when the chief and the field officers of every department of any moment in the country will respond to alarms with the speed which comes from using automobiles. As an example of this character of activity, this illustration presents a 40 horsepower Alco operated by Chief Engineer Henry R. Yates, of the Schenectady, N. Y., Fire Department.

(B) The time has now arrived when family tours extend across the continent, not infrequently, and it is in these long jaunts that evidences of mechanical refinement of automobiles drop out. Obviously it would be an enormous undertaking, fraught with much hardship, were tours of great length undertaken, unless the automobiles used could be implicitly relied upon. Lewis J. Lampke, wife and family, in a Palmer-Singer 40 combines business with pleasure in a trip which he is making from the Atlantic to the Pacific, in which he has scheduled calls upon his customers.

(C) That the gun-boat type of body offers unusual opportunity for touring under pleasurable conditions seems to be a fairly established fact, and Joseph M. Gilbert, manager of the Continental Caoutchouc Company, after a most pleasant experience in a Lozier Lakewood model, is an enthusiastic advocate, claiming that it lends itself either to rapid work or loafing.

(D) The Flag to Flag Contest offers wide opportunity for the strenuous testing of automobiles, and E. W. Swanbrough, of Denver, has entered a Hupmobile, with a view to showing how well this make of car will travel from Denver to Mexico City. The distance strings out on the tape for long, but this is not the important matter; the car will have to negotiate 1,000 miles of sand-strewn flats, some scores of troublesome rivers, and a desert or two.

Exterior

Grill Room

MOTOR RACING ASS'N CLUBHOUSE

FORMAL opening of the new city clubhouse of the Motor Racing Association at 304 West Fifty-eighth street took place recently when a reception was held to the newly elected associate members of the association. The commodiousness and attractiveness of the club building was a decided surprise to the several hundred people who were present. These were welcomed by C. F. Wyckoff, president; E. R. Hollender, vice-president; Carl H. Page, treasurer, and W. C. Allen, secretary.

The building, an old brownstone mansion, has been fitted for club purposes and has every equipment and convenience to make a comfortable and attractive town house for those interested in speed competition or in the trade. On the main floor are located the offices of the M. R. A., a reception and a dining room. On the floor above are billiard and pool tables. Card and writing rooms occupy the third floor, while on the fourth floor are located several suites of sleeping apartments.

Reception Room

Billiard Room

Office

Card Room

Seventieth Street Front of Winton Combined Office, Sales, and Garage Building, Showing Two Garage Entrances

Prominent New York City Garages—II—Winton

IN a city the size of New York there are many large garages which can do very well taking in but one class of or one make of cars, that is, the product of but one maker. In this class might be described the garage of the Winton Company, located well up in Automobile Row, at the northeast corner of Broadway and West Seventieth street. While other makes of car are not refused, it has just happened that the clientele of this garage numbers so many Winton owners as to take up all of the available space, and thus, the place has received the name of being exclusively a Winton garage, which of course, is not the case.

The garage part of the building—the Broadway front is utilized as a salesroom and offices for the New York Winton branch—is located on the entire second, third, and fourth floors of the building, the entire roof, and the Seventieth street front of the ground floor, there being no basement. The entrance is

View on Second Floor, Devoted to Live Storage. Also Third Floor, for Dead Storage

Fourth Floor Showing Machine Shop, Also Roof with Repair Work in Progress on Two Cars

on the Seventieth street side, through two twelve-foot doors, between which are located the garage offices and checker.

Driving straight in to the center of the building, the elevator is reached, which serves the floors above. The whole available space of the ground floor—necessarily small on account of leaving space from both the doors to the elevator—is used for live storage, as is also the whole second floor. Above that, the third floor is given up wholly to dead storage, while the fourth floor houses the repair shops, some dead storage, and when pressed for room, some cars on live storage also. Above this, the roof shows a unique feature, being finished off just like any of the lower floors, excepting only for the covering, which is but 25 or 30 feet wide around the south and west sides. Under this roofed part, are placed electric lights, while the elevator shaft carries up, that making of the roof an additional floor of full size in fair weather, and about half size during bad, cold, or inclement weather. At the time the pictures shown herewith were taken, this roof was being used for dismantling two cars, preparatory to spring overhauling and repairing.

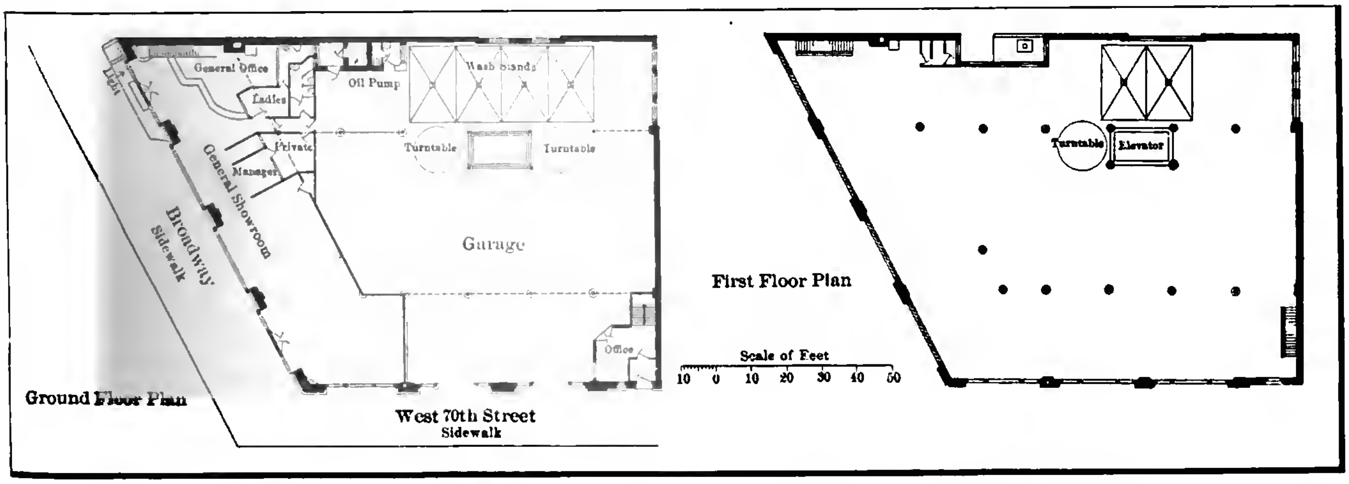
The building is comparatively new, having been built but three years ago, that is, in the fall of 1907, and like all modern buildings, is well equipped. Gasoline and oils are kept on the ground floor, a special room containing the latter, in barrel lots, while the former, is housed in a 400-gallon tank, in a separate room, of brick, and kept locked at all times.

The full capacity is said to be no less than 110 cars on live storage and 75 on dead storage, the whole capacity being slightly less than 200 cars, the present distribution being according to the figures given. To handle this number of cars, and handle them properly, about 50 to 55 men are employed, exclusive of sales and office employees, who are kept separate.

In the arrangement of the distribution of the cars, the vital point in a city garage where space is at a premium, the arrangement is good, consisting of the aforementioned elevator in the center of the building with turntables on each side of it on the ground floor, and on but one side on all other floors, except the roof, where there is no turntable. Not all of the turntables are in constant use, they being of an old pattern, but on the floors where they are in working order, the men find them a very useful adjunct, saving as they do much manual labor in pulling and hauling the cars around, as well as saving the tires.

On the ground floor are also located the lockers for chauffeurs, the rest or play room for the latter, as well as the washstands for the cars. On each of the upper floors, there is placed one or more additional washstands, so that the car may be washed and then taken to its proper floor, or taken up to the floor on which it belongs and washed there, just as circumstances would seem to indicate which course was best.

The machine shop is complete as garage machine shops go, and has in connection with it a very large stock room, containing not only repair parts for all model Winton cars, but also a good supply of standard parts, bolts and nuts, bar stock, and similar material, which would be necessary in the repair of any make of car.



Winton Garage—Ground Floor and Typical Higher Floor Plans, Showing Irregular Shape of Building

THE LAW OF THE ROAD

(*Continued from page 769.*)

RIGHT OF WAY

Police, fire department, fire patrol, traffic emergency repair, U. S. Mail vehicles and ambulances shall have the right of way in any street and through any procession.

Subject to Section I of this article, everything being equal, all vehicles and street cars going in a northerly or southerly direction shall have the right of way over all vehicles and street cars going in an easterly or westerly direction.

Subject to Section I of this article, street cars shall have the right of way between cross streets, over all other vehicles; and the driver of any vehicle, proceeding upon the track in front of a street car, shall immediately turn out upon signal by the motorman, driver or conductor of the car.

No vehicle or street car shall so occupy any street as to interfere with or interrupt the passage of other street cars or vehicles.

A vehicle waiting at the curb shall promptly give place to a vehicle about to take on or let off passengers.

The driver of a vehicle, on the approach of a fire engine or any other fire apparatus, shall immediately draw up said vehicle as near as practicable to the right-hand curb and parallel thereto and bring it to a standstill.

The driver of a street car shall immediately stop said car and keep it stationary upon the approach of a fire engine or other fire apparatus.

MAXIMUM SPEED

No vehicle shall proceed at any time at a greater speed than the law allows and is safe and proper under the conditions then obtaining.

No vehicle shall cross any street or avenue running north and south or make any turn at a speed rate exceeding one-half its legal speed limit.

OVERTAKING STREET CARS

A driver of a vehicle overtaking a street car shall exercise due caution not to interfere with or injure passengers getting on or off said car.

GENERAL PROVISIONS

No one shall drive a vehicle that is so covered in or constructed as to prevent the driver thereof from having a sufficient view of the traffic following and at the sides of such vehicle.

No one shall drive or conduct any vehicle in such condition, so constructed or so loaded as to be likely to cause delay in traffic or accident or injury to man, beast or property.

No one shall so load a vehicle, or drive a vehicle so loaded, with iron or other material that may strike together without its being properly "deafened" so as to cause no unnecessary noise.

No one shall ride upon the rear end of any vehicle without the consent of the driver, and when so riding no part of the person's body shall protrude beyond the limits of the vehicle.

RIGHTS AND DUTIES OF DRIVERS AND PEDESTRIANS

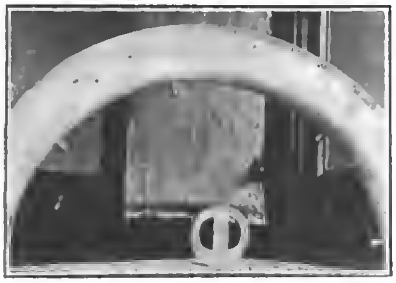
The roadbeds of highways and streets are primarily intended for vehicles, but pedestrians have the right to cross them in safety, and drivers of vehicles and street cars must exercise all possible care not to injure pedestrians. Pedestrians should, on their part, never step from the sidewalk to the roadbed without first looking to see what is approaching, and should not, needlessly, interfere with the passage of vehicles or street cars.

By crossing a street as nearly as possible at right angles, preferably at a regular crossing, and when a traffic policeman is stationed there, by waiting for his signal, pedestrians will greatly add to their own safety, facilitate the movement of traffic, and make it much less difficult for the horses, which often have to be reined in suddenly and painfully to avoid careless and unthinking pedestrians. Nothing in the foregoing should excuse drivers from constant vigilance to avoid injury to pedestrians under all conditions.

The word vehicle includes equestrians, led horses and every-

PROMINENT ACCESSORIES

The old problem of producing a puncture-proof automobile tire without reducing air space and the resiliency (which is the main purpose of a tire) too much, has found a new solution through the efforts of Dr. T. J. Cooper, of Paterson, N. J., who has produced the "Fear-Naught" tire shown in the accompanying illustration. Dr. Cooper is a veterinary surgeon, like Dunlop, the erstwhile inventor of the pneumatic tire, and has spent a good part of the past eight years in bringing his invention into practical shape, the difficulties lying mostly in perfecting manufacturing processes so as to reduce cost and weight to a minimum. It can now be made either as a plain single-tube tire to be fastened to the rim and prevented from creeping by means of metal studs projecting at intervals from the inner periphery, or provided with flanges of rubber and fabric for application to the universal clincher rim. A "Fear-Naught" tire of the latter type of 3⅛-inch diameter and adapted for a 30 by 3-inch rim weighs 22 pounds, while an ordinary clincher tire of 2⅞-inch diameter. adapted for the same rim, weighs 15 pounds. The difference is due mostly to the thick vertical web, made of rubber 50 degrees pure, which separates the air space in Dr. Cooper's tire into two parallel divisions, and to which are due the tire's non-collapsible and almost puncture-proof qualities.



View of Cooper Tire Showing Lugs

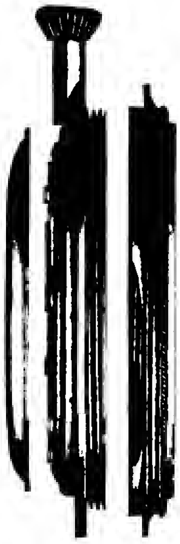
The tire is inflated through a single valve, from which the air duct forks Y-like through the vertical web, and the apertures to each of the air chambers are closed with one-way rubber flap valves admitting air during inflation but preventing one chamber from losing its inflation if the other should happen to become punctured. Even if both chambers are deflated, however, the tire still supports its load and no rim cutting takes place, as has been proved to users by severe and long-continued tests, especially in Paterson, where several automobiles have been fitted with these tires for four years. The inventor himself used one on a rear wheel of an automobile, and wore out three other pneumatic tires on the other rear wheel in competition with it. Dr. Cooper is negotiating with the Board of Trade of his home town with a view to arranging for the establishment of a manufacturing plant.

Section of Cooper Tire with Air Space

Carbon removal is at best a difficult job, and one that is never welcome to the amateur owner, nor to the professional chauffeur. So, it is with great relief that car owners and drivers are now turning to the various preparations on the market for doing this work, but doing it insidiously and quietly, without tearing down the engine. One of these decarbonizers is called by the makers, the Flash Manufacturing Company, Zanesville, Ohio, "Flash," from its very rapid action. This decarbonizer is a compound dissolvent in dry form, that is, a powder, which is placed in the cylinders, is aerated by the combustion, and the mephitic vapors given off check the formation of carbon, or if already there, loosen it from the cylinder or other walls, so that it is blown out through the exhaust pipes.

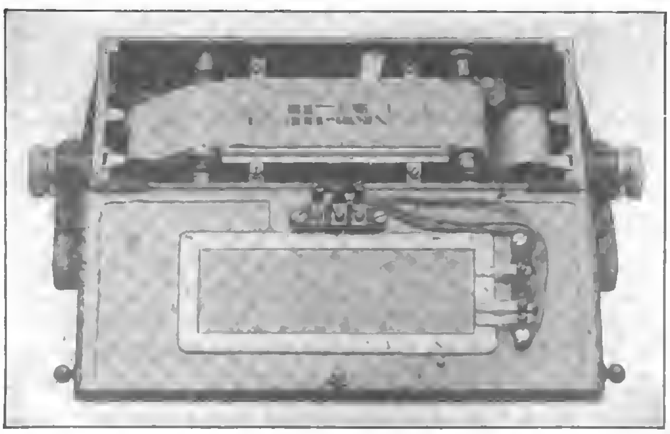
A new spark plug, the Blue Blaze, is that made and sold by the National Steel Products Company, Lorain, Ohio. The greatest features of this plug is that the lower or firing end is closed with the exception of a single very small diameter hole. The spark is thus made inside of the body of the plug, and passes out to the combustion chamber through the small hole. The result is that no soot or carbon can accumulate, the action being that of self-purification. So well has this worked in actual practice that a Blue Blaze plug has been known to run sixteen months without removal from the cylinder, to say nothing of cleaning. The plug is made with both porcelain and mica cores, the buyer being offered his choice.

A new watch for use in broughams, landaulets, and other closed cars is that of the New England Watch Company, Waterbury, Conn. As the illustration shows, the back of the watch snaps on, making the delicate mechanism of the inside dust and damp-proof. The watch is fitted to the toilet case by screwing the front or bevel to the flange, so that the watch and toilet case are the same as if made in one. The dial has heavy black figures and hands, making it an easy matter to read the time by means of it at any time of day or night. The movement is very high class, being fitted with a double-roller lever movement, seven jewels, Breguet hair spring, cut expansion balance, etc.



New England Watch Company's Limousine Watch

Since one's location on the road is fully as important as the speed, the time, or the condition of the road, a new device, herewith illustrated, should find favor with automobilists. This is a position indicator, which shows at all times the exact location of the machine upon the road which is being traveled. In appearance, it is a square wooden box about 6 in. high and wide by 10 in. long, which is fastened to the dashboard. On the upper glass face, a ribbon or map passes under a thread which indicates the automobile position. The map, corresponding to the route traveled, and being geared to the wheels, the correct position is always shown.



Hofmann Location Indicator, a New Device

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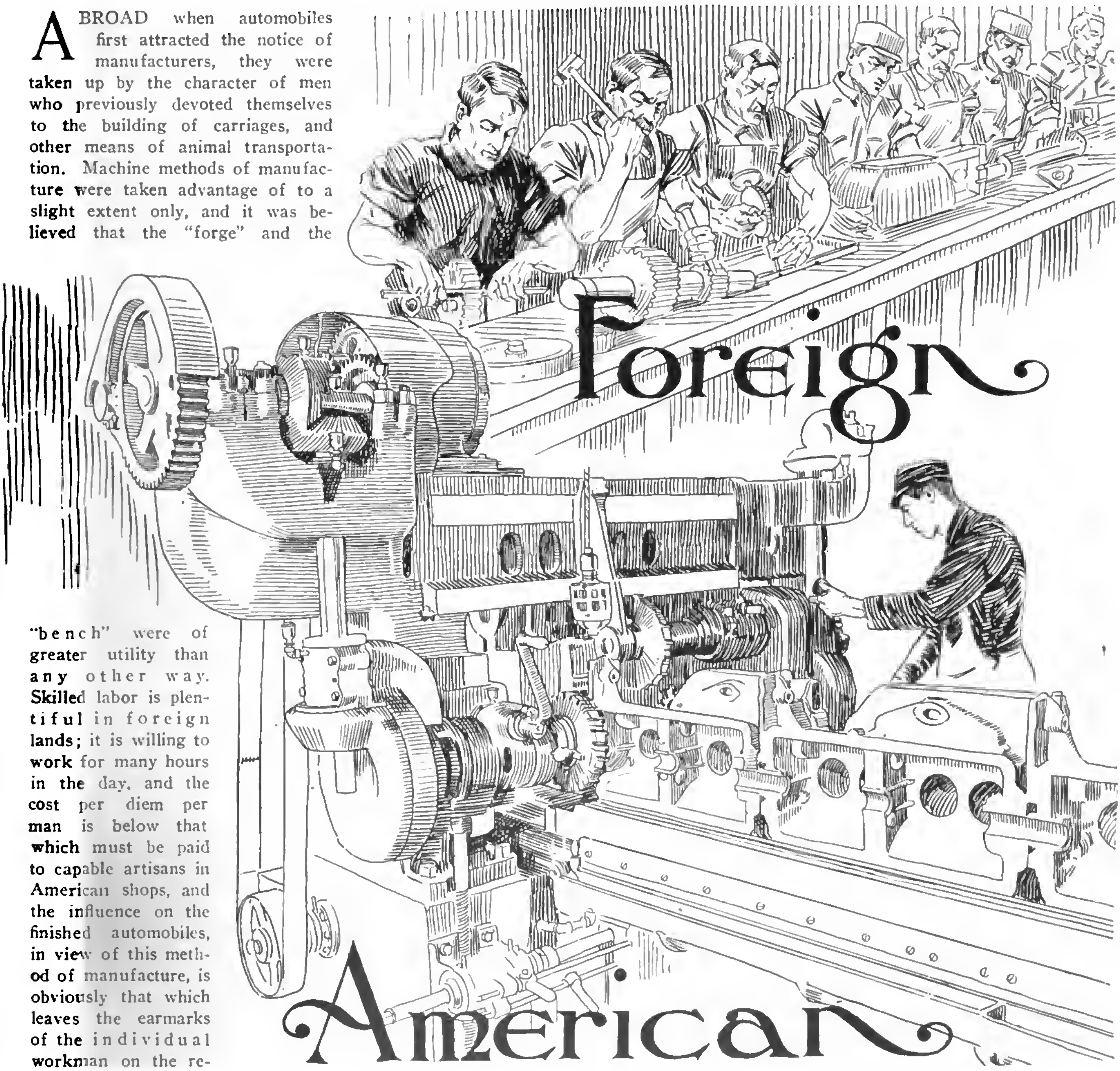
THE AUTOMOBILE

HOW PRODUCTION PROBLEMS ARE SOLVED

ABROAD when automobiles first attracted the notice of manufacturers, they were taken up by the character of men who previously devoted themselves to the building of carriages, and other means of animal transportation. Machine methods of manufacture were taken advantage of to a slight extent only, and it was believed that the "forge" and the "bench" were of greater utility than any other way. Skilled labor is plentiful in foreign lands; it is willing to work for many hours in the day, and the cost per diem per man is below that which must be paid to capable artisans in American shops, and the influence on the finished automobiles, in view of this method of manufacture, is obviously that which leaves the earmarks of the individual workman on the respective automobiles.



The finished product so made is at the expense of an unusually large number of man-hours, and the quality of the product, aside from the question of the material employed, is the net and direct result of the skill of the workmen employed. The total cost of these cars would be enormously high in America, because living wages are paid to the men who do the work, and in this country, in order to be able to satisfy all phases of the problem, dependence is put upon highly developed

Fig. 2—Battery of Fellow's shapers, which are substantially automatic, requiring but one man to keep them running

machine tools, under certain well-defined conditions of manufacture, thus eliminating the army of workmen, unusually long hours of labor, and certain other involved variables.

Despite the cheapness of labor as it obtains abroad, and the low price commanded for the materials used, the prices of foreign automobiles were found to be so high that they were regarded in this country as toys for the luxuriantly inclined. Experience, and the extension of output, tended to the lowering of the unit price of cars so made, but it was soon found that a popular level could not be reached, even when the workmen were urged to the point where a semblance of interchangeability of the parts is all that could be claimed.

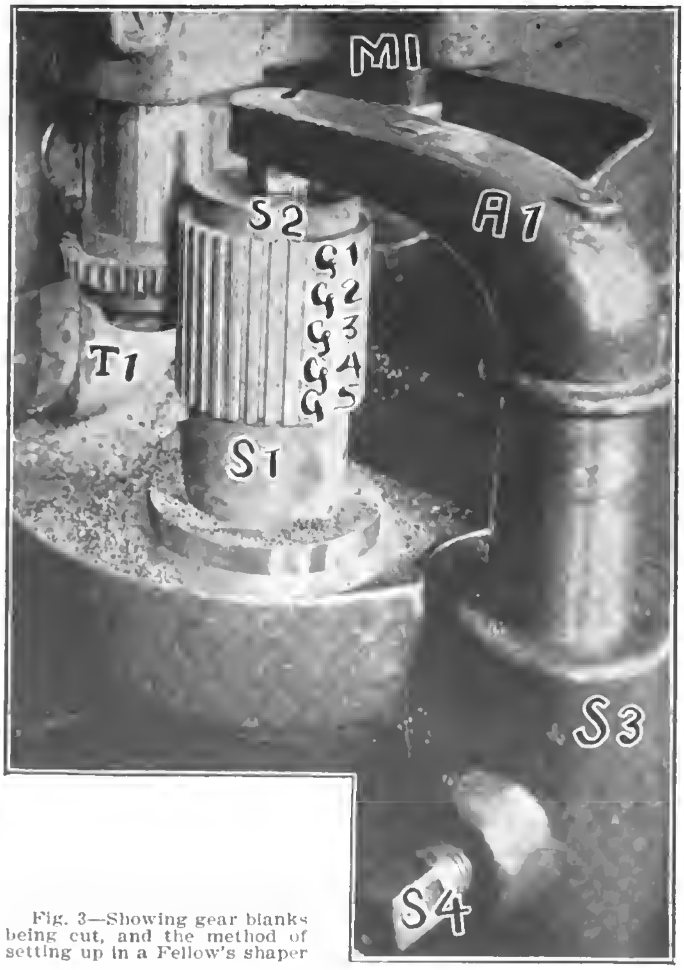


Fig. 3—Showing gear blanks being cut, and the method of setting up in a Fellow's shaper

Some of the earlier efforts in America were in replica of these foreign attempts, modified somewhat perhaps, by the influence which the machine tool methods of that time necessarily brought to bear. Under such conditions, even the American manufacturing situation left a trail of formidable difficulties, which had to be erased before it could be said that quality and price were as companions in the enterprise.

HERE WERE IMPORTANT MATTERS TO BE CONSIDERED

It was soon ascertained that interchangeability of the component parts of automobiles was not possible when a plurality of men were depended upon for co-operation in the process, nor did it matter if the men, severally, were skilled. No two men, however equipped with instruments of precision, are agreed as to the dimensions of given parts, although it is true that the amount of the disagreement is but slight in many cases. The difference is always sufficient to make it impossible to ship a repair for an automobile to a distant point, and feel that it will go into place without having to be dressed and fitted at

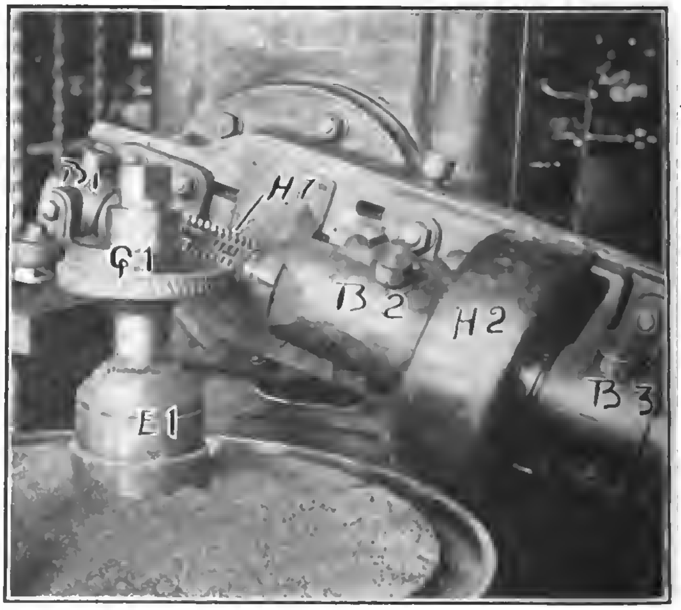


Fig 4—Hobbing machine working on the balancing gear of a Brush Runabout motor, showing continuous cutting operation

the expense of some skill on the part of the man who may do the work, and with a fair chance that the part may have to be centered in a lathe or in a grinder, and brought down to suitable dimensions, all things considered.

Interchangeability of the component parts must certainly be regarded as one of the important considerations, but a hand-whittled automobile can never measure up to this requirement, because the limit of tolerance will never strike within the range required. As an illustration of the exactness demanded, if the parts are to be interchangeable, it is only necessary to call attention to the great influence that a slight change in dimensions will have upon the fit of certain parts. It is well understood that a flywheel, for instance, if it is not securely adhered to the crankshaft will go adrift, and the damage it will do, in view of the energy it stores, is past reckoning. Let it be assumed that the flywheel is fetched up on a taper, which may be say, 3/16 of one inch per foot. Were the diameter of this taper to vary from a given standard by barely 0.001 of an inch, the flywheel would have to be moved up on the taper 1-16 of one inch. In other words, for every variation in diameter of the taper, the axlewise movement of the flywheel on the shaft will be 62 1-2 times the diametral variation.

The foregoing is not an unusual example of the differences which must be reckoned with when variations creep in during the manufacture of parts. That these variations will obtain, is an unavoidable certainty if a standard is not adhered to, and if each workman relies upon his own skill in the search for accuracy. In the absence of an arbitrary mechanical standard, there will be nothing but the plurality of standards of the respective operators; each one will have his own version of what he terms a neat fit, and there is nothing so surprising as the differences of opinion which actually do obtain as between men of recognized skill in this connection.

The quality of an automobile is not necessarily reflected in the design, as the same may be expressed in drawings. The engineer gives expression to his views when he supervises draftsmen, and they reduce the product of his creative genius into working drawings. The drawings serve for a certain utility purpose, if they are so clearly executed that they tell the workman what to do in definite language. It is a well established fact that while a one-inch round plug should go into a one inch hole, no one has ever succeeded in accomplishing the feat, and in practice an allowance must be made to satisfy an incongruous situation.

Limits of tolerance, if they are properly expressed upon the

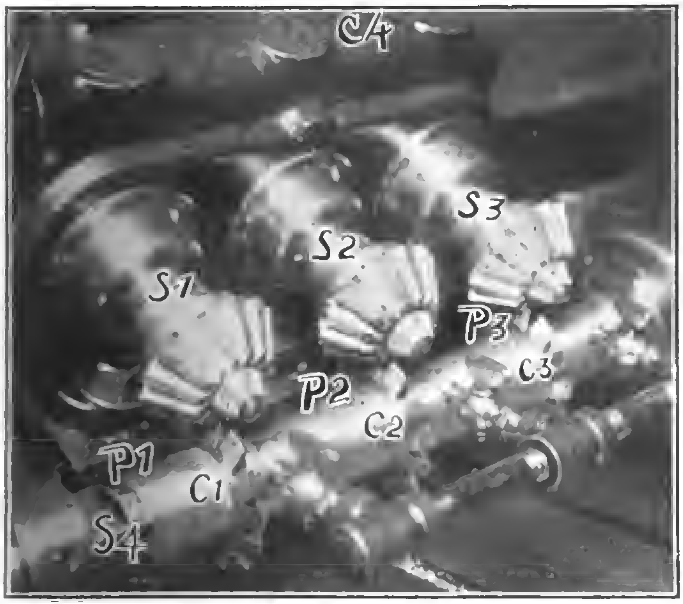


Fig. 5—Beveled pinions in a gashing machine with fixed cutters working three sets at one time

working drawings, tell the workman how much of an allowance he may be permitted to make, having in mind the necessity of so manufacturing the parts that they will satisfy the interchangeability idea. These limits must be varied with the diameters of relating parts, as for illustration, tbe practicable difference, considering a part with a one inch diameter, may be considerably less than the difference which will have to be instituted when the parts are say six inches in diameter.

This situation is so fraught with complication that the tabular values of the allowable limits of tolerance, require years of refinements ere it can be said that the interchangeable situation will be adequately represented, and the principle of operation is such that the algebraic sum of the allowances must be equal to zero.

PREDETERMINED INACCURACY PRESENTS THE RIGHT IDEA

From what has been said, a normal conclusion may be reached when it is decided to control the inaccuracies with the drawings in hand with which to execute the scheme of the designer, and the limits of tolerance thereon, which will tell of the allowable variations; the workman may then be permitted to proceed, but unaided by some further and scientific process, he cannot possibly execute the design on a basis of interchangeability. If it

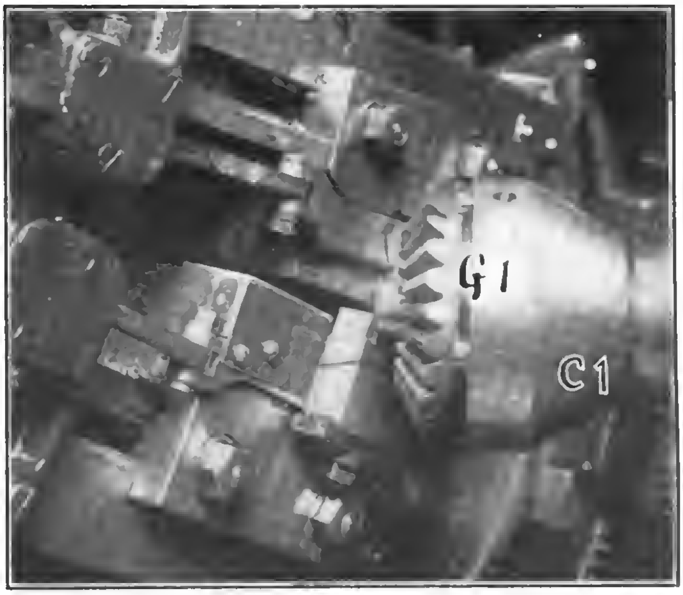


Fig. 6—Gleason planer profiling bevel gears after they have been gashed in the milling machine

is admitted that no two workmen can measure a given diameter of a part and arrive at the same conclusion, this is equal to admitting that no two workmen can make a given allowance in departure from a neat diameter. It is just as difficult to machine a part down to some variable from a fixed diameter; as it is to execute the work in the absence of any allowance at all, unless it is true that the allowable variation is several times that which should obtain on a basis of the interchangeability of parts.

Even with the accurate machine methods, as they obtain at the present time in America, limits of tolerance must be taken advantage of in order to satisfy the situation. The machine process has for its basis the quick and

Fig. 7—Double spindle vertical boring equipment with a special fixture, working on Regal cylinders

substantially accurate method of production so contrived that the variable, whatever it is, will be the same in all the parts produced, no matter how many men are employed, or which one of them performs a given operation.

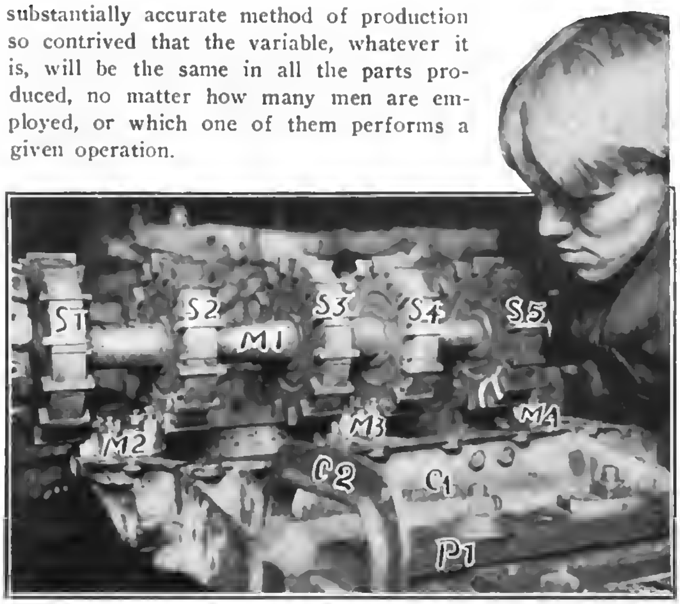


Fig. 8—Regal crankcase having main bearings ended off by means of a straddle mill set on a large milling machine

What the American makers of automobiles started out to do was to reduce the cost of automobiles without reducing the quality thereof. They were compelled to consider the higher cost of American labor, and the use of good material naturally had a further influence on the cost, with an upward trend. The very fact that American labor will take the initiative when it is left to its own devices constitutes a danger, and the personal equation represents a serious situation, which, like the inaccuracies of process, must be subdued and controlled.

DRAWINGS ARE NOT USED TO BUILD AUTOMOBILES

In the execution of the plan of the designer, since no two workmen can be depended upon to arrive at the same conclusion in measuring the dimensions of the parts, it is a self-evident fact that drawings are valueless for the purpose; what they are for, and why they are made, is quite another story. Workmen, in order that they may be utilized under conditions of rapid production, are given the required special machine tools to operate, and the parts to be machined are locked into fixtures, which are so contrived that they serve as jigs, and the cutting processes, whatever they may be, are done by means of special tools, which are sharpened and sized in a tool room by men who are schooled in the art. Under such conditions, if a workman is required to drill say four holes in the flange plate of a cylinder, all he can do is to mount the cylinder into a fixture in the one way that it will go, lock it into place, and with the drill given him, which is properly sized before he gets it, drill the four holes just where they register, by means of the jig plate, which is a part of the fixture.

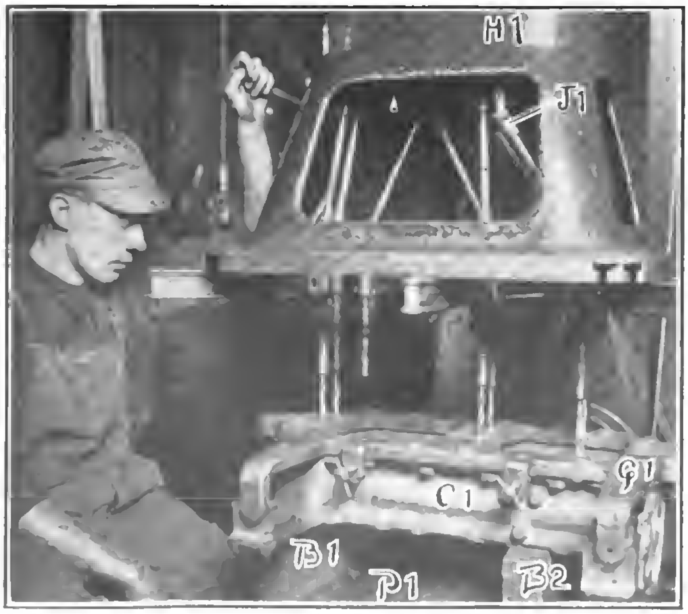


Fig. 9—A multiple spindle drill having 16 spindles, some of which are engaged on a Regal crankcase, guided by a jig

What the drawings are for, then, is to guide the toolmakers who produce the special fixtures, jigs, gauges and tools. If there is any inaccuracy it is that which will come from mistakes made hy the toolmaker specialists. By a system of checking in the

Fig. 10—Multiple spindle drill in the Regal plant working in conjunction with a jig fixture, reaming connecting rods

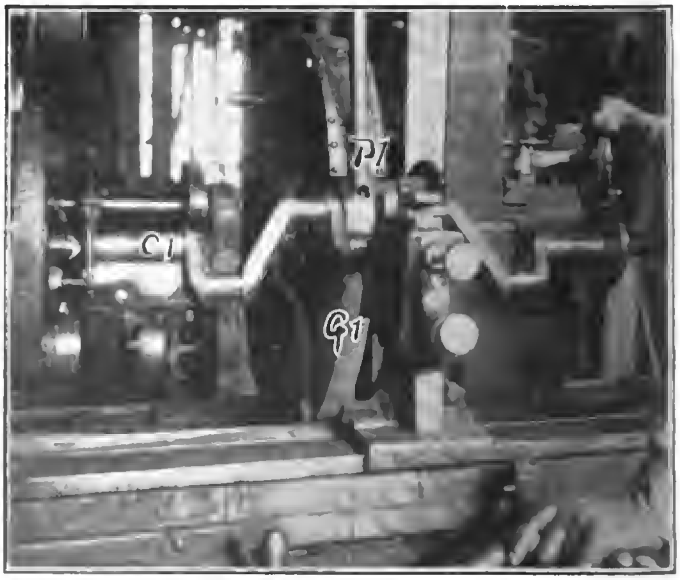


Fig. 11—Landis Grinder in the Regal plant finishing crankshaft bearings to make them round and true

tool room, all such mistakes are likely to be discovered. Even if a mistake should be made in the production of a fixture, it does not necessarily react to disadvantage, because every automobile produced will have this mistake in it and the parts will be interchangeable notwithstanding its presence. It is perfectly feasible to standardize a part, even though departure may be made from the drawings, the difference, if it creeps in during the production of the tools, may be tolerated if only it does not interfere with the manufacture and assembling of the products, nor is it far-fetched to reach the conclusion that a mistake from the toolmaker's point of view, ceases to be such.

DIVERS MAKERS FURNISH A WORKING EXAMPLE

If it is understood that the accuracy and speed of production is dependent upon the process and the machinery equipment, rather than upon the skill of the workmen and other like considerations, the reader will be ready to go into the shops and review the processes involved and employed, in order to learn why it is that American automobiles may be produced in the large numbers that they are, and be the better for it. The very facts reviewed thus far reflect quality as the companion of

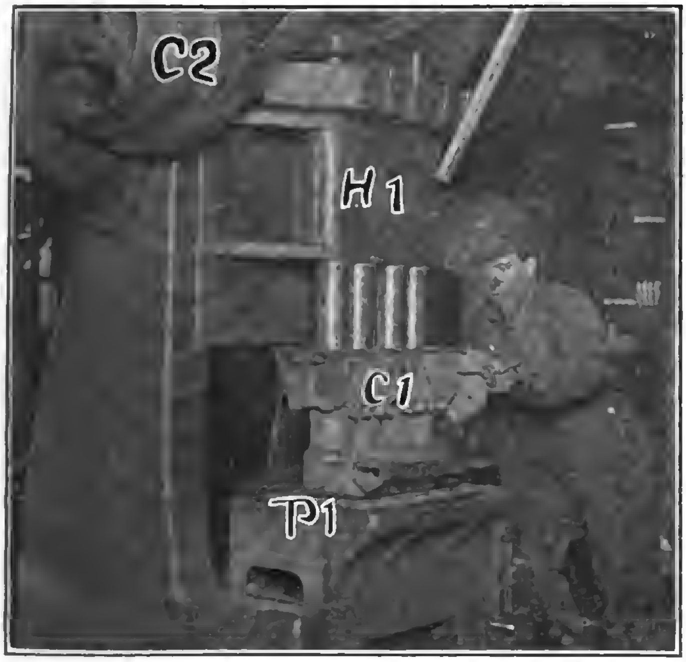


Fig. 12—Special vertical boring mill with 4 spindles so spaced as to finish Everitt en bloc cylinders simultaneously

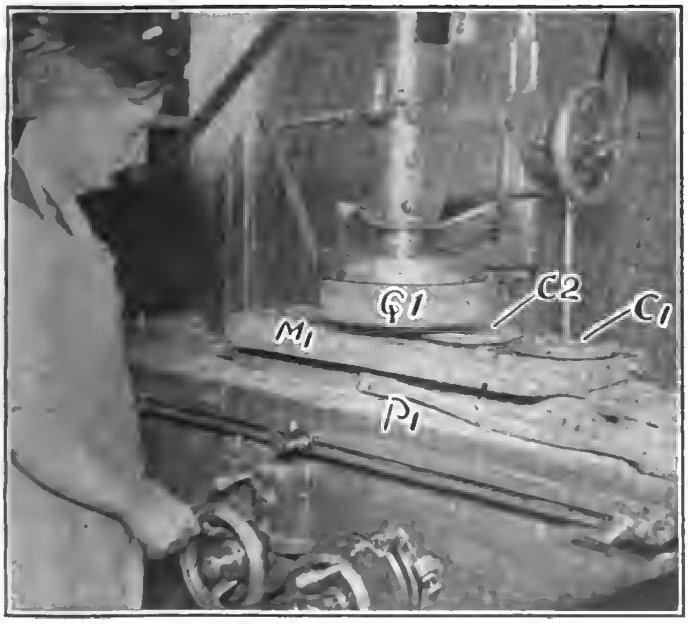


Fig. 13—Flat grinder with magnetic chuck working on hand-hole plates in the Excelsior plant

quantity, and the trend of the theme has for its foundation the fact that interchangeability of parts, and harmony in the relation of the components, cannot be the child of the individual uncontrolled efforts of men however skilled they may be.

Multiple operations are taken advantage of to a marvelous extent, and it is of course true that a machine tool, if it will turn out five parts instead of one, will do the work of five men

Fig. 14—Piston ring grinder with magnetic chuck finishing piston rings for Excelsior motors

at the cost of one. On the other hand, if it will do the work of one man with sufficient accuracy for its intended purpose, the same accuracy will obtain for all of the operations.

The special machine tools which are designed for multiple operations are so made in many cases that they perform their respective functions continuously. Turntable platens in some cases permit of setting up work to be done at one point on the platens, while work is being done by the tool at some other point thereon.

THE AUTOMATIC PRINCIPLE IS TAKEN ADVANTAGE OF

In divers examples, the multiple operation idea fails to satisfy the needs of the situation, and automatic machine tools are introduced in order to expedite work. Fig. 2 shows a row of Fellow's shapers which are excellent representatives of this idea. This equipment is in part representative of the process utilized in

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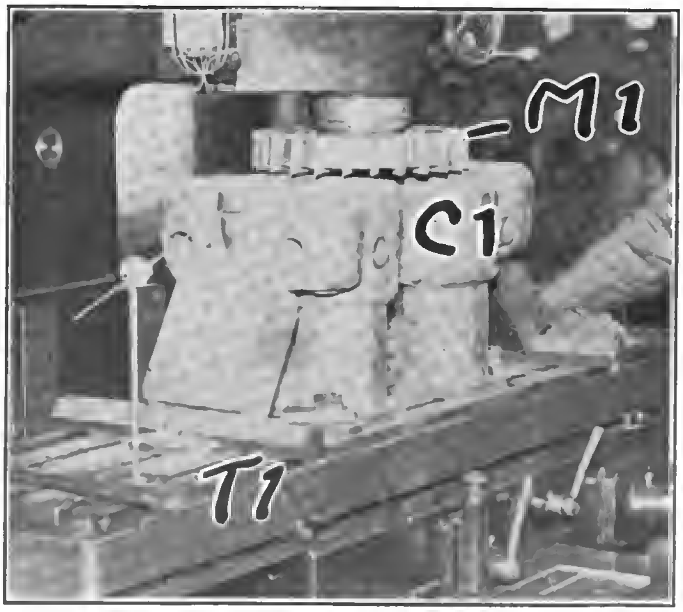


Fig. 15—Cat head on a No. 4 vertical Cincinnati mill finishing 4 Excelsior cylinders at one time

BEST MEANS FOR DUSTPROOFING THE HIGHWAY

By MARIUS C. KRARUP

ONE of the objects of this article is to contribute to the success of the good roads agitation by pointing out a systematic method for making information on the subject of dustless roads applicable to any given set of requirements. Incidentally, it will appear, by this method, that the available information is insufficient for this purpose and in need of being supplemented.

A mass of scattered literature has been accumulated, here and abroad, during the past ten years, on the subject of improved, modern road construction and maintenance, with special reference to the damage done to the best roads of the earlier types by rapid automobile traffic, to the means for avoiding this injury to the roadbed and, most particularly, to that symptom of destructive road wear which is in itself a nuisance and a source of disease and expense: The dust.

But this literature, expensive as it is, must be read with pen in hand and copious taking of notes, if the reader shall avoid feeling himself driven by the strong current of events and opinions toward the acceptance of certain conclusions which after all may not be fully justified or applicable to the practical case of contemplated road improvement with regard to which he seeks enlightenment. On the surface of all records of recent achievements in road improvement there is written a strong testimonial to the superior qualities of the new-built macadam road, protected against subsoil water by drainage and against rain and detrition by immersion of its materials in a matrix of refined coal tar. Durability, long-time economy and freedom from dust, noise and vibration seem to be demonstrated as more fully combined in this type of road, properly built, than in any other. Built for heavy traffic, it should, according to widely accepted data, offer decided advantages over granite setts, and, built for light traffic, it should prove cheaper than an ordinary graveled or stoned country road, by reason of reduced cost for maintenance. In the light of plain engineering, which assumes that the higher first cost may be defrayed by means of a loan drawing 4 per cent. interest or by some other legitimate financial operation on the part of the community which is to pay the cost, there seems to be no reason why roads of any other type should be built. The freedom from dust is a gratuitous addition to its advantages. This conclusion, however, is flatly contradicted in practice. The measurement of road values in absolute dollars and cents is not accepted, partly because the values considered are always prospective, but also for other reasons. Political, legal, financial, economical, engineering and labor conditions conspire to render the stupendous American road problem one of the most complex with which any man can grapple. And little has been done to simplify it.

Only those who refuse to recognize road improvement as urgent have a simple solution—this of doing nothing or as little as possible. Their position may be similar, in some respects, to that of the "common people" of whom Lincoln said, that God must like them, since he made so many of them. They refuse to be stampeded into paying, wholly or in part, for building an expensive road where only a dirt track is needed for occasional travel, in their judgment. In the rubbing and jostling of opposing interests, they represent properly the thousands of miles of roads which should not be improved by public means, because they carry little traffic and would not carry much more traffic of economic value if they were improved. In the great division of the road problem, as to where roads should be improved and how roads should be improved, they represent the questions under the first branch as intelligently as anybody, but trespass, of course, on the second, as all conservative interests do when roused by opposition. When they are in error in a financial comparison between the final costs of one type of road and a better one, and choose the type involving lesser risk rather than the one promising most economical results, it is fair to presume not that they are temperamentally opposed to progress, but that no convincing argument has been placed before them, or that they have observed many discouraging cases within their own municipal experience, where incapacity or corruption saddled a heavy burden of maintenance upon a community through the miserable execution of excellent plans. From this point of view, the problem of the good roads movement becomes largely the problem of establishing a reliable system of guarantees for the proper selection of the most advisable type of road in each case, for the proper workmanship in its construction and for the maintenance of the road for a definite period, such as twenty years. Often the legal status interferes with the establishments of such guarantees as alone would satisfy hardheaded objectors. Frequently local ordinances relating to the debt limits prevent the financing of a project which is meritorious only if financed with thorough provisions for continued maintenance of the values which it is to establish.

The questions of proper financing and of proper guarantees are now admitted by several authoritative good roads advocates to constitute part and parcel of the problem of comparative road economy. Road values, as pronounced by the road engineer, are consequently subject to modifications, accordingly as the financing and the guarantees actually available are more or less removed from perfection.

The Romans, of old, removed the questions of maintenance cost and organization by building deeply founded, broad-based stone roads to last for ages without repairs, and they settled the question of location by military edict and the difficulty of high first cost by employing serf labor, but in a self-ruling State composed of self-ruling communities, the majority of voters must somehow be convinced that they get value, and not only that the intangible and faraway abstraction, known as the State or the larger commonwealth is benefitted. To get order out of chaos and indecision under democratic institutions, a strong, convincing educational campaign is admitted by all to be a requisite, but in the matter of dustless road construction there is at present only a mass of road engineers' notes and data, and to simply hurl this at the heads of the unwilling does not seem to constitute the best method of persuasion.

There is a still more important limitation to the road engineer's dictum as to the relative values of different kinds of roads. More important, at the bottom of things, than any distinction as to where a good road is justified and where a makeshift road is more sensible and more important than any consideration of difficulties in financing and guaranteeing of the work, the question whether any proposed type of road construction admits of procuring materials and labor within the boundaries of the community which must pay for these materials and labor, looms up as one which the responsible members of the communities are justified in considering in the very first line. It is related of MacAdam that he took great pride in getting much of the road construction work for which history has honored him, done by "old men and women," whose time would have been wasted in idleness, if the road building enterprises had not provided an occupation for which they were as well suited as younger persons. This had special reference to the breaking of stone at the roadside, and is, of course, inapplicable to modern American conditions, but the principle that work which is simply added to the sum of work ordinarily done in a community, and the wages for which are paid to a class of workmen who practically spend all their earnings in the local purchase of life's necessities and deposit possible savings in local banks where they become available for industry and commerce, that such work in reality costs nothing, while adding to the wealth of the community by producing a value or a luxury which is wanted.

is a tenet of social economy of which the engineer's estimate takes no cognizance, but which is honored in the decisions of many local authorities, often in contravention of ordinances which provide that the lowest responsible bid shall be accepted. And it is still a peculiarity of road work that it appeals largely to a class of workmen who have no liking for steady labor, but who are inoffensive citizens willing to work hard at intervals in order to gain leisure for other periods. Every town and village seems to have its contingent of persons who subscribe to this easy philosophy, and in the economy of the community they take the place of MacAdam's "old men and women," whose work for the improvement of the roads he considered a clear gain.

It is probably clear that acknowledgement of the claims for the greatest possible local participation in road improvement work does not restrict the usefulness of the road engineer, but on the contrary enlarges the sphere of knowledge on his subject of which he must possess himself in order to become indispensable and thereby raises his occupation to the level of a distinct branch of civil engineering, not easily to be mastered except as a specialty and life vocation.

And the activities of the great national construction companies could hardly be enlarged and diversified by any safer means than by kindling local interest in road improvements through a broad acknowledgement of the active part which the locality may often assume in the production of the materials and the labor required for the work. An example is afforded in the possibilities which exist for establishing a plant for the refining of coal tar in every town possessing gas works, it being admitted and urged by road engineers all over the civilized world, no less than by the construction companies, that the highest durability of bitulithic roads and of every road which is improved by means of coal tar treatment, depends upon obtaining perfectly definite and known grades of coal tar for the work, while at present the shipment of these grades from distant production centers represents a considerable addition to the necessary cost in this class of road-building.

Still another very large factor obstructs the probabilities for having the road engineering data, which have been compiled during the past ten years, applied in a simple and direct manner and on a purely financial and mechanical basis, to every projected road improvement enterprise in this broad land. As above referred to, these data relating to the testing out of many and diverse processes for meeting the demand of the age for lasting and dustless roads, converge in their recommendations of coal tar products as indispensable for true economy, with various residues of asphaltic petroleums the only competing materials, except in special localities, as in California, where crude petroleum as such, locally produced and very rich in asphaltum, also competes, or perhaps predominates, owing to a favorable climate.

The question arises at once whether the national production of coal tar is or can be made to equal in quantity the vast amounts which would be required, if the conclusions arrived at by the authorities on road construction in the United States and Europe were to be unanimously accepted and acted upon. Only relatively short stretches of dustless roads have so far been built, mostly suburban in this country, though both France and England have treated or rebuilt a considerable mileage of country roads, largely with special preparations of water-gas tar, but showing a leaning recently in favor of refined coal tars. It is a foregone conclusion that the price of coal tar will rise steadily, if the agitation for dustless roads achieves a true popular success in this country. It seems more than doubtful if a town with gas works will be able to supply the material in sufficent quantity for its own outlying streets and roads, as well as for the other industrial purposes, such as roofing and the production of dyes, for which coal tar is used. And if a positive shortage is bound to result before the dustless road, accomplished by means of

(*To be Continued.*)

ELGIN GUARANTEES FUND FOR BIG RACE

PROGRESSIVE citizens of Elgin, Ill., have guaranteed a fund of at least $15,000 to make possible the holding of an automobile road race near Chicago this year. There is strong reason to believe that the event may assume the character of a national stock chassis contest since the Automobile Club of Lowell, Mass., has decided not to hold its authorized event.

M. M. Cloudman, merchant; W. W. Willson, editor and Fred W. Jenks, theatrical manager constituted the committee of Elgin business men who succeeded in securing the promises of financial support from the city of watches and butter and as a result of their success along this line, enthusiasm runs high in Elgin and the Chicago Motor Club is very complacent.

The course that has been discovered near Elgin is an irregular polygon with two long sides and is about eight and a half miles in circumference. Starting at the northeast corner of the course, the route follows the old McQueen road in a generally northwesterly direction and passes over the only hill of any importance about midway between West Elgin and McQueen. This hill is approximately 12 per cent gradient, but is short in length. On the other side, the descent is easier and when the route turns southward, just this side of McQueen, the road level is practically the same as it is at West Elgin. The south leg is short and the turn at Udina brings the contestant around to the east where the road stretches away almost straight and flat as a board as far as West Elgin. South from the course the wonderful, rich Illinois prairie, black and deep with the fatness of the earth, extends as far as the eye can reach. The last leg of the course is northward to the point of beginning.

In some respects the Elgin route possesses more natural advantages than any similar track in the country. There is not a dangerous spot in the eight and a half miles and the turns can be banked with little effort so that high speed will be possible.

Elgin will donate steam rollers, horses and working apparatus as well as the services of the road supervisors, who have volunteered to take charge of the job. It is estimated that it will cost $8,500 to put the course in racing shape and the latest reports indicate that at least $16,500 will be raised. This amount is well over the tentative figures suggested by President David Beecroft of the Chicago Motor Club when he first considered the advantages of the Elgin course.

The discovery of the course is credited to Frank Wood, manager of the Chicago Knox branch and after a careful inspection by the C. M. C. the matter was laid before the business community of Elgin with a suggestion for co-operation. The advantages to the locality were so patent that the movement had instantaneous growth and vigor and the progressive city that "Makes the Whole World Tick" seized upon the opportunity presented.

Definite plans for the initial contest have not been made so far, but as soon as the final word is given, the scope of the plans will be considered in detail. The situation is full of possibilities as the schedule for big racing events about Chicago have been in a doubtful state for some time and more uncertainty looming up for the future.

The new course has excellent transportation facilities. It is only about thirty-eight miles from Chicago and is reached by rail and trolley with practically continuous service. On big race days immense crowds could be easily handled to and from Chicago.

The idea of constructing this course seems to have met spontaneous approval from everybody concerned and all indications so far seem to point to realization of the hopes of motordom.

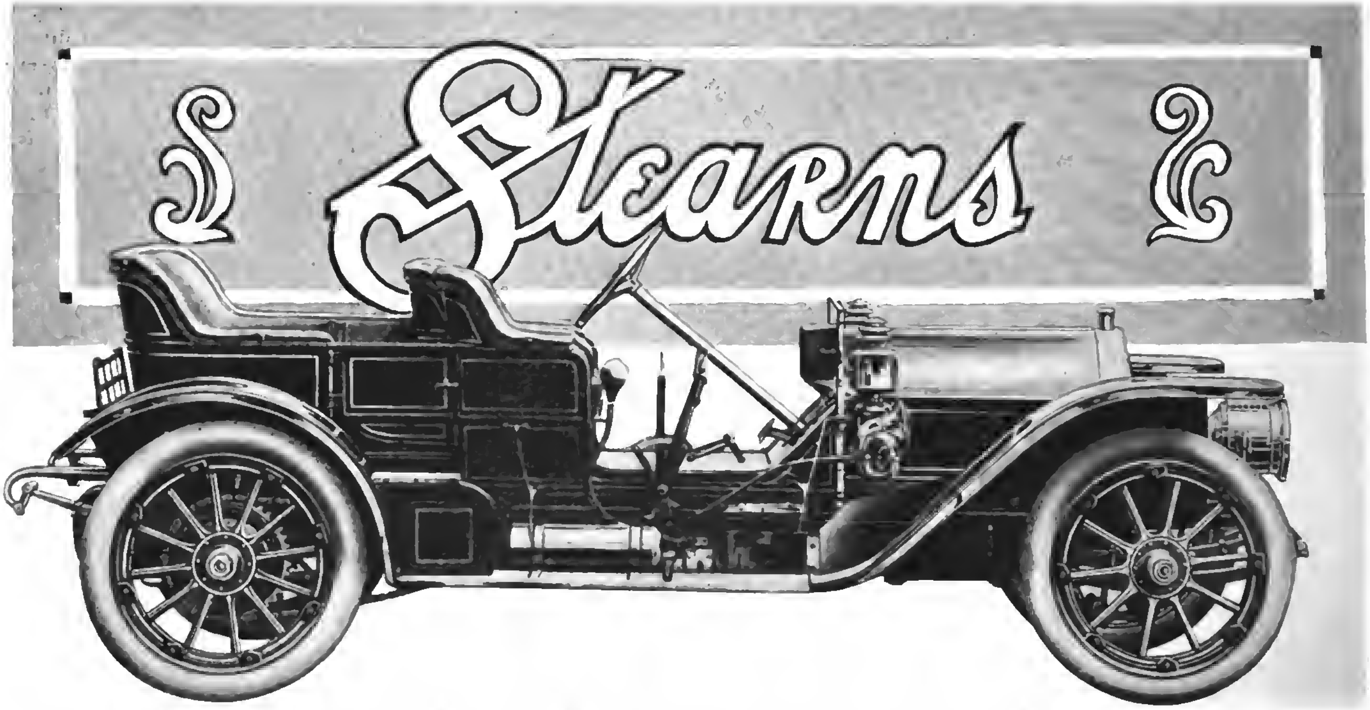


Fig. 1—Stearns 30-60 with a seven-passenger side entrance tonneau of the side chain drive design, showing ample room for the front seats as well as in the tonneau

THIS make of car as produced by the F. B. Stearns Company, Cleveland, Ohio, is offered to discriminating buyers in two models, the smaller of which is known as the 15-30, and the higher powered car is represented as a 30-60. Taking the model 15-30 as the subject for the moment, it may be described with a touring body as a car which seats five and sells for $3,200. The motor is of the four-cylinder type, with a bore 4 1-2 inches, and a stroke of 4 5-8 inches. The cylinders are of the T type, with the valves located on the left-hand side. The cylinder design is that designated as en bloc, utilizing the four-cycle principle. Lubrication is by splash, with a gear pump which is used for the purpose of maintaining a constant level and circulating the oil on a basis of profuse lubrication. A notable feature of this system lies in the control of the oil supply, which is by means of external leads; they are well designed, stout, and get-at-able. The gear pump is driven by a spiral gear.

Cooling is with water, circulated by a centrifugal pump, utilizing a cellular type of radiator of neat design for the purpose of absorbing the heat out of the water, and the air circulation is maintained at the desired rate through the use of a six-blade fan which is driven by a belt.

Ignition involves the use of a magneto, and an auxiliary means, the Bosch dual system is employed, and as is well appreciated by users, they are enabled to start with all the facility which is offered by a battery and coil, and to switch over to the magneto with its attending advantages at will. If, in the course of time, the magneto should become deranged, the auxiliary portion of the system is sufficiently complete in itself to serve the purpose. Carburetion is by means of a Stearns design of carbureter, in conjunction with a gasoline tank of ample capacity, and the gasoline flows to the carbureter impelled by pressure in the tank.

Coming down to the most pertinent of the mechanical features, the clutch is of the latest dry plate type, using steel on fireproof fabric, thus affording a soft but positive action,

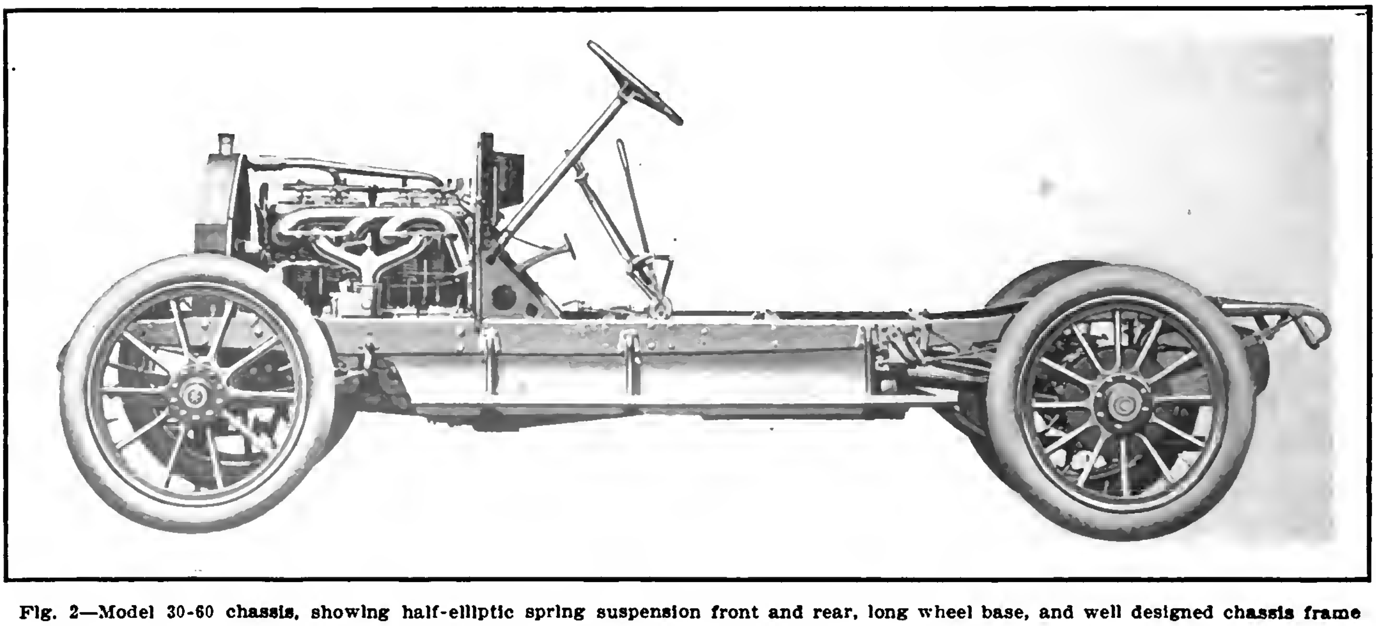


Fig. 2—Model 30-60 chassis, showing half-elliptic spring suspension front and rear, long wheel base, and well designed chassis frame

and other advantages, which were brought to prominence during the last year. From the clutch to the transmission gear the mechanical features are worked out to a nicety, and the gear itself is of the selective sliding type with three forward speeds and reverse. The transmission connects with a shaft drive, utilizing a torsion tube, and the rear axle is of the full floating type.

Bearings are of the anti-friction type at every point of the slightest moment. The crankshaft revolves on annular type ball bearings, of which there are three, and the same may be said of the camshaft, clutch spindle, transmission gear and rear axle. A thrust bearing is used in the clutch. The hub bearings for the front and rear wheels are of the roller type, self-sustaining as to thrust, and capable in the radial plane. Plain bearings are used in the steering knuckles.

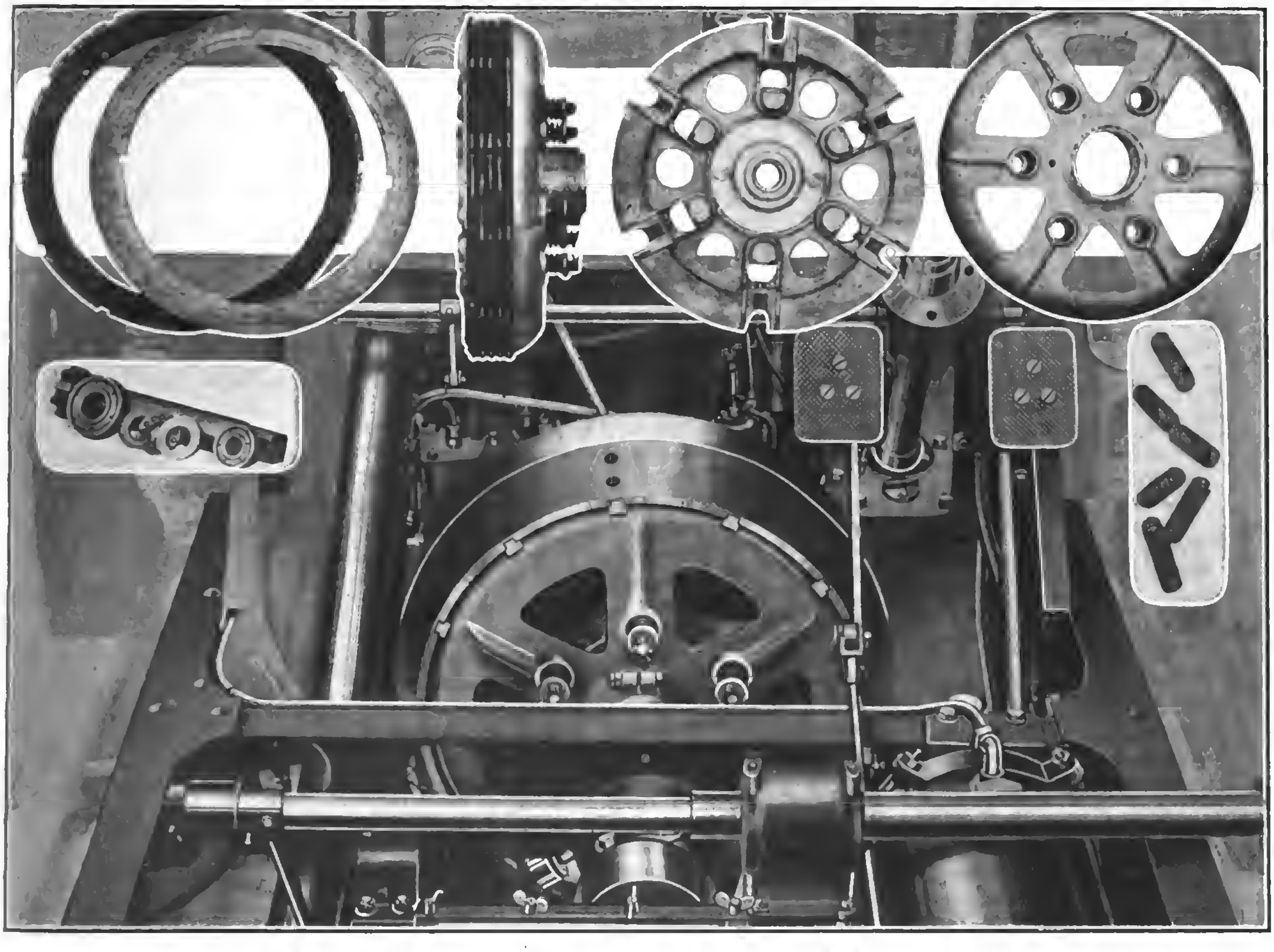


Fig. 3—Details of design and construction of the Stearns dry plate clutch, showing strength and stability throughout

The wheelbase of this car is 116 inches, with a 56 1-2-inch tread, and the wheels are fitted with 34 by 4-inch tires front and rear. The suspension of the chassis frame is of the semi-elliptic type of springs in front, they being 2 inches wide and 39 inches between eyes. The rear springs are three-quarter elliptic with 2 1-2-inch plates, and the span is 51 inches.

The front axle is of the I-beam section, forged without welds. and suitably treated to bring out the kinetic properties of the metal. The rear axle is a construction involving a double branch I-section with a differential gear and bevel drive suspended between the bows of the branching members, the idea being to eliminate the troubles which are normal to inferior live rear axles, which are manifest by sagging and disalignment generally. The wheels are fitted with Continental demountable rims, and the construction throughout is on a high engineering plane, using alloy steel at every point demanding high ability, and special heats in other grades of steel to induce a proper measure of harmony.

CHARACTERISTICS OF THE 30-60 STEARNS MODEL

This car, fitted with a touring body, with a capacity for seven persons, sells at $4,600. The motor is a four-cylinder, water-cooled type of the four-cycle genera. The bore of the cylinders is 5 3-8 inches, and it rates with the long-stroke type of design because the stroke is 5 7-8 inches. T-type cylinders are used, with the valves located on the left side, cylinders cast in pairs, and the design is conspicuous for the symmetrical arrangement of the components, a certain get-at-ableness embodying the idea of quick dissembling in the event it becomes necessary to make an investigation in an extended way for any purpose.

Lubrication is by splash, but the oil level is maintained at the right elevation through the good office of a gear pump, which is driven by a spiral gear, and the oil ducts are externally placed, rigid in their design, and open to inspection at will. The water circulation is by means of a commodious centrifugal pump, which is gear driven, and a thoroughly capable cellular type of radiator, in conjunction with a six-blade belt driven fan, co-operated in the cooling process. A conspicuous feature of the Stearns motor work, which is carried into the cooling system, is the character of the water piping, etc., in which the earmarks of capable coppersmiths may be readily observed.

Ignition is by Bosch magneto, hand controlled, with an auxiliary system of Bosch characteristics. A Stearns carbureter is responsible for the character of the mixture.

A discussion of the pertinent mechanical features of this model will bring out the use of a dry-plate clutch, with steel on fiber, particularly harmonious details of the control system as pedals, etc., and passing back to the gear-set discloses a four-speed selective sliding gear. It is claimed for this four-speed system that it induces economy in the operation, helps in the accelerating process, and has the virtue of reducing tire depreciation, because by the use of four speeds in a car of this size it is possible to apply the power of the motor progressively and by such graduations that a harmonious relation will obtain between the tractive ability between the point of contact of the wheels and the exertion of the motor.

The transmissions system involves a shaft drive, but at the option of the purchaser side chains are furnished instead. With a shaft drive a capable torsion tube is employed, whereas if the side-chain drive is selected solid radius rods are responsible for the accuracy of the location of the rear axle. In the shaft-drive type of this model a full floating rear axle is employed.

The crankshaft is equipped with three annular type ball bearings, the camshaft with four, and the clutch spindle gear set and rear axle are also fitted with annular type bearings. It is worthy of note that the thrust of the clutch is taken by a suitable anti-friction bearing. The front wheels are equipped with roller bearings, but the steering knuckles and steering gear have ball bearings. From what has been said, it will be observed that the bearing situation is well in hand.

The wheelbase of this car is 123 inches, with a 56 1-2-inch tread. The wheels are fitted with Continental demountable rims as regular equipment, and the tires are 36 by 4 1-2 inches front and rear. The front springs are semi-elliptic, with 2 1-2-inch plates, and the span is 41 1-2 inches. The rear springs are also semi-elliptical with 2 1-2-inch plates, but the span is 52 inches. The front axle is I-section of a highly kinetic grade of steel, forged in one piece. and suitably treated. The brakes, of which there are service and emergency, are fitted in the rear wheels; the service brakes are worked by a foot-pedal, and the emergency brakes are actuated by means of a side lever. The service brakes are of the contracting design, but the emergency brakes are of the expanding type. The chassis frame is pressed steel of excellent proportions, the further details of which will be rendered at once apparent by glancing at the illustrations here afforded.

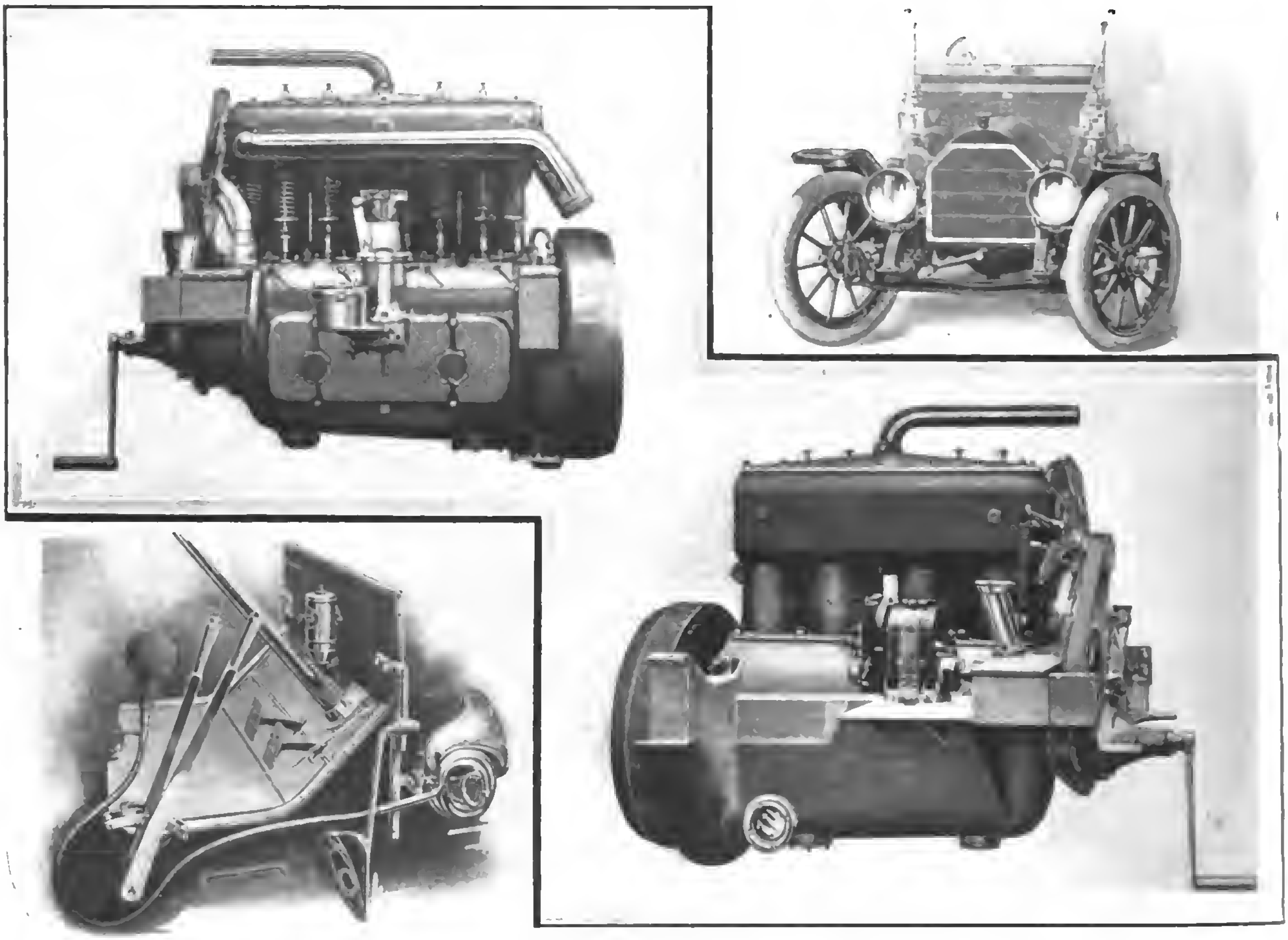


Fig. 4—Two views of the 15-30 motor, showing the carbureter on the left-hand side, and the magneto on the right. Two views of the chassis, one of which presents the characteristic Stearns front and the other depicts a clean dash

GENERAL CHARACTERISTICS OF STEARNS AUTOMOBILES

Carburetion has the virtue of having been used in previous years, and it is claimed by the designer that it has the advantage of two carbureters fed from the same float chamber, and actuated by the same throttle lever. It is well appreciated by autoists in general that extreme flexibility is difficult of realization when a single nozzle is employed. The relative sizes of air and gasoline passages are so proportioned that the mixture, considering the power required, is in substantial accord with power variations as they are indicated by road conditions and speed.

There are many points of refinement in relation to the power plant such as might be enlarged upon advantageously, as. for illustration, in the 15-30 the character of the block casting is up to a high standard. It is a perfectly symmetrical shape with a smooth and agreeable exterior, but passing beyond the question of mere appearance, it is to observe that the walls of the casting are uniform, bunching of metal is obviated, shrink holes are not prone to develop, and in the foundry in view of the large top opening, gases are permitted to escape most readily, and wasters are therefore avoided. The top cover being large. permits of

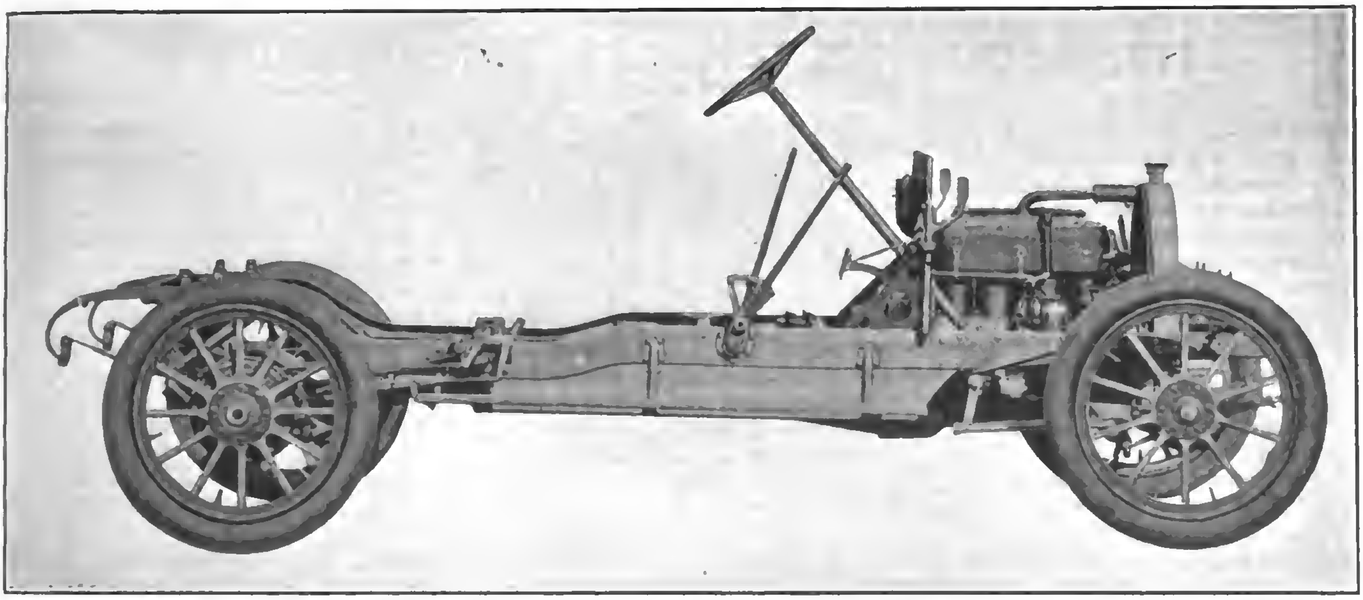


Fig. 5—15-30 chassis with double drop frame, three-quarter elliptic rear, and half elliptic front suspension

getting at the domes of the respective cylinders, and the volume of water available is such that cooling problems do not have to be coped with.

Passing back to the clutch for a moment, it will be observed that the dry plate members are sandwiched between a pair of capable master plates, and pressure is applied by means of six relatively light but live springs. Should the spring pressure be less than that desired by the owner of the car, he is offered the facilities of adjustment of the springs up to the limit of his own personal inclination, but should the springs press harder than the situation demands, the tendency to fierceness in the action of the clutch may be eliminated by the simple expedient of reducing the spring tension. The thicknesses of the clutch members are sufficient to take the torsional effort of the motor, and to accept resistance offered by the car as it negotiates road conditions, without undue surface pressure at the splines, so that the clutch engages and disengages readily, and undue wear on the pressure faces is done away with.

The chassis frame is stoutly braced in a lateral plane, and a cross-bar just back of the clutch is firmly anchored at its ends, and is so designed in point of strength as to present a neat appearance, evidences of strength, and to take the thrust without backing off so that the movement of the foot pedals is not reduced in effectiveness to the slightest degree.

The general appearance of the Stearns cars is enhanced because of the shape of the chassis frames, and the side entrance in both models is wide, comes well in front of the mudguards, and the height of the running boards is up to standard carriage practice, so that entrance and egress is on the most comfortable basis possible in automobile work. It is in matters of refinement such as this that the company has given much thought, and, considering the excellence of the general design, use of fine materials, character of the workmanship, etc., the reputation of the cars has expanded to excellent proportions.

From the point of view of safety in service, the straight line design of the cross and drag links, considering the quality of material and workmanship used, goes to show that this phase of the problem has been adequately attended to. The steering wheel and the method of its construction lends further promise to safety, and the relation of the driver in the seat to the steering wheel, foot pedals, side levers and other means of manipulation is that which has been found to be natural and efficacious.

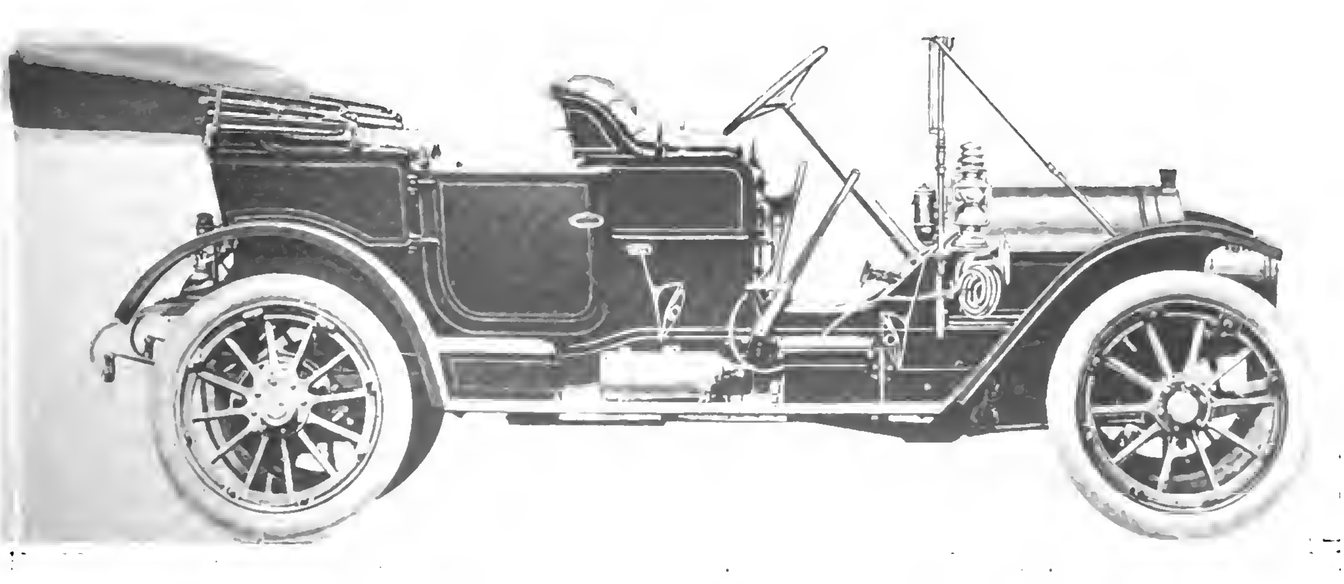


Fig. 6—Stearns model 30-60 presented complete for touring, offering evidences of ability and refinement

THE PROGRESSIVE TESTING OF MOTORS AND CARS

INCREASING output has its viscissitudes as well as its advantages. While it is admitted that the overhead charges reduce in dollars per automobiles built almost inversely proportional to the number of cars made, the fact remains that this can only be a true approximation if the facilities afforded are such as to avoid conjecture during the process. When it became apparent to the builders of automobiles that quantity production was an absolute necessity, not only in order to be able to supply the demand, but with a view to building well at a reasonable cost, it was directly realized that the testing question would become a source of much annoyance, if not a serious stumbling block, unless a means could be found which would permit makers to test as they go along.

It is useless to try to get out of testing every motor made; the necessity of testing really increases with the output. The chances of making mistakes are relatively slight when but a few men are employed, but they grow out of all proportion to the increasing product. When a man starts out to build one motor for use in say one automobile he no sooner completes the mechanical task than he busies himself in a prolonged and exacting test to ascertain the extent of his success. When the same man undertakes to build 1,000 such motors, he becomes enmeshed in a mass of intricate details, and if his caliber is inconsistent with the proportion of the undertaking, it is easy enough for him to conclude that further testing is inconsequential, and he abandons himself and his product to the uncertainties of fate.

The builders of automobiles of the class who succeed fully understand that if they fail to master the great task it will master them. It is a great task to test a large number of motors every day, and the only way it can be accomplished is to contrive a means at whatever cost of time, ingenuity and money. In the plant of the Regal Motor Car Company, Detroit, Mich., the problem has been coped with successfully and fortunately, and as it is the purpose here to show, the scheme employed has the merit of being simple as well as reliable.

When the motors are assembled, after the parts are completed, inspected and accepted, they are transferred to the initial test department, a section of which is shown in Fig. 1, where they are given a run-in test. In this undertaking the motors are operated under conditions of profuse lubrication, and they are given a critical inspection in divers ways, the idea being to note that they are complete and likely to survive in a more extended test under load conditions. As soon as the motors comply with the terms of the run-in test, all of which, for a given motor, transpire within an hour or two, the motors are dissembled, all the parts are given further inspection, thoroughly cleaned and the reassembling (which should be final) is undertaken.

After the final assembling all but a certain percentage of the motors go to the regular block test, a section of which is shown in Fig. 2. In this test they are run for a sufficiently long time under approximately normal conditions to ascertain as to their competence, in view of the service to which they are to be put, and the testers, who are skilled in this undertaking, go through a fixed formula and make records on a systematic basis, which records are properly numbered, identify the motors for all time, and reach the desk of General Manager Haines before 10 o'clock on the morning of the following day.

Throughout the plant everything moves in hundred lots, the idea being to complete 100 automobiles in each lot within the shortest possible time, consistent with the aim which is to build automobiles to live up to the Regal reputation. The management recognizes the fact that it is possible for the routine operators to drop into a groove and thereafter fail to appreciate the necessities of the occasion. To guard against troubles of this sort, a certain proportion of all the motors made are picked at random by the head of a separate testing department and are taken away to the electro-dynamometer room where they are put through just such a test as will bring out trouble, if there is any, and show the competence of the motors in any event. Fig. 3 presents the type of electro-dynamometer used, in which M1 is the motor to be tested, the arms of which are bolted to angle irons A1, which in turn rest upon cast iron standards S1 and S2, and they are supported by I-section beams B1 and B2. The beams extend across to the cradle C1 and C2 of the electro-dynamometer. The armature of the electro-dynamometer A1 rotates on its spindle, which is centered in the outboard bearings which extend up from the cradle members C1 and C2. The field F1 of the electro-dynamometer has inverted radially disposed poles upon which windings W1 (multipolar type) to the required number of ampere turns arranged for separate exciting are placed. The arm A2 extends out for a predetermined distance, and supports the weight W2, by means of which loading is accomplished.

The armature windings of the electro-dynamometer connect to brushes through a commutator in the ordinary way, and an external circuit runs to the switchboard S3, where the switches, instruments and field rheostat are placed. Resistance is introduced into the armature circuits according to the demands, by means of a water-rheostat W3, which is connected to a switch on the switchboard by the use of insulated copper wire of a suitable section, in view of the load to be carried. Varying the resistance of the field alters the excitation, and speed regulation is thereby accomplished. Varying the resistance W3 in the armature circuit changes the output of the same in the proportion of I square R equals W, which divided by 746 equals horsepower when I equals current in amperes, R equals resistance in ohms and W equals power in watts.

The field F1 of the dynamometer tends to rotate and it is only prevented from doing so by the weight W1. In ascertaining the power of the motor M1, it is brought up to the desired speed.

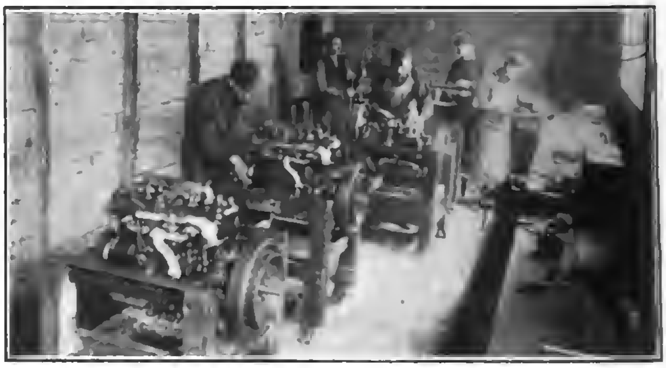


Fig. 1.—Preliminary run-in test under conditions of profuse lubrication, made for the purpose of ascertaining general competence of the motors.

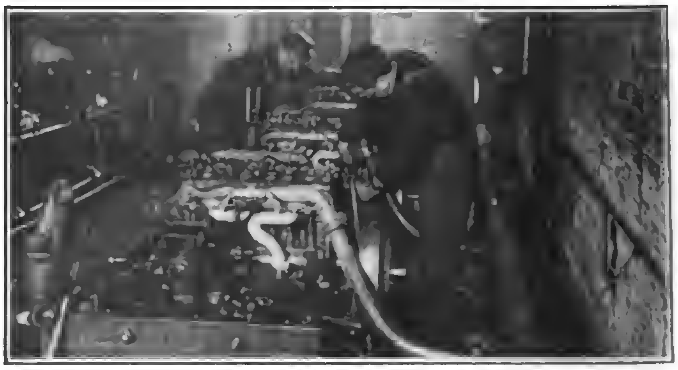


Fig. 2.—Regular block test, made under the most exacting conditions, during which time the motors are tuned up and put into serviceable condition.

measuring the same by tachometer, and the weight W1 is increased or decreased as the occasion requires, until the arm A2 assumes a horizontal position, when the power of the motor M1 is at its maximum for the given speed, provided the weight W1 is all that the arm will bear and remain in a horizontal position.

There are two ways of determining the power of the motor M1. If the electro-dynamometer is calibrated, and its internal losses are thereby ascertained, the power will be proportional to the electrical output multiplied by the percentage of efficiency in which W equals E multiplied by I, when W equals the output of the armature of the electro-dynamometer in watts, E equals the potential difference across the terminals thereof in volts, and I equals the current in amperes from the armature, and this may be reduced to horsepower by dividing by 746.

The excellence of the electro-dynamometer is thoroughly well established. Its accuracy may be measured to within a fraction of 1 per cent., and its flexibility is such that the testers, who have great skill in this connection, are enabled to investigate a goodly number of motors within a relatively short time.

After the motors are completed and tested, and assuming that the check test on the electro-dynamometer accords with the

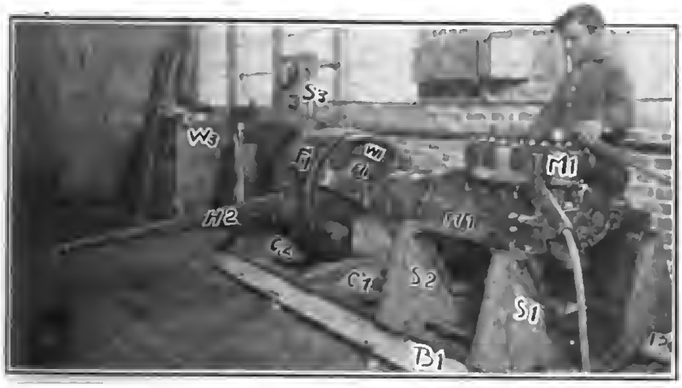


Fig. 3.—Electro-dynamometer, which is used in the check test of a certain percentage of the motors, they being taken at random

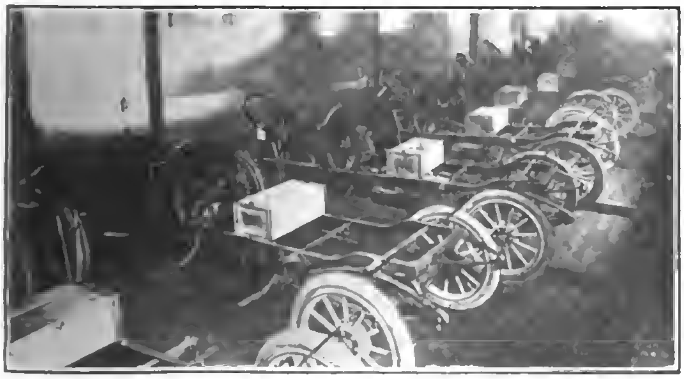


Fig. 4—Chassis test which is made on every chassis completed before the cars are put upon the track for their final test

desires of the general manager, they are assembled into the chassis, and Fig. 4 depicts the next proceeding. The chassis are run into an iron house, after which they are jacked up at the rear. the motors are cranked and the cars are thus given a running test. All cars so tested that prove to be noiseless and satisfactory in general are taken out of the chassis test department, put onto a track on the company's property, and run by a chauffeur whose duty it is to carefully note the extent of satisfactory performance, and report in writing just what he finds. the character of which, in his judgment, is inharmonious. The whole idea, from start to finish, is to test out the parts and the products progressively and in step; to be able to determine deviations from a fixed standard before it is discommodingly late, and to correct evils so quickly and efficaciously that each hundred lot of cars will come through on time.

SPECIFIC INSTRUCTIONS PRODUCE RESULTS

BY O. G. A.

OF the devious ways of country garage men with the innocent motorist, the stories seem to be without end. A New Jersey owner was telling his experience the other day.

"When I got my little 4-cylinder runabout," he said, "I was about as green as they make 'em. I had no particular trouble with the car, except that my batteries were everlastingly giving out. I didn't know then what the matter was; I simply ran into Smith's garage and asked him to fix the engine up so it would run. He'd fix it up, all right, and it would run beautifully. I would take the car out, and in a day or two it would begin to miss. I learned to expect trouble as soon as the missing began, and to head for home; but many a time I was hung up on the road, miles from anywhere. The engine would run a little, a few hundred yards, and then quit. When I was tired cranking I would rest. I didn't know it, of course, but I was giving the battery a chance to rest, too. Presently I would turn the crank and the engine would start, and I would run for a mile or so and repeat the performance.

"When I got the car to Smith's I would ask him what ailed it, and he would say that he would have to look it over. I would leave it there, and in a couple of days he would report that the valves needed grinding or some other fool thing, and I would pay him $10 or so for his trouble. Of course all he did was to put in new batteries, half-dead ones at that.

"One day I left Smith and started for a town six miles away, where the nearest agency of my car was located. I was three hours getting there! The same old performance took place, and I am afraid to say how many times I objurgated that car. When I reached the agency all the mechanics were out, leaving only a boy in charge of the place. My battery was so far spent that he had to help me push the car into the garage. As the men were out I thought I should have to wait, but the boy ventured respectfully to assert that he could fix me up. I asked him if he knew what the matter was, and he said 'No, but that he could soon find out.' In the end I let him go ahead. I didn't watch him, but in ten minutes he had that engine running as well as I had ever heard it. I asked him the charge, and he said, 'Two dollars.' I asked what for, and he said, 'One dollar and fifty cents for new batteries, and fifty cents for my time.' I paid it, thanked him, and then asked how soon I would probably be in trouble again. He climbed into the seat and felt of the coil tremblers. Then he said, 'These batteries will run you about seventy miles; in a minute I will fix them so they will run you three hundred.' I watched him then, and all he did was to slacken the tension of the contact screws on the tremblers! That rascal, Smith, not content with selling me dead batteries at $10 or $12 per set, had screwed down the contacts so they would eat up what little current was left as fast as possible. I went my way in the glow of a great light.

"A few days later I stopped at Smith's for gasoline. He asked casually, 'How's your car running?' 'Splendid,' I said. 'I thought so,' said Smith, cheerfully. 'I knew the last time I fixed you up that it would run all right.' 'Smith,' I said, 'do you know how long it took me to get to town after I left you that day? Well, it took me three hours. It wasn't you that fixed me up; it was a fellow at the agency in town.'

"Smith looked at me in a queer sort of way, and asked, 'What did he do?' 'Nothing in the world,' I told him, 'except to put in *good* batteries and slacken the tension on the tremblers.' At that Smith turned on his heel suddenly and walked away. But as he did so he flung back the remark over his shoulder, 'I guess I shan't get any more easy money out of you!'

"Well, he didn't, for from that day to this I have never left my car in Smith's garage or any other without giving explicit instructions as to what I wanted done, standing by to see it done, and then taking the car out immediately when it was ready to run. In all, my experience with Smith cost me $58, but I know now that it was money well spent for education."

Pertinent Features of Abbott-Detroit Car

THIS year is the one of conspicuous company efforts in the automobile line, and visiting the plants of the respective companies discloses a wide variation in the methods employed by them respectively, each one being a study in itself. In the Abbott-Detroit plant, of the Abbott Manufacturing Company, the car which is being turned out sells for $1,500, and with a touring body, seats five persons. The method involved in the manufacture, if such it might be called, is entitled to even greater mention than the product itself, because of its excellence, but as might be expected, excellence of the method employed is reflected favorably in the product.

In this establishment a unit system of production obtains throughout; the materials come in through the receiving door, are sorted into their respective generic types, and pass on to the preliminary testing room wherein they are carefully inspected and counted. If some of the materials fall below the exacting standard set by the company for its inspectors, they are moved to the right into a room wherein doubtful products await the action of the production manager, whose power of final decision enables him to promptly approve of the inspectors' marks, and return the materials from whence they came. The good materials pass on to the general storeroom, and are there sorted out in such a way that they may go into the shop in assembly boxes, each box holding the requisite number of pieces or parts, and such materials in the rough as may be required to satisfy an assembly order.

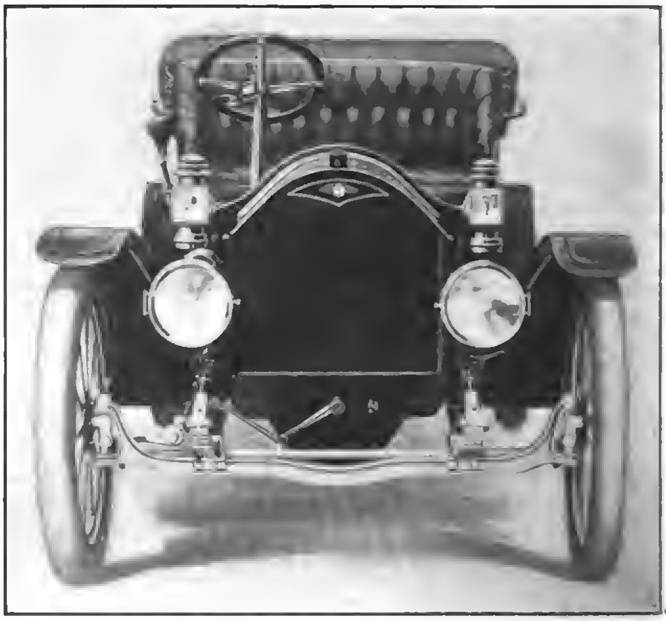


Fig. 1—Looking at the front of the car showing I-section drop axle, protected cross-rod and drag link

In the shop, at every point, the same idea obtains throughout the work. "Schools" of materials advance from one stage to another, until in the course of events the units which compose the automobiles are assembled, inspected, and then pass on to the testing department, wherein competence is proven, or defects uncovered. Should an assembly unit fall below the established standard during test, it is sent back to the department responsible for the inferior work, is dissembled, and the parts are then re-inspected, during which time the trouble is definitely located, responsibility is centered on the individual who may have disregarded the requirements, the parts which do not conform to the needs are cast out, and after re-assembling the unit is again returned to the testing room, with the expectation that it will come up to the chief tester's requirement.

This method of grouping materials has a wide influence on the product of the plant, and the cost thereof. In the average shop, much time is wasted by the workmen, who, when they are instructed to proceed with a shop order, must first lock up the material list, determine the character and quantity of materials required, and then stand in line in front of the store room distributing window awaiting their turn, always with the opportunity to kill a considerable amount of time, which they do pleasantly enough, since they have company, and the environment is ripe for unprofitable discussion. By means of tote boxes, in which the materials for a given job are placed and checked off by the store-keeper long before they are required by the respective workman, all delays as above indicated are done away with.

GENERAL CHARACTERISTICS OF THE ABBOTT-DETROIT CAR

The motor is of the 4-cylinder water-cooled type, with a bore of 4 inches and a stroke of 4 1-2 inches. The cylinders are

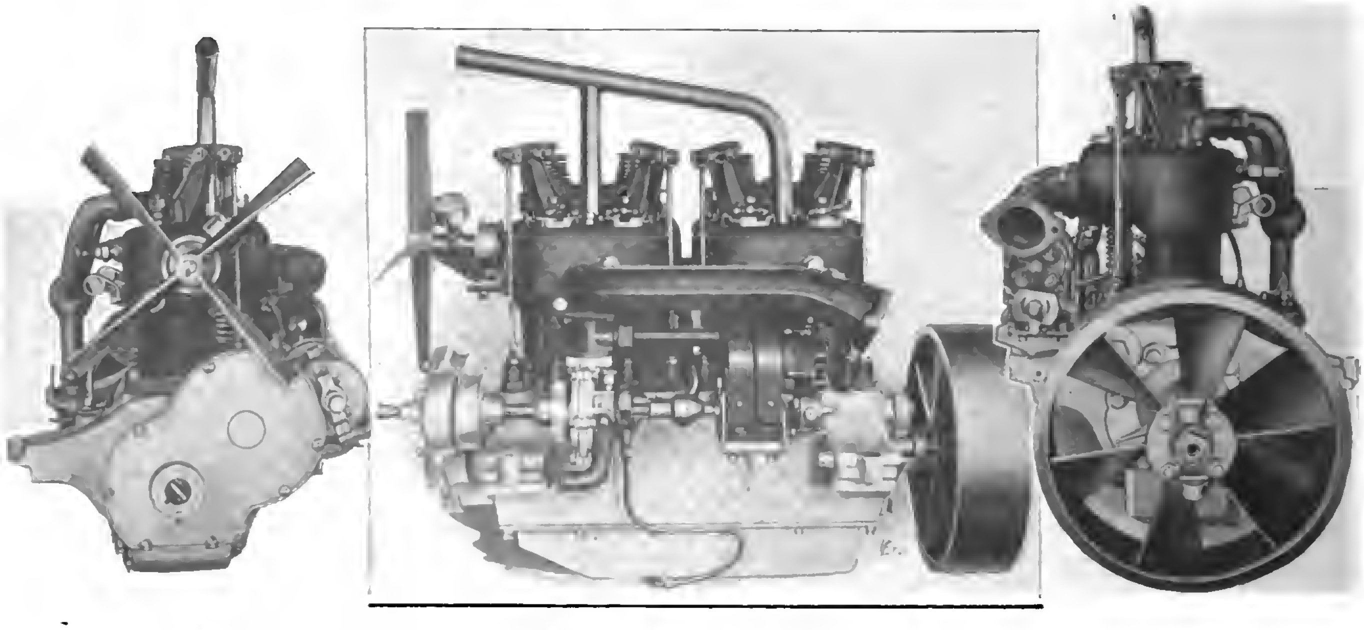


Fig. 2—Three views of the motor showing pump and magneto on one side, and a fan in the flywheel

cast in pairs of gray iron, and the motor is normally rated at 26.5-horsepower. The valves are located with the inlet on top, and the exhaust on the side, and the timing is that which obtains in satisfaction of the 4-cycle principle. The general appearance of the power plant is shown in Fig. 2, with three views, the one on the left being the front end of the motor, indicating how the half-time gears are completely encased; the middle view presents the left side of the motor, and indicates the manner in which the water pump and magneto are driven by an extension shaft which passes out from the half-time case, back through the water pump, thence to an Oldham joint, beyond which the magneto is placed on a shelf which projects out from the top half of the crankcase. At the right, the rear of the motor is shown; the flywheel is of large diameter, and the spokes form fan blades, which exhaust the air from the hood, whereas air is pulled through the radiator by a fan in front. The water cooling, in view of the use of a commodious centrifugal pump, a fan in the flywheel and one in front, is most thoroughly accomplished, and the performance of the motor reflects the completeness of this system.

The valve system, and the method of its application, will be best appreciated by referring to Fig. 3, which is a view of the two pairs of cylinders looking down from above, with two of the valve cages removed from the cylinders at the left, which cages show, as the figure at the right, with a screwdriver so placed that it pries one of the valves off of its seat against the pressure of the valve spring. Obviously, it is a simple expedient to remove a pair of valves with their cages complete from the cylinders, for the purpose of grinding, or in the process of inspection, and the design is so carefully worked out, that the inequalities, due to heat changes, have no ill effect on the service rendered, because the cages fetch up against flat seats, with a clearance in the radial plane, and the joints are ground. The valve springs are of suitable proportions to afford the desired pressure, but the design thereof is such that the springs are alive, and the angular rotation of the camshaft is reduced to the minimum, during the period of closing of a valve under the action of the spring. Matters such as this add materially to the power and smooth-running qualities of the motor, and make it possible to adjust the timing for the best result.

Lubrication is by splash with a pump which is located outside, hence open to inspection at will, and it affords the additional advantage of being readily removed for the purpose of repair. The pump takes its power from the camshaft, and the oil is circulated by pressure to whatever extent positiveness is necessary and by gravity for the rest. Fig. 4 shows a section of the crankcase in the region of the half-time gears, and a close examination thereof will indicate quite readily how profusely lubrication is induced, but additional sections would have to be used to more clearly indicate the means at hand for draining the used oil away from the bearings, thus permitting a fresh supply to supplant it continuously.

While attention is riveted on Fig. 4, it will be timely to call attention to the camshaft which has one very large end bearing at the gear end, a relatively large bearing at the opposite end, and two intermediate bearings proportioned for their responsibilities. The cams are cut integral, and attention is called to the design of the lift, which is in two parts, one part of which, with its mushroom, engages the cam, and the other part engages the rocker-rod stem. An intervening spring presses between the two engaging members, and the result is that noise, due to lost motion is aborted. An adjustment is provided, whereby it is possible to re-establish the timing of the valves quickly and readily should the occasion require. Ignition is by jump spark, utilizing what is known as the dual system, involving a magneto in the main, and a coil and battery for auxiliary work, with a hand control. Splitdorf magneto is the regular equipment. Carburetion is accomplished with a Mayer carbureter, and the fuel is fed from a tank of suitable proportions, by gravity.

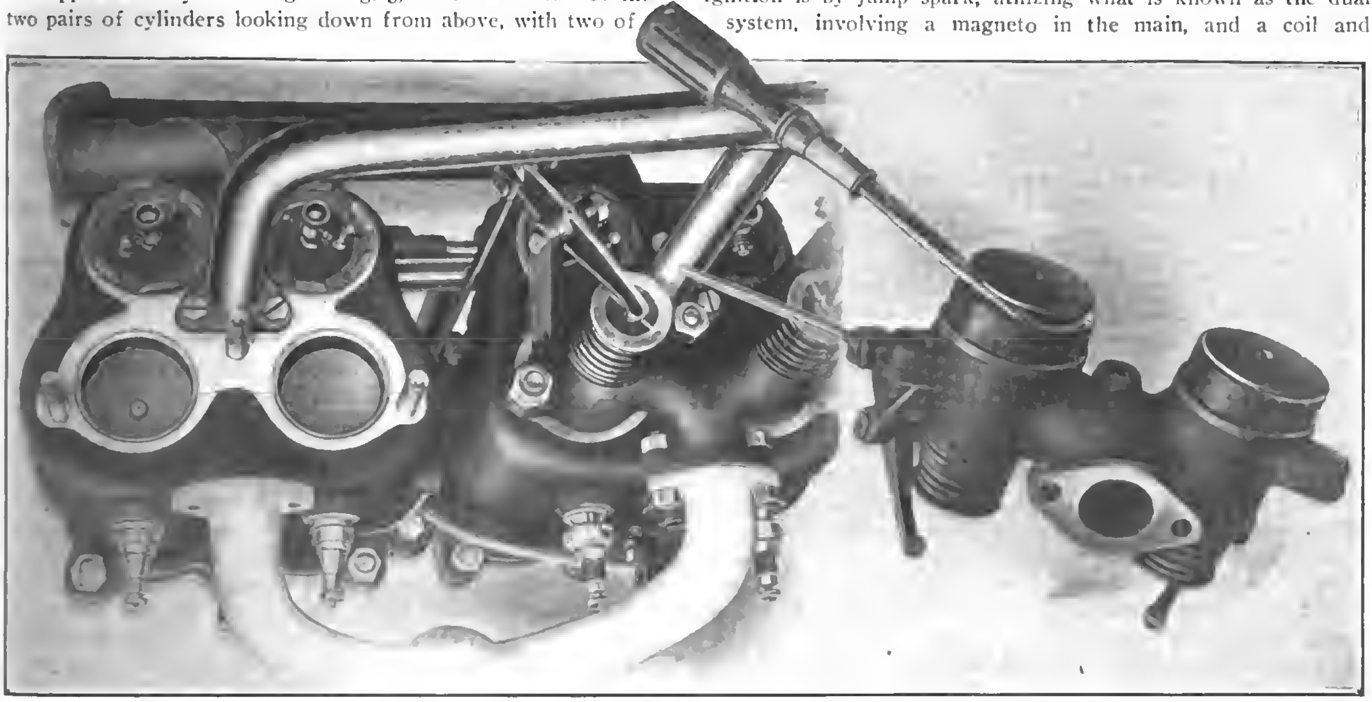
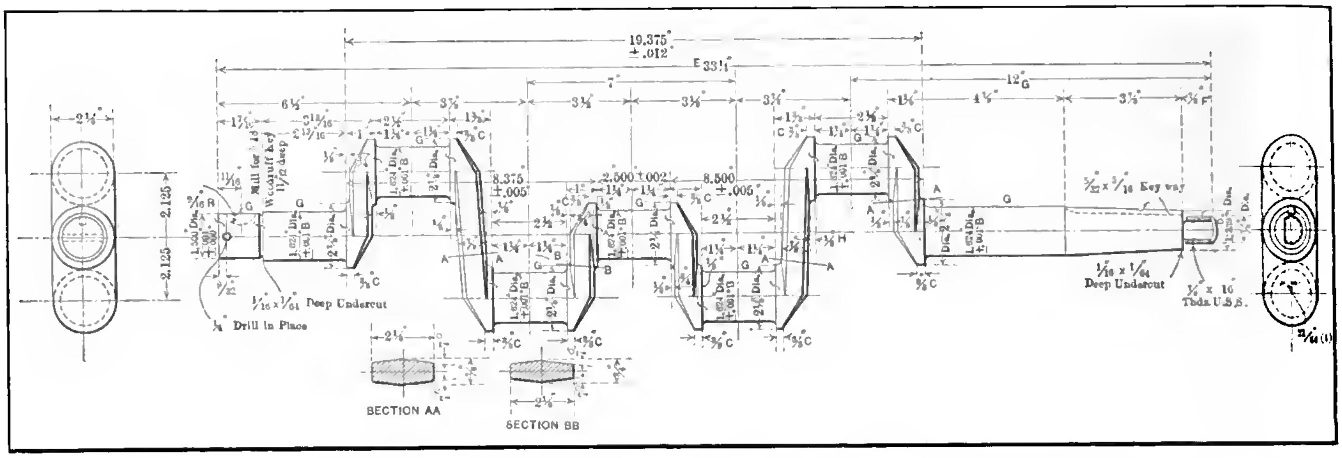


Fig. 3—Looking down on the motor presenting details of valves in the head with one pair removed and presented at the right

In further recognition of the mechanical makeup of the car, attention may be called to a multiple disc clutch with steel on steel, and a sliding-gear system of the selective type, located amidships. This gear has three forward speeds and reverse. It is related to a shaft drive through suitably disposed universal joints, terminating in a floating type of rear axle, with the reactions satisfied by means of a well-designed torsion rod.

The bearings in this model comprise three, which are plain in the crankshaft of the motor; the camshaft bearings are plain also. F & S ball bearings are used in the road wheels and rear axle system, excepting for the front wheels, which have Timken roller bearings. The plain bearings used in the car are lined with Parsons white metal.

The wheelbase of this model is 110 inches, with a 56-inch tread, and the wheels are fitted with 34 by 3 1-2-inch tires front and rear. The spring suspension of the chassis is semi-elliptic front and three-quarter elliptic rear. The front axle is of the

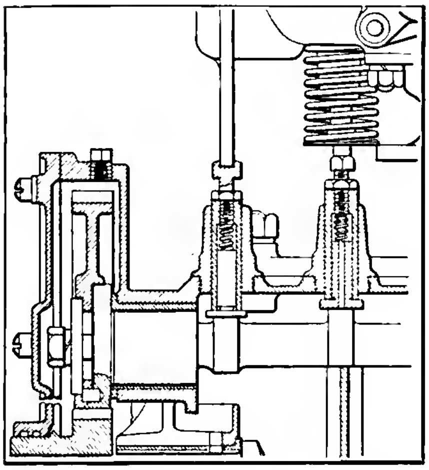


Reproduction of Working Drawing of Crankshaft, Showing Liberal Sizes, Large Fillets, and Close Work Required

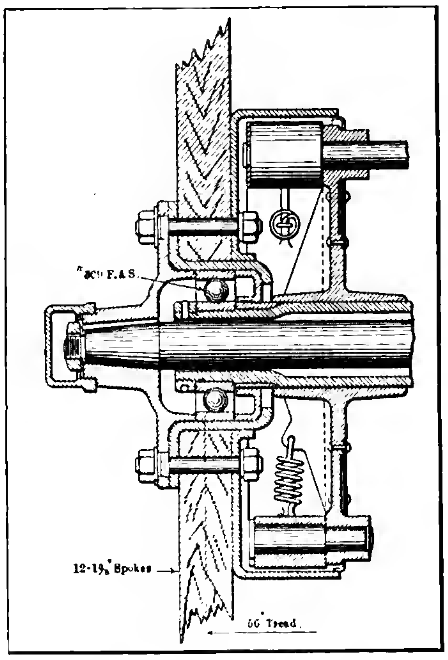
I-section, drop forged of suitable material, and the yoke for the knuckle is of excellent strength, the mechanical arrangement is noteworthy, and the knuckle pivots on a large ball, which renders the steering motion nearly frictionless. The rear axle construction, as shown in Fig. 5 presents some features with novelty in their makeup. A single F & S ball bearing in the plane of the load is responsible for the good performance, the hub fetches up on a taper, is pressed home by a hub-nut of good proportions, and dirt is excluded by a cap, which screws on and fetches up to a shoulder, hence stays on without the use of further locking devices. Pressed steel parts are used in the hub construction, and closures prevent the grease, which is placed to lubricate the bearing, from pressing out or becoming contaminated. The brake drum centers on the pressed steel hub member, and the drum is of excellent diameter, made of pressed steel with a closure to prevent mud from interfering with the performance of the internal expanding brakes.

Referring to the differential system and bevel drive, the differential gears are of the bevel type, the jackshaft members have square ends and register with square holes in the differential gears. The differential housing is of substantial construction, and the holding bolts, which sustain the two members in their proper relation, are also used in bolting the bevel gear into place. The driving pinion of the bevel drive fetches up on a taper of a stub-end shaft, and a large cup-and-cone ball bearing is in concentric relation with an extension of the hub of the bevel pinion, thus assuring that the pinion will hold to its pitch line relation, and the thrust is also taken by the same commodious cup-and-cone ball bearing. In order that this stub-end shaft, which carries the driving pinion, will sustain the relation of the pinion to the gear, a second cup-and-cone ball bearing is utilized at a considerable distance away, so that the resolved component of the relations of the pinion and gear will not induce an undue pressure, tending to distort the stub shaft out of its true location. The stub shaft connects with the propeller shaft through a universal joint. The whole system is carried in a spherical member which is suitably ribbed and nicely designed, and made by the steel-casting process. The steel tubing which composes the rear-axle shell is of large diameter and is selected for strength, care being taken to sleeve the tubing where it joins the shell, with a sufficiently long bearing to guarantee the future good performance of the axle as a whole.

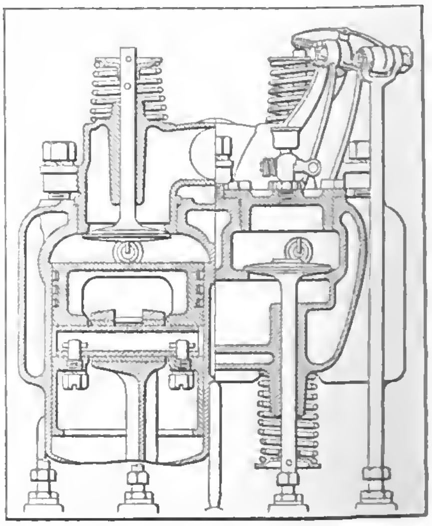
Attention is also called to the working drawing of this rear axle, in particular, the outer end of it, which shows the single ball bearing previously mentioned, as well as the balance of the construction. The brake drums are of pressed steel, in a single piece, and are bolted up to the two other parts of the hub in such a manner as to form practically an integral part, with a corresponding gain in strength. Within this drum works the brake, of the expanding band variety, the construction of the brake supports being such as to completely close all openings left for assembling purposes, thus rendering the whole dirt and dust proof. This latter brake support is so formed as to bear on the axle tube for a very considerable length, making it very strong and a rigid support, while stiffening the ends of the load-carrying axle as well. In the section through the engine showing the valves, it will be noted that the latter are of the conical-seated variety. Similarly, attention is called to the fact that the piston pins are fixed in the piston with a two-diameter pin, cotter-held.



Camshaft Showing Attachment of Gear



Rear Axle, with Single Ball Bearing



Cylinder Heads with Valve Mechanism

AERONAUTIC PROGRESS ALONG CONSTRUCTIVE LINES

By MARIUS C. KRARUP

STEERING devices, rudders and keels are among the elements of construction which engage most attention among aviators at present, but what is most important with regard to their mechanical action, in combination with the most successful aeroplanes of to-day, is likely to be found of little consequence, as soon as improved planes, propellers and motors make their appearance. Only the fundamental principles of these elements will then be of interest. But for a number of years to come the tilt-rudder usually in front of the biplane and the vertical rudder usually to the rear, as well as the corresponding members in monoplanes, must be reckoned with, somewhat as hot tube ignition and "hit-and-miss" motor speed had to be studied for years in the automobile industry, until improved carbureters and progress along the whole line made throttle control and the magneto practicable. Learned discussions on the relative merits of governing "on the intake" or "on the exhaust" are now remembered with a smile. And at all times some of the constructors knew that those expedients could only be temporary makeshifts; yet, they had to be employed.

In the art of aviation, soon to be an industry, much of the progress which is theoretically in sight must probably await the advent of suitable construction materials in suitable shapes, combining strength, lightness and elasticity in a degree which can never be developed in a wood-and-canvas structure. The makers of fine alloy steels have here an open field for experimental work, relating to the economical production of thin structural shapes, most of them elongated and tapered, others in the form of joints and clamps, and all of them uniformly heat-treated at the producing plant and preferably made from a single, standardized "aviator's alloy," highly dependable, and whose strength in any given size and shape may be calculated to a nicety. While the pressed-steel frame, and the processes which made it possible, proved highly adventitious to the automobile industry, the production of aeronautic steel lumber, adaptable to experimental construction, would seem to be outright indispensable for substantial progress in aviation, as the constructor must be released from bondage to unreliable woods, especially weak and bulky in the joints, before he can get elbow room and begin to materialize his ideas. The latter may be faulty or correct, but as a rule they will be "between and betwixt," and will require demonstration before their worth can be decided. But while the evolution of special aeronautic construction materials is foreshadowed and necessary, it will require time, and during the years which must pass before such materials are likely to be available, the design of the thousands of aeroplanes to be built must probably include tilt rudders, steering rudders and such slight warping of planes for steering purposes as wood construction admits.

Mere keels, unadjustable and inapplicable to any kinetic purpose, are already passing into the realm of superstitions or preconceived notions, as it has become perfectly plain that they are just as much of a hindrance to the regaining of equilibrium as a help in preserving it. As their alleged utility has never been founded on theory, it need not be theoretically gainsaid. Their use has mainly served as a reminder of something faulty in other parts of the construction. The seesawing of the main planes, which they were intended to prevent, was a symptom partly of overconcentration of weight along the axis of the machine and partly of shiftiness in the support afforded by the planes, and the logical remedy has been found, by those constructors who use no keel, in better distribution of weights, the use of more strongly curved planes, whose support is less variable from accidental influences than that derived from planes of small curvature, and in the manipulation of vertical rudders. But weight distribution has not yet been found feasible for monoplanes, and here the remedy taking the place of stabilizing keels is the adoption of the dihedral angle, so-called, in conjunction with a low center of gravity, as in Latham's well-known machine.

The principle at stake is that of mobility versus inertia, for preserving equilibrium. In favorable weather the inertia elements, whether keels, vertical or horizontal, or tails, produce the steadier flight, perhaps, but in irregular weather the mobility principle wins out. The main question in this respect is clear: Should air resistances, which are not subject to graduated control, be employed as means for controlling equilibrium, when air currents are the disturbing element to be guarded against? The analogy drawn from the steadying effect of the keel of a ship loses all force, when it is considered that the ship's keel is not itself exposed to the action of either waves or winds, which are the disturbing factors in navigation. In aviation, keels are not to be.

The tails of monoplanes combine two elements of inertia, one derived from the trailing weight, which at present serves the double purpose of keeping the machine head on, so long as the motor and propeller work, and of suppressing irregularities in the tilt and support of the planes, and the other consisting in the air-resistances which oppose any rapid displacement of their extended surfaces, except in the line of motion of the machine. These two elements of inertia in conjunction destroy the advantages which the monoplane should intrinsically possess in the way of superior speed, due to the smaller air resistance against propulsion of its single plane, and explain why it has not been able to maintain this supposed speed-superiority in contests.

In the biplanes, some lack of uniformity in the support afforded by the planes is acknowledged in the considerable distance from the front edge of the main planes, at which it has been necessary to place the tilt-rudder. As the tilt-rudder is small in comparison with the main planes, it must be made to act with great leverage against any tendency which the main planes may develop toward pitching forward or backward. This tendency, with properly curved and narrow planes, should not be very pronounced. Even a somewhat irregular wind will usually drive the whole aeroplane machine before it rather than raising or lowering any part of it, similarly as the housefly is saved from a clumsy pursuing hand by the air current preceding the attack. But safety against the exceptions to this rule is vital, and the tilt-rudder is intended to supply it. And, while every biplane is supposed to be so balanced by its designer that its weight is distributed evenly on both sides of its axis, and also to the front and rear of a line which may be drawn parallel with the front edge of the planes and, roughly speaking, about one foot behind this edge, the corresponding line indicating the transverse axis of aerial support does not stay in one place, but shifts forward with an increase of speed and backward with an increase of load, and the tilt-rudder is relied upon to take care of these changes in the fore-and-aft balance of the machine, through proper manipulation. At high speed, the tilt-rudder is desired to cut the air quite edgewise, no forward lifting action being required of it. But, if the machine is intended to be used mainly at some lower speed, the size and distance of the tilt-rudder from the main planes should be so adjusted that it will cut the air edgewise at that particular speed, because this arrangement will give a maximum range of effective rudder action for control and safety, namely, 20 degrees of deviation on both sides of the direction of motion. It has been experimentally demonstrated that rudders of present construction reach their maximum effect at that deviation, so that nothing is gained by turning them farther. Fortunately, the nice balancing of the whole machine involved in procuring these results may be obtained experimentally not only by adjustments of the area or leverage of the tilt-rudder, but also by moving the

(*To be continued*)

On the 17 Mile Drive in Monterey, Calif

Looking for Civilization in Texas

Fighting Texas Roads near Sierra Blanca

Through Swamp and Desert to Pacific

AFTER fighting four days in the teeth of a driving sandstorm, Walter H. Hanson and his transcontinental touring party recently swung into the frontier town of Mecca, on the edge of the great desert, tired from the battle with the elements but happy in the unusual accomplishment. The dust and sand had penetrated to the depths of their beams, but the car, a seven-passenger Stearns, weathered the gale in good style. From Mecca to Los Angeles the tour was pleasanter, although the roads were terribly rough. Mr. Hanson, who is a wealthy broker of Saratoga Springs, N. Y., his wife, son and chauffeur appeared to have enjoyed even the more strenuous of the incidents of the trip from ocean to ocean.

They were mired in Louisiana, mobbed in one of the swamp parishes, traversed some of the most forbidding trails of the country, but arrived at their destination in good health and spirits.

"We made Phoenix all right," declared Mr. Hanson upon his arrival at San Francisco, "and there we picked up George Dake, who acted as our guide through to Los Angeles. Of course even Mrs. Hanson had become hardened to the bad roads of the South and the jolting didn't bother us much. We reached the Colorado River all right and were ferried across by the Indians and pulled out of Ehrenburg Thursday morning expecting that with ordinary luck we would reach Mecca that night.

"The sandstorm on the desert was something indescribable. While it was an extremely trying experience insofar as our eyes were concerned, I enjoyed it to a certain extent. The wind blew the sand so that one could not see 20 feet ahead. The sand was deep and fine as powder, making it a hard matter to hold straight the big car with its 6,000 pounds of weight. Sometimes we could see the tracks of a wagon which had gone ahead, and sometimes the road looked just like any other part of the desert. We didn't get lost, but I can easily imagine how an automobile could lose its bearings going over the stretch of country between Mecca and Ehrenburg.

"But when you strike the civilized portion of California, then you begin to realize what a paradise it is. Outside of a few roads in New Jersey, I don't know of a State that can boast of such good, ordinary highways as southern California. Talk about your bad roads, why California highways are as asphalt pavements beside them!

"Down in Louisiana we were held up one night by a band of ruffians who declared that we could not pass. I turned around; went back to the nearest town, got the deputy sheriff out of bed and then, he standing on one running board and I on the other with gun in hand, forced our way through this terrorist mob."

The run from Mecca to Los Angeles, a distance of 154 miles over some of the worst roads in the southern part of the State, was made yesterday with the son at the wheel. The transcontinental party was met near Pomona by a party of newspaper men, who piloted them into the city. On the return into the city, the local car was left behind by young Walter Hanson, who came flying over an unknown road faster than most road racers would want to take it.

At present the Hansons are touring in California and are not sure when they will return to the East.

In Front of the Alamo Mission, San Antonio, Tex.

Mexican Prison in Juarez, Mexico

Near San Miguel Hill New Mexico

Figures and Deductions From 1909 Exports and Imports

IN the yearly summary of the foreign commerce of the United States, the figures interesting to automobilists would seem to have been carefully buried under a subdivision of comparatively small moment, that is to say, in classifying automobiles and their parts under the heading of "Carriages, Other Vehicles and Parts of," the Bureau of Statistics of the Department of Commerce and Labor seems to have given the lead to the insignificant part. In short when the division is called "Carriages," when carriages amount to but 1 per cent. of the total, while automobiles and parts consist of the other 99 per cent., it really seems like a case of the tail wagging the dog. It is time that the automobile manufacturers rose in their might and had this changed.

Getting right down to the figures, some very interesting facts are there brought out. Thus, in the summary of commerce with non-contiguous countries, the fact appears that our trade with the Philippines and Porto Rico has dropped off, while with Hawaii, on the other hand, such a big increase is noted as to nullify the other two losses.

SHIPMENTS OF CARS, CARRIAGES, AND PARTS TO PORTO RICO, ETC.

Year.	Porto Rico.	Philippines.	Hawaii.
1907	$615,720	$166,359	$339,711
1908	563,829	261,628	452,040
1909	548,509	129,995	707,540
Change Over 1908	— $15,320	— $131,633	+ $255,500

From the above, it would appear as if the automobile manufacturers had not given enough attention to the Philippines or Porto Rico, to their own loss.

As a concrete expression of the business done by American manufacturers, the summaries of total exports and imports are of much interest, although the previously mentioned combination with carriages and carriage parts somewhat beclouds the exact facts. At any rate the constant increase and its changing each year will be given thus:

VARIATION IN TOTAL EXPORTS OF CARRIAGES, ETC.

Year.	Value.	Net Change for Year	Change in Per cent.
1903	$10,499,195		
1904	10,936,618	+ $437,423	+ 4.16
1905	10,610,437	— 326,181	— 2.93
1906	17,788,425	+ 7,177,988	+ 67.6
1907	20,513,407	+ 2,724,982	+ 15.3
1908	22,072,902	+ 1,599,495	+ 7.56
1909	15,392,817	— 6,680,085	— 30.2

Probably the most noticeable and also the most surprising thing in the above table is the radical falling off of the business during 1909, as compared with 1908, which latter is not thought of as a good year, at least not particularly so in the automobile business.

Geographical distribution is valuable when tabulated, for the reason that a country taking a big percentage of present exports should be a good field for a maker just starting in to export, rather than virgin territory. In the Government summaries the grouping is very general, there being but six grand divisions, the exports to which for 1909 were:

DISTRIBUTION OF EXPORTS BY GRAND DIVISIONS

Division	Amount	Percentage of Whole
North America	$6,485,742	42.10
Europe	4,229,802	27.50
South America	3,084,187	20.10
Oceania	857,126	5.55
Asia	527,579	3.42
Africa	208,381	1.34
Total	$15,392,817	100.01

In this table the surprising thing is not the amount of trade with North America (Canada and Mexico), but that with South American, Oceania and Asia, these latter three, which the ordinary man would say were negligible, amounting, when added, to no less than 30 per cent., or, in round figures, one-third. All things considered, it would appear as if this part of the world offers the greatest future of all, the untold numbers of people in Asia being an immense field as soon as they can be educated to the benefits of the automobile. Taking China alone as an instance, with its population of 410,000,000, Japan with 45,000,000, Persia with 8,000,000, Siam with 6,000,000, to say nothing of the untold millions of India and Russia in Asia, this virgin field should absorb in years to come all of the automobiles that America and other countries produce over and above their own actual needs, even when, as indicated in last week's THE AUTOMOBILE, the whole production amounts up to the astounding figure of several millions of cars.

In order of amount of duty collected from imports, cars, carriages and other vehicles and parts were number 28, with a total of $1,547,123, upon which the average duty was 44.98 per cent. This amount is divided into automobiles and parts, $1,518,340, and carriages but $28,783. Over 1908 the former showed an increase of $225,280 in duty, 17 per cent., and in value $502,103, an increase of 17.5 per cent. The latter, on the other hand, increased the duty but $4,022, amounting to 16.2 per cent., and in value $10,823, equal to 19.5 per cent. From these figures it would seem as if the value of both automobiles and carriages is increasing faster than the amount of duty paid, this making it appear that cars of a much higher class are imported. If this be true, and there is no reason to doubt it, the case is just opposite to that of exported domestic makes, as the value of each machine exported is on the decrease.

Finally, balancing up the imports and exports for the fiscal year, the balance lies with the home manufacturers to a great extent. The exact figures are: Exports, $5,387,021; imports, $2,905,391, leaving the favorable balance of $2,481,630. With the parts, however, the imports lead, the figures being: Imports, $773,743; exports, $605,179, an unfavorable balance of $168,564. The whole gives a net favorable advantage for American makers of $2,313,066.

Other countries imported and exported large numbers of machines of a high value, for it must not be considered that this country has any monopoly; in fact, just the reverse.

France's exportations of cars, valued at $24,569,000 in 1908, were distributed as follows: United Kingdom, $11,784,000; Belgium, $2,229,000; United States, $2,124,000; Germany, $2,018,000; Argentina, $837,000, while Algeria and other French colonies, India, Egypt and European countries received practically all of the remainder.

Italy exported most of her motor cars to European countries, $1,297,000 worth going to the United Kingdom, $985,000 to Switzerland, $556,000 to Germany, while to the United States the exports were valued at $664,000, and those to Argentina $571,000, these five countries representing nearly four-fifths of the entire motor car exports of Italy during 1908, valued at $5,533,000. From the United Kingdom the exports of cars and parts in 1908 were valued at $6,124,000, of which $592,000 worth went to British India, $573,000 to New Zealand, $176,000 to this country and $123,000 to Canada.

The exports from Germany in 1908 were valued at $2,936,000, together with parts valued at $95,000. The greater part, valued at $567,000, went to European Russia, while France took $517,000 worth, Austria-Hungary $474,000 and the United Kingdom $448,000, while to Italy, Switzerland, Roumania, Argentina, Belgium and the United States, in the order named, were shipped the remainder of the export product.

MOTOR INDUSTRY IN ATLANTA

ATLANTA, GA., Apr. 25—There are over 1,500 automobiles in daily use upon the streets of Atlanta and 95 different makes of cars have agencies in the city, while the location of a big factory is being planned for the near future. The city has taken to the motor car with special avidity and has come to be known as the automobile center of the South. It is stated that the motor industry has done more for Atlanta's recent progress than any other single factor.

BEST PRACTICES LEAD TO SILENT ACTION

MAKERS of automobiles, understanding the situation perfectly, undertake to eliminate noise on the count that it stands for far more than the mere disagreeableness of the discords rendered up by ill shaped parts. To depend upon the ability of the workmen, no matter how skilled they may be, is to court disappointment; and even if the machine tools are the best that can be had, the situation is still confined to the realm of speculation, and in the long run it is necessary to provide instruments of precision in order that the workmen will be able to judge of the results they produce.

In the Rambler plant, as the illustrations here given will adequately portray, this matter is taken up on a basis which is intended to check with the design of the automobiles produced, taking into account the shapes of the parts, the materials of which they are made, and the relation they hold to the connecting members.

Limiting the discussion to the methods in vogue in the production of gears, Fig. 1 presents a quick and accurate method of measuring the diameters, in which A is a gear of the bevel type and B is an instrument which belongs to the extensometer group, and is capable of quickly locating an error of a small fraction of 0.001 inch even when the workman is more or less unskilled.

As a further indication of the extent to which this principle may be carried there is illustrated, in Fig. 2, an instrument which utilizes the principle of the micrometer and the extensometer. The gear G is having its pitch diameter determined; the yoke Y of the instrument holds the micrometer M at one terminal, and the extensometer E at the other. The instrument is so designed that the points jam on between the teeth of the gear just on the pitch line, and the pitch diameter may be determined within a small fraction of 0.001 inch.

Fig. 3 presents still another version of the methods of determining the dimensions of gears, and in this example it is the idea to illustrate the manner of noting how well a set of gears match up with each other. The gear G1 is centered on the plug P3, and the pinion G2 is centered on the plug P2. The distance between the plugs P2 and P3 is exactly right, considering the pitch and number of the teeth of the gear and pinion. The pointer P1 will take up a position of O on the scale S, if the work is so well done that the gear and pinion mesh properly on the pitch lines, but any departure from accuracy will show by the position of the pointer P1 on the scale. The plug P2 is attached to a moving part, so that it may be located with respect to the plug P3, but when the gear and pinion are properly made, the pointer should rest on 0 of the scale S.

As a further indication of the methods reference is had to Fig. 4 of an instrument which is employed to determine the accuracy of the bevel gear. It is just this class of gear that will make noise, if it is not well made, and it is a problem to accurately finish a gear of this character. The gear G, rests on the base-plate B, through the supports S, which are so shaped that they engage the teeth of the gear at two points. If the gear is properly made the depth gauge will show a certain distance between its gauge point and the face of the base-plate. By rotating the gear 180 deg. and taking a second measurement, it is determined whether the gear is warped.

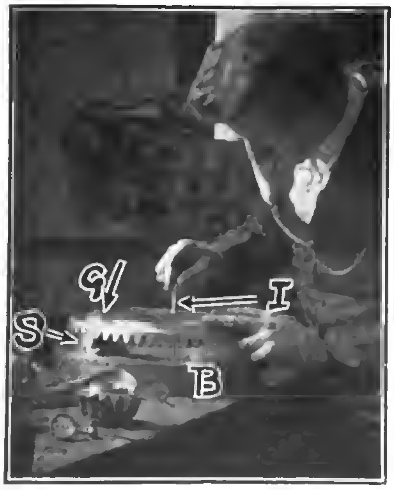
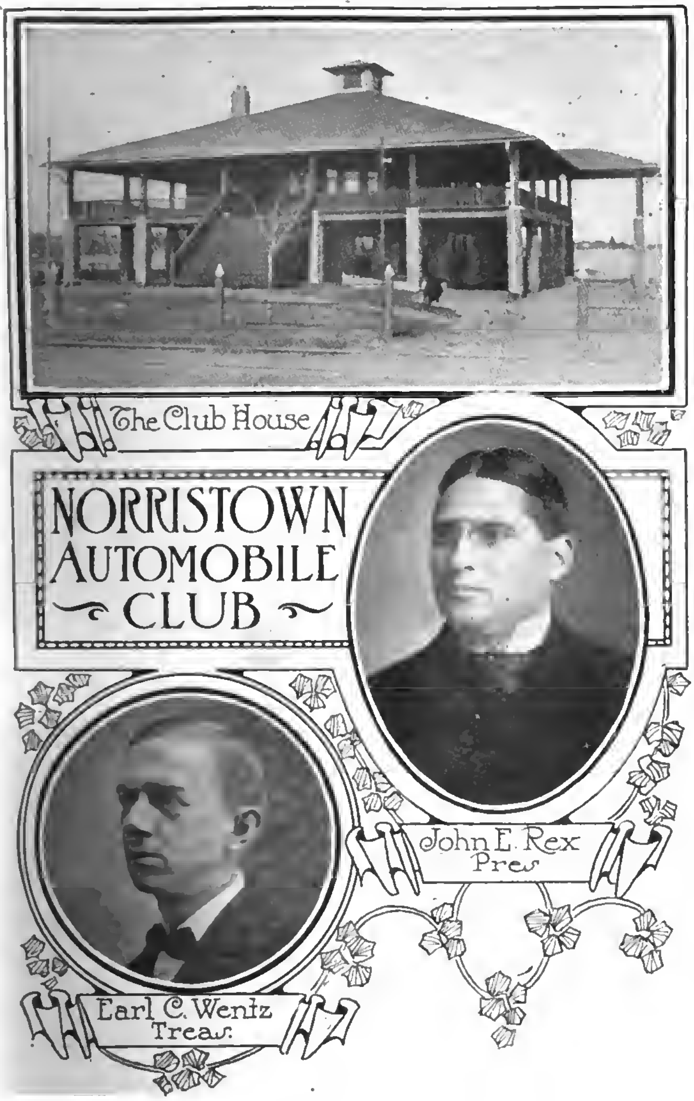


Fig. 4—Instrument employed in the inspection of bevel gears to ascertain if the pitch diameter is right

These methods tell of



ONE of the most useful automobile organizations in Pennsylvania, from the viewpoint of actual accomplishment, is the Norristown Automobile Club. It has only been in existence for about three years, but during that period it has done wonders and waxed strong and influential, not only in its own locality, but also throughout the State.

Like all organizations of its kind, it has some very wealthy men on its roll of membership, but, unlike most automobile clubs, the vast bulk of its members are simply active professional and business men whose wealth is still largely potential. As a result and without any slight upon men of money, the club fairly teems with vitality. It does things, and it does them with a snap and vigor that is refreshing.

There is not a speed trap nor horn trap in Montgomery County, despite the fact that there are three big automobile factories located in it or close to it. Such a thing as an arrest for careless driving or speeding is almost unknown, and, by the same token, accidents are exceedingly and gratifyingly rare.

The underlying reason for these conditions is the perfect understanding that has been worked out between the Norristown Automobile Club and the authorities. One might imagine that such a statement meant that the authorities overlooked violations of the law and were remiss in their duties, but as a matter of fact the secret of the situation is the terse principle upon which the club works. As stated by its President, John H. Rex, this is: "Always remember that the education of the public includes instruction of one's self."

The club has a fine home situated on the Ridge Turnpike Road, and equipped with everything adequate for comfort, entertainment and recreation. It is presided over by Julius L. Ernotte, steward, the only paid employee or officer of the organization. There are 275 active members, and recently an arrangement has been entered into, between the club and the Century Motor Club of Philadelphia, by which the members of the Norristown organization have been taken into the Century as associate members, and those of the Century were made associates of the Norristown club. This arrangement is advantageous for both, as the Century has a magnificent clubhouse at Broad and Oxford streets, Philadelphia, while the Norristown Club will be an excellent country club for the city men.

In a sporting way the Norristown club occupies a prominent position. Its first road run was given in 1908 and occupied one day to Lancaster and return. This proved a success, and in the fall of that year a hill-climbing contest was given on Skipback Hill, one of the stiffest and most trying in the vicinity.

Last year the club gave a two-day run to Hagerstown and return, in which 52 automobiles participated. The route and conditions were particularly trying, and the inspection and checking systems put into effect by President Rex and Secretary William B. Hart were of such a nature as to add greatly to the honor of winning the race. These conditions were very strict and were enforced to the letter.

"We figured," said Mr. Rex, "that the value of endurance runs lay in exposing structural defects and mechanical errors in the cars themselves, as well as in demonstrating their good points. Our rules were framed along those lines, and as a result the winner must be a creditable machine."

On May 18 and 19 the club will put on its fourth event and its third road run. This will be 327 miles long and will cover every known variety of going. The out-trip starts from Hotel Montgomery, Norristown, and passes through Reading, Pottsville, Hazleton, Wilkesbarre to Scranton, at each of which places checking stations have been arranged. The return trip will be from Scranton to Stroudsburg, Easton, Allentown, Philadelphia, and back to Norristown.

The club looks for about 75 entries, which will be divided as follows, into two divisions and six classes. The first division is for manufacturers and sales agents. In Class A, cars carrying four or more passengers and valued at $1,901 or over; Class B, four or more passengers, cars valued at $1,900 or less; Class C, two or three passengers and cars listed at $1,501 or more; and Class D, carrying two or three passengers and valued at $1,500 or less. The second division is to be composed of members of the Norristown Automobile Club and other clubs affiliated with the A. A. A. and the non-contestant class under the new reliability rules.

The special regulations governing the run were something of an innovation and caused much comment at A. A. A. headquarters. This was particularly true of the following clauses:

"Between the checking stations each car may stop for a total elapsed time of ten minutes and no more without penalization, provided no repairs or adjustments of any kind whatsoever are made during the time elapsed, and provided that the motor is kept running. This does not apply to the clause covering tire trouble and adjusting non-skid devices, and is inserted in these rules to prevent excessive speed between checking stations. For example, if a car checks out at checking station "A" at 9 o'clock, and is due at checking station "B" at 10 o'clock, the wheels of that car must be in motion for fifty minutes of that hour, and the car cannot stop for a period of over ten minutes outside of the limits of "B" checking station, and cannot cross the line of "B" checking station before 10 o'clock sharp without penalization for overrunning time."

This rule prevents terrific speeding on good stretches of road for the purpose of advertising, and tends to equalize the chances of all contestants. Another thing required under the rules is a brake gear that will check a car moving backward down a 10 per cent. grade, in fifty feet.

Four fine pieces of plate are offered to winners. They are the McDonald and Campbell Trophy, the McCullough cup, Kelly-Springfield Tire Company's cup, and that of the Norristown Chamber of Commerce.

The club has also done good work in improving the roads. It has been stated that the highway extending from the clubhouse to Norristown was the worst bit of going in the State up to about a year ago. To-day that particular bit of road would take high rank with the best in the country. What has been done there has been done in varying degree throughout the county, and the farmers who have to drive to Philadelphia with produce enjoy the benefits quite as much as the members of the club.

It also acts as host to the poor children of the county when it conducts the annual Orphans' Day celebration at Willowgrove Park, and in a dozen different ways does its level best to popularize the motor car.

Its objects are the welfare of the automobile; education of its members to the rights of others, so that good legislation may be secured; co-operation with the local authorities to maintain the law and to promote sociability and good fellowship.

The club was formed in 1907 on a basis of nominal dues. It reached a membership of 100 and commenced its career of usefulness In 1908 it was chartered under the laws of Pennsylvania, and July 9, 1909, it opened its clubhouse. It now has 275 members paying $10 dues, and within a few months it is expected that some further changes will be instituted that will greatly add to the efficiency of the organization.

John H. Rex, a leading attorney of Norristown, is president and a moving spirit in club activities; Edward C. Meier, Phœnixville, is vice-president; Earl C. Wentz, banker, treasurer, and William B. Hart, secretary of a big woolen mill, is secretary. The prediction is made by the officers that the membership will soon be increased to over 500.

HOW SUNLIGHT DETERIORATES TIRES

ANYONE who has had experience knows that sunlight has a deteriorating effect upon tires. Obviously it is impossible to avoid exposing them to the light when running the machine, but when standing, it is the part of wisdom to favor them in any possible manner. To this end don't leave a car standing for hours where the hot sun will strike it—if you do you may find a flabby tire on your return, as an immediate result, with the ultimate ill effect not so readily overcome. It is far better to stop in the shade and walk a hundred feet to your destination.

And in the case of the car that is run mostly at night, it should be covered through the bright hours of the day when in the garage. The man with his private garage can obtain this protection by providing heavy shades for the windows. Sections of old carpet or rugs are excellent for this purpose.

Some short circuits are exasperatingly hard to locate—so much so that many a car has been rewired because of inability to find one. As a last resort (and sometimes before), start up the engine in the dark and look for a spark that shouldn't be.

It is quite possible to show class in little things; a man who has regard for the niceties of the business does not put a rough forged or cast end of a jack against an axle without a doubled rag or piece of waste intervening.

HOW PRODUCTION PROBLEMS ARE SOLVED

(*Continued from Page* 791)

the manufacture of Brush Runabouts. It will be observed that the tools occupy relatively small space, and a single workman who may not be capable of doing anything else feeds the whole battery, which is devoted to the production of gears.

The tale of speed remains concealed thus far. Fig. 3 will help to illustrate the real story. In this figure the working part of one Fellow's shaper is brought clearly into view, in which it will be observed that the cutter is fashioning five gears at one time, they being G1, G2, G3, G4, and G5, which are fashioned by the multiple cutter tool T1, which is reciprocated in the axle plane of the gears, and given rotation concurrent with the rotation imparted to the blanks in the cutting process. The teeth are thus generated in conformity with the most approved practice, not by a unit method, with a fixed cutter which gashes for juxtaposition faces of two teeth, but by a series of strokes in progression until the whole number of teeth are generated to completion. The gears are clamped between spacers S1 and S2, on the mandrel M1, which in turn is held in rigid relation by the arm A1, which is adjustable in two planes, and is held in its socket S3, being clamped tight by the capscrew S4. When the blanks are clamped into place, the cutter is attached to the spindle and the machine is adjusted for running, all of which may be done within the briefest period of time, the shaper is started, and the gang of blanks have their teeth generated on without further attention of the operator. By having extra mandrels, the operator is enabled to mount blanks upon them while the machines are doing their work, and owing to this facility, a single operator is enabled to keep a gang of Fellow's shapers in substantially continuous performance, each one of which is doing five or more gears at one time, and in this way speed is accentuated to the maximum, whereas accuracy is absolutely independent of the man, and is the maximum attainable, due to the qualities of the tool employed.

There are many examples of gear shapers, planers, and cutters, each one of which has its special use, and Fig. 4 is offered as a further illustration of this phase of an important situation. In this a Schuchardt & Schutte type of Pfauter gear hobber is working on the balancing gear, which is used in the Brush Runabout motor to compensate for secondary moments, which are essentially produced in a crankshaft or a single cylinder motor when it is operating at high speed. The balancing gear G1 is mounted on a mandrel, which in turn is fastened to the platen by means of an extension E1, and the hib H1 is carried on its spindle in bearings B1, B2, and B3, taking power from a train of gears, the driven member of which is concealed by the housing H2. The hob rotates in its tangent relation to the gear to be cut, and is so adjusted that the teeh on the gear are fashioned in conformity with the demands, with the further advantage that the cutting is a continuous process, progressive in its character. In this type of tool, while it is true that but one gear can be cut at one time, it is worth noting that the speed of cutting is at a high rate, and a workman may feed a whole battery of these tools so that the labor item is reduced to a minimum basis.

In gashing beveled gears, the idea of ganging the work is a relatively new one, which was brought about on account of the desire of automobile makers to expedite the work, and at the same time add materially to the accuracy, which latter consideration was an absolute necessity in view of the modern idea *i. e.*, noiseless performance is the first requisite. Fig. 5 shows how this situation is satisfied in the production of Brush Runabouts, in which a Carter & Hakes Lincoln type miller operates upon three bevel pinions simultaneously with fixed gashing cutters C1, C2, and C3, in suitable relation with the pinions P1, P2, and P3, they in turn being on spindles S1, S2, and S3, which are rotated for the spacing of one tooth at a time by means of a multiple dividing head, which is housed in the case C4. The gashing cutters are packed on a spindle S4, and are driven by a train of gears.

For the accurate generation of the teeth of beveled gears, which is the final process after gashing, Gleason, Bilgrim, or other suitable equipment is employed. With a view to a sufficient elucidation of the complete process, considering the gashing equipment as shown in Fig. 5, Fig. 6 is offered presenting a Gleason planer, which is shown in the process of generating the correct conformation of bevel gear teeth, and the gear G1 is shown in the chucking fixture C1, in its correct relation to the generating cutters of the tool proper, and the divers means by which the work is fed to the cutters for the purpose of generating theoretically correct teeth show in the illustration.

THE HEAVIER WORK REQUIRES DIFFERENT TREATMENT

Thus far, the principle of rapid production along accurate lines has been illustrated by means of automatic machine tools working on symmetrical and relatively light parts. That the idea is limited to work of this character, however, is not demonstrated by the facts, and Fig. 7, which was taken in the plant of the Regal Motor Car Company, is offered for the purpose of depicting a method of rapidly and accurately rough-boring cylinders. A twin cylinder C1 is mounted in a fixture F1 on the platen P1, of a double spindle vertical mill M1, and the spindles S1 and S2 are equipped with multiple cutters C2 and C3, which are guided into the cylinders by the bushed holes which register therewith. The whole process is rugged, accurate, and speedy. the fixture is quickly mounted into place, and finds its registering position in the absence of any great skill on the part of the operator who has merely to so place the fixture that the pins P2, of which there are two, may be inserted into place.

Fig. 8 is another Regal idea, in which a Wormer milling machine of substantial construction is fitted with multiple cutter straddle mills S1, S2, S3, S4, and S5, which are mounted on a mandrel M1 and so properly spaced that they face off the main bearings M1, M2, M3, and M4 of the crankcase C1, which is clamped to the platen P1, by means of C clamps C2, etc., of which there are four. The straddle mills rotate at the desired speed in the process of cutting, and the work which is clamped to the table, or platen, feeds across at the right speed for the purpose. This method has all the accuracy of the tool room, the speed which comes from the utilization of stout tools, and the main bearings are faced off at both ends simultaneously with the caps in place and bolted down, so that the speed which is obtained is not at the expense of accuracy in any way, nor is the workman personally relied upon for anything but his ability to feed the machine and watch it do the work.

The multiple spindle drill idea has been developed to a high state of perfection since the advent of the automobile, and Fig. 9, which was taken in the Regal plant, shows one of its possible applications; the upper half of the crankcase C1 rests on the platen P1, excepting for the intervening blocks B1 and B2. The multiple spindle drills are guided by the jig G1, and they feed downwards against the work by motion of the housing J1, and in the present case six of the drills are actually working, although any number up to as high as twenty-four are employed under varying conditions of automobile work.

Fig. 10 shows a vertical multiple spindle drill as used in the Regal plant, with one of the spindles S1, and a reamer R1, in its socket, guided by a jig G1, reaming the large end of a connecting rod C1. The jig is so contrived that the connecting rod may be put into place and locked speedily by the workman. and it may be freely moved around the platen P1 as the occasion requires. There are several of these spindles, and the work passes from one to the other in rapid succession so that the process is substantially continuous, and the accuracy of the work done is that which is fixed by the care with which the tools are sized in the tool room, quite independently of the skill of the workman in the finishing process.

Crankshaft finishing, in view of the high quality of the steel used in these members, and the accuracy demanded in practice, is something of a problem which only bows to intelligent treatment. The drop forgings are first rough-machined in a special crankshaft machine designed for the purpose, and they are thereafter set up in a suitable grinder, where the pins are brought down to the finished size. Fig. 11 presents a Landis grinder in the Regal plant, working on a Regal "30" crankshaft C1, and the big grinding disc G1, is reducing the middle main bearing of the crankshaft to a perfectly round and predetermined diameter. Water is fed to the grinding disk through the pipe P1, thus maintaining the temperature substantially constant, and it is a well appreciated fact in shop circles that grinding is not only rapid, but it has the special facility of finishing the pins to a round diameter. In turning work, as it obtains on a lathe, a perfect round is not obtained, and it is easy enough to see that a journal, if it is fitted to an elliptical pin cannot deliver satisfaction. Grinding, in view of this fact, is essential to success.

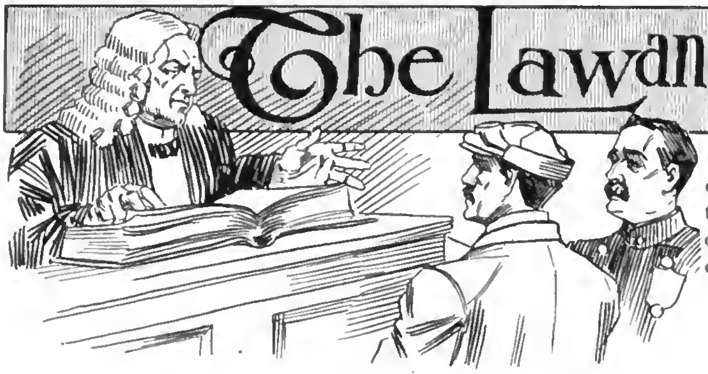
Conventional types of machine tools as they obtain for work in general are scarcely adequate from a specialist's point of view, as Fig. 12 very clearly indicates. This multiple spindle milling machine, which was designed for boring cylinders of the Everitt "30" made by the Metzger Motor Car Company, of Detroit, has four boring spindles, which are so centered with respect to each other that they register with and bore the four cylinders in the block casting C1, notwithstanding the fact that the top half of the motor case is integral with the block of cylinders. The casting is placed with the cylinder head down on the platen P1, and the spindles in their bearing housings H1, are rotated by means of a train of gears taking power from the cone pulley C2, and the belt which rolls over its periphery. The platen of the tool feeds the work up against the spindles, and this, it will be remembered, is the reverse to the customary method. By means of this special tool, this particular shape of motor casting, despite its tendency to complication, is finished expeditiously and accurately, so that in the long run, the motor becomes one of the most simple that it is possible to design.

Covers for cylinders and hand-holes in motor cases were considered very difficult of finishing up to the time when the flat grinder came into vogue. Fig. 13 presents the flat grinder idea, in which the covers C1, C2, etc., are placed on a magnetic chuck M1, and the grinding disc G1 is lowered down until the grinding face is in proper relation with the faces of the covers to be finished, when the platen of the grinder P1 feeds back and forth in the plane at right angles to the axis of grinding. The magnetic chuck holds the work, and the operator is enabled to change over after the grinding is completed in a few moments so that this character of machine tool has an enormous capacity, and the finished faces are to greater accuracy than is possible of attainment by a milling process, or if a planer or shaper is used for the purpose.

Grinding is one of the truly important processes in the modern shop, and Fig. 14 shows another meritorious application of the principle. In this case, piston rings P1 are first machined to near size, and then placed on the magnetic chuck C1, when the grinding disk D1 performs the finishing operation, first on one side of the rings, and then upon the other. The magnetic chuck enables the operator to lay the rings upon the face of the chuck and to immediately throw the traveler into gear, and by previously fixing the distance between the face of the magnetic chuck and the grinding disk, considering the design of the tool, the work proceeds substantially automatically, and the capacity of the two is very great. Accuracy is one of the assured conditions, and interchangeability follows, since the tool works within close limits day after day.

Vertical milling machines of a very massive type are coming into vogue for divers important operations, and Fig. 15 presents one version of this idea, in which the cylinder C1 is having its faces milled by the multiple cutter M1. The cylinder rests on the traveling platen T1, by means of which work the work feeds across in its correct relation to the multiple milling head and accuracy as well as speed is realized in practice.

The Law and the Automobile



REGISTRATION NOW PENDING IN KENTUCKY

Kentucky motorists are deeply interested in the automobile State registration bill, which is now pending before the Legislature, providing for the registration of automobiles with the Secretary of State. The bill is similar to that adopted by many other States throughout the country. The chief item of interest in the measure is that providing that a certificate of registration of any other State shall be considered a license for a car owned by motorists in another State to pass through Kentucky, provided a similar privilege is accorded Kentucky-owned and licensed vehicles in the States concerned.

Owing to the fact that a city license is not recognized in most other States, it is now necessary for automobilists whose cars are registered in any city in Kentucky to secure a permit from the Secretary of State or some other official after leaving the State. House bill 272 provides the registration with the Secretary of State and a fee of $2 per car for such registration. Its speed regulations are ten miles per hour in the business districts, 15 miles in the residence portions of cities, and 20 miles per hour on the public highways. A fine of $20 to $50 is provided as a penalty for violation of the act. This act will repeal all laws and acts inconsistent with it.

FREE RIDE FROM NEW YORK TO BOSTON

Boston, Apr. 18—Anybody who wants a free automobile ride from New York to Boston can simply engage a taxicab—that is, if the taxicab driver will accept the engagement after he learns the destinations. The Supreme Court of Massachusetts recently decided that no law compelling patrons of taxicabs to pay for their rides exists on the statute books of the State.

However, the New England manager of an automobile concern is anxious to find the supposedly wealthy New Yorker who engaged a taxicab at Seventy-ninth street and First avenue, New York, for a ride to Bridgeport. The man spent money freely, and the chauffeur made no objection when the trip was extended to Boston. But at Waltham, Mass., a few miles from the latter city, the stranger disappeared through the back door of a hotel, leaving the chauffeur waiting outside, with the sum of $171 registered on his taximeter.

NEW YORK AUTO BILL PASSES HOUSE

Albany, Apr. 20—With only three votes against it, cast by Mr. Lansing (Rep., Rensselaer), Mr. Lee (Rep., Kings) and Mr. Gray (Rep., St. Lawrence), the Assembly passed the Automobile bill, handled in the lower house by Assemblyman Allan S. Callan (Rep., Columbia). This is the measure which makes a general speed limit through the country of thirty miles an hour; gives the three cities of the first class, New York, Rochester and Buffalo, the right to make their own traffic regulations; provides a speed limit of fifteen miles an hour in all second and third class cities and villages, and a registration fee to be paid to the Secretary of State at the rate of $5 for cars of 25-horsepower or under; $10 for cars between 25 and 35-horsepower; $15 for cars between 35 and 45-horsepower, and $25 for all machines above the 45-horsepower class.

"FARMER" DUNN GETS CAR AND COIN

Far-reaching in its purview is a decision rendered recently by the New Jersey Supreme Court in the case of Elias B. Dunn against the Greenhalgh Engine and Machine Works, of Newark. Mr. Dunn ordered some repair work upon his car and the parties agreed to a price for the work. After several tests, Mr. Dunn reported that the car did not work properly and the company declined to allow the machine to leave its possession until its bill, which exceeded the agreed price, was paid in full. The court decided that the company was in the wrong and the jury not only awarded the possession of the car to its owner, but also gave him a verdict of $1,032 as damages for its unlawful detention.

NEW KENTUCKY LAW IS POPULAR

It is estimated that Kentucky will receive $25,000 a year from the automobile tax which will become effective June 14. At present there are about 3,000 automobiles in the State and the number is increasing steadily. The majority of the motor cars are in Louisville. The tax is graded according to the horsepower of the cars and will range from $5 to $10 and $15 a car. Automobile owners favored the law as it will give them a better standing and the protection of a State license. The speed laws were also changed to their liking.

MORE POLICE TO WATCH N. Y. SPEEDERS

To stop speeding by automobiles in the outskirts of New York City, sixteen bicycle policemen have been added to the force in the Bronx by Commissioner Baker. This is the result of several fatalities and serious accidents during the past few weeks. The six motorcycle men who formerly made up the whole speed squad of the Bronx will henceforth pursue speeders on upper Broadway, Pelham, and Riverdale avenues.

TESTERS MUST PAY LICENSE FEE

Detroit, Apr. 18—According to an opinion rendered by Attorney-General John E. Bird, an automobile tester comes under the same ruling as a chauffeur in Michigan, with the result that he must pay a license fee of $2, this being merely a nominal sum imposed for the purpose of giving the State control.

ROAD BUILDING NEWS

WILL ABANDON ROAD MAP WORK

Detroit Automobile Club will continue as a family country club, maintaining its present delightful quarters at Pine Lake. This action was decided upon at the annual meeting, sentiment being unanimous in favor of leaving touring and road map work and the maintenance of a city club to other organizations. This does not mean that the club will lessen its activities.

E. A. Skae, Frank H. Whelden and Sherman L. Depew have been elected to vacancies on the board of directors, to serve three years.

Commissioner H. L. Bowlby of the Washington State Highway department has authorized an expenditure of $2,000 for the improvement of one mile of road between Asotin and Cloverland.

Recent Club Activities

HARTFORD CLUB ELECTS OFFICERS

Hartford, Apr. 25—The annual meeting of the Automobile Club of Hartford was held at the club quarters in the Allyn House and the following officers elected: President, C. H. Gillette; vice-president, Arthur G. Hinkley; secretary, Phillip E. Curtiss; treasurer, C. De Lancey Alton, Jr. The chairman of the various committees were appointed as follows: House, Albert M. J. Kohn; Membership, Fred W. Dart; Contest, H. P. Maxim; Good Roads, Ralph D. Britton; Rights and Privileges, Colonel George Pope.

C. H. Gillette, the new president, was vice-president of the club two years ago and has always been an active worker in the organization, especially on the contest committee. Arthur G. Honkey was secretary during the past year. Phillip E. Curtiss is a newspaper man and was recently elected secretary of the Connecticut Automobile Association. The report of the secretary shows a membership of 337. The total receipts for the year were $4,334.77, while disbursements were $4,287.04.

CLUB WILL INSIST ON ROAD ETHICS

The Outagamie Automobile Club is a new county association of owners formed at Appleton, Wis., by thirty prominent citizens. Frank J. Harwood was elected president. The other officers are: Vice-president, Charles Hagen, of Black Creek; secretary and treasurer, P. M. Conkey, Appleton. Directors, Samuel J. Ryan, M. F. Barteu, Jacob Wolf, Dr. Laird and Sam Whedon, of Appleton; Dr. Charles Boyd, of Kaukauna; Arthur Miller, of Seymour; A. K. Dewick, of Shiocton, and A. Heller, of Hortonville.

The constitution and by-laws lay particular stress upon the object of imposing penalities upon members violating the rules of the road and conduct detrimental to the motor car's best interests. The club will affiliate with the Wisconsin State A. A. and thus with the A. A. A.

CLUB ACTIVITIES IN TWIN CITIES

Minneapolis, Apr. 25—The Minneapolis Automobile Club held its annual meeting recently and the following officers were elected: President, George M. Gillette; first vice-president, H. J. Clark; second vice-president, Charles D. Velie; secretary, G. A. Will; treasurer, Louis Koch.

The membership of the club has increased 55 since a year ago and the treasurer's report showed a surplus of $6,389.51.

At a meeting of the board of directors of the Minnesota State Automobile Association in St. Paul, April 7, definite plans were made for the installation of sign posts along the main traveled thoroughfares throughout Minnesota. An Indian concern will furnish the posts and install them free of charge. The State association will pay for the standards.

BLUE GRASS AUTO CLUB IS ORGANIZED

Permanent organization was effected by the Bluegrass Motor Club at a meeting held recently at the Phoenix Hotel, Lexington, Ky. The following officers were elected: K. G. Pulliam, president; E. H. Alexander, vice-president; James S. Helm, secretary; W. S. Viley, treasurer.

The following board of governors was also elected: K. G. Pulliam, James S. Helm, W. S. Viley, E. L. March, Alex Morgan, C. E. Lyons and Dr. H. H. Roberts. The club has a membership of 100, which is expected to double within a few months.

The club expects to have steel mile posts and guide signs placed on all automobile routes in the central part of the State.

LOUISVILLE CLUB WILL BUILD

The annual meeting, banquet and election of the Louisville Automobile Club was held at the Seelbach Hotel. The following officers were elected: President, Eugene Straus; first vice-president, L. H. Wymond; second vice-president, Hewitt Brown; secretary, Dr. R. Lindsey Ireland, and treasurer, Walter Kohn. Kohn and Straus were re-elected. In his annual report President Straus announced the preparation of plans for the construction of a clubhouse and garage in the central section of the city. The proposed building calls for an expenditure of $25,000, which it is proposed to raise by the sale of stock.

PHILADELPHIA CLUBS PREPARE TO TOUR

Philadelphia, Apr. 25—The Century Motor Club is planning a sociability run, which will be a leisurely affair based solely upon enjoyment. Two-hour dinner control and secret checkers will be two of the details of the arrangements. The exact date has not yet been selected.

Both of the ladies' automobile clubs are also planning annual outings. That of the Quaker City Ladies' Motor Club will probably come first, followed by that of "La Movigante Klaubo," which is quartered in Colonial Mansions in Fairmount Park.

CLUB PLEDGED TO IMPROVE ROADS

Owners at Manitowoc and Two Rivers, Wis., are organizing a club, one of the objects of which is to improve country roads and to raise funds for placing sign boards in Manitowoc county. Both cities are objective points of many parties during the touring season. J. E. Hamilton, millionaire manufacturer of Two Rivers, is slated for the presidency, and Edward J. Carroll, manager of a hotel at Manitowoc, will be secretary. About 100 members will sign the charter, it is expected.

SHOW BREVITIES

EASTERN MAINE AUTO SHOW

Bangor, Me., Apr. 20—Under favorable auspices, the second annual automobile and motor show of Eastern Maine will open Saturday evening. Extensive preparations have been made, and the management is confident that the affair will be successful from every viewpoint. The show will be held in the Auditorium and will continue until April 29.

HARRISBURG SHOW A SUCCESS

Harrisburg, Pa., Apr. 18—The recent exhibition held under the auspices of the Harrisburg Dealers' Association proved to be a glittering success. One of the developments and results of the show is the emphasis laid upon the need of a large building in which to house the future events of this character.

Difficult Carbureter Adjustment

Editor THE AUTOMOBILE:

[2,240]—I have a light runabout, using a * * * carbureter. How would you adjust it to give the most power? It goes well at high speeds with the throttle open three or four notches, but seems to choke up if the throttle is opened over one-half. Your answers to inquiries about carbureters that have springs on the air valve do not apply in this case. Would it pay me to jacket the exhaust pipe and carry hot air to the inlet of the carbureter

Mooers, N. Y. CARBURETER.

It is difficult to understand how a carbureter of to-day can be made and used without an air adjustment. If the carbureter in question has one, the adjustment of it goes as follows: Run the engine at its highest possible speed, and vary the air adjustment while so running to give all the speed possible. By varying the adjustment while the engine is running you will discover whether the result is favorable or otherwise. If favorable continue until the high point is found, while if unfavorable, turn in the opposite direction until the desired result in secured. Having adjusted this until the maximum possible speed is obtained, slow the engine down as slow as possible, then adjust the gas line feed so as to give the lowest possible number of turns per minute of the engine. This, too, will be found by experimentally turning in both directions. When the very slowest speed is found and fixed as to adjustment, and the same as to the high speed, the carbureter is said to be adjusted. Beyond this work, the only thing that can be done is in the nature of very slight additional changes which would be made on the road, to give slightly more or less speed, or more power at slower speed.

Now that warm weather is coming on, it would hardly seem advisable to go to the trouble and expense of supplying the carbureter with either hot air or hot water, which is essentially a cold weather provision, making vaporization more easy at that time.

There are, however, many makers who fit a source of heat to their carbureters even for summer use.

Cast Iron Welding

Editor THE AUTOMOBILE:

[2,241]—I have a Packard '06 car, but unfortunately have cracked the water jackets of both cylinder units. In one cylinder the crack goes through the cylinder wall proper. The break is very small and collects about half a cup full of water when the car is at rest. Could you recommend some firm which could weld the cylinders successfully? I should be much obliged if you would do this, as no one around here seems to know much about it.

Rhinebeck, N. Y. H. M. SUCKLEY.

The success or failure of the welding process will depend somewhat upon the nature, size and condition of the break. If small, not opened up very wide, and with rough edges to help the welding material adhere, the job will doubtless be successful. This art of welding cast iron has advanced so much in the past few years that in your particular case it is well worth trying before purchasing new cylinders, which would be somewhat expensive. The best plan would be to bring the cylinders in to New York City, where there are many firms doing this kind of work. To mention a few of them: Davis-Bournonville Company, West Street Building; Industrial Oxygen Company, Hanover Bank Building; Schaap Flame Utilities Corporation, 344 Cumberland avenue, Brooklyn; National Electric Welding Company, 181 Christopher street.

Valve Sizes and Relative Importance

Editor THE AUTOMOBILE:

[2,242]—I should like to ask your opinion about the valve sizes and lift in modern automobiles. Are not the size and lift of valves an important function of gas engine efficiency; almost as important as cylinder bore and stroke because of what use are large cylinders if they cannot be completely filled and emptied with each explosion? The effective power of various cars will vary widely with the same cylinder displacement, and while there are many elements contributing to the efficiency of gas engine power, it seems logical to believe the valve details are a most important item.

All details of engine construction are widely advertised as an essential in rating the car except the valve construction, and these records are very rare. In fact, it seems to be a carefully guarded detail with many makers. At both the New York Automobile Shows every maker would tell you all about the cylinder bore and stroke, about the crank, pistons and engine with perfect freedom of knowledge, but when you come to valves they simply are ignorant or cautious. Some would guess at it, others did not know. Foreign makers were frank enough to say it was none of your business, you could buy a car and measure it. Why is this such a mysterious secret?

The quick rejection of hot gases through ample exhaust valves is a most direct means of reducing heat in cylinders, and the cooling system would be designed in proportion and yet they consider this unimportant. It is generally understood that engines for high speed work must have extra large valves, and if so, why would the same valves be undesirable for ordinary work. Manufacturers may feel a hesitation in letting competitors have the information and think the ordinary layman has no business with it. This is a great perod of mechanical study, it is universal, and the layman is really the buyer. The purchase of a new car is a very important expenditure for many and it is natural that he should want to feel that his new car is reasonably proportioned for his use.

Many manufacturers will say that their engineers know their business and that their cars are always satisfactory, but satisfaction in a car is more or less a matter of degree based upon previous experience in a comparative sense. A person could easily buy a 50 horsepower car with too small valves and express general satisfaction, in perfect ignorance of what the same car would do if properly proportioned throughout. It may compare favorably with the old car he has just gotten rid of, and yet he will calmly explain that he does not care for speed when he swallows dust from many 20 and 30 horsepower cars, and he will continue to maintain his position that he has not been "stung."

This is a matter that should be scientifically proportioned from practice, and it seems to me an evidence of lack of confidence when a maker will dodge giving this detail about his own product. I would like to hear your opinion and I would like to hear manufacturers explain their ideas of valve importance, just for general information. D. C. N. C.

New York City.

In the beginning and even right down to this day valves were proportioned to the speed of gas flow allowable and the quantity of gas to be passed through the valve. Thus, a lineal dimension as speed in feet per minute times a fixed area results in a volume that is, the volume of the gases. In the case of the inflowing gases this volume is fixed by the cylindrical capacity of the cylinder to be fed, but in the matter of the heated and expanded exhaust gases the volume cannot be determined so accurately.

So it is that the latter has always been a guessing point. When a manufacturer has guessed right, and proved it by actual results, he is not usually willing to give this advantage away to his competitors. More than this, the starting point, the allowable speed of the gases is a sort of guessed-at point, which is being constantly revised, so that the whole design of valve ports and valves is somewhat shrouded in mystery.

Later engines have shown that for any given figured area of port, taken in conjunction with the speed and valve lift to give a predetermined volume, there were two matters which could be varied with varying success. Thus, the older engines had high lifts with small valve ports. Lately, it has been found that superior results could be obtained with larger valve openings and lower lifts. the net area or volume being the same. The extreme speeds now obtained in racing cars is in part due to this fact, and the universal recognition of it, but the makers who found it out by costly experimentation were not the first ones to publish that fact.

Unequal Wear of Two-Cylinder Engines

Editor THE AUTOMOBILE:

[2,243]—Will you please answer the following question: Will the front cylinder of a two-cylinder gasoline engine wear out of round owing to the different angles of the connecting rod and crankshaft on the firing stroke? HAVENS BROTHERS.

Ladoga, Ind.

If the above question is understood correctly, reference is had to a nearly obsolete form of engine, in which the crankshaft was set across the axis of the car, so as to have a straight line chain drive from the transmission located on the crankshaft to the rear axle. In this form, the load on the springs, when fully applied, lowered the rear end of the engine so that it set at a slight angle to the horizontal. This condition is only possible with this location of the engine, since with the engine placed across the frame, that is, with the crankshaft axis parallel to the axis of the car, as is the usual case now, this could not happen. Both cylinders would then be depressed equally.

In the case under consideration it is believed that the cylinders would wear slightly out of round in any case, purely from the nature of the situation, that is, the natural tendency to wear would be augmented by the force of gravity. This, however, would be effective in the case of both front and rear cylinders, and that any additional action would take place in the front cylinder is to be doubted. in fact, it would seem as if the rear cylinder would depart more from a horizontal line than would the front one. This is because the rear end of the chassis would come down under the load more than the front. The whole action is nearly negligible.

Age No Bar to Chauffeurs

Editor THE AUTOMOBILE:

[2,244]—Will you kindly consider the following and give me your opinion in "Letters Interesting, Answered and Discussed?" I am a boy 16 years old, of medium height and weight. I have had experience driving automobiles for the past five years, during which time I have driven them for thousands of miles. I have also taken care of them and done repairing. Would you think a person as young as I am could obtain a position as a chauffeur in the summer months on extended tours? S. M. J.

Middlefield, O.

Age should be no bar to employment as a chauffeur, either on extended tours or otherwise. If a man can prove his worth as a driver there should be no question as to his age. If your mechanical ability is such that you can handle cars, repair them, and generally take care of them, age, height, weight, color, nor previous condition of servitude would be no bar to your obtaining and holding a good position as a driver. Several of the prominent racing drivers now before the public are but 18 years old; surely if these boys can manage a racing car, a chap but two years younger can handle a car under less strenuous conditions.

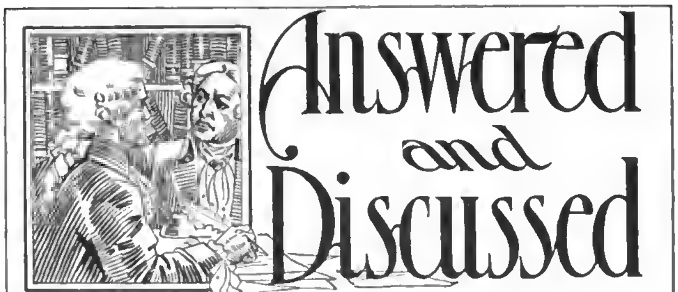
Cannot See Very Well

Editor THE AUTOMOBILE:

[2,245]—I wish to call your attention to letter number 2,169, February 17, 1910, issue of "The Automobile," in which you state that a full description of the Keystone car is given in the issue of July 15, 1909, page 109. I cannot find the Keystone car mentioned on that page or in that issue. Please let me know through the columns of "The Automobile" where I can find a description of that car. A SUBSCRIBER.

Zanesville, O.

On page 109 of the July 15 issue of THE AUTOMOBILE for 1909, Volume 21, the entire page is devoted to the Keystone car. This page shows a special head of the car in question, marked "Keystone Six-Sixty," following which are some 1,000 words descriptive of the car, ending with a picture of the engine, labeled "Keystone Six Engine Has Two Separate Exhaust Pipes." The writer above could never have looked at the right page, or he would have the story in question, as it occupies the whole page to the exclusion of everything else.



Danger of Breaking Crankshafts

Editor THE AUTOMOBILE:

[2,246]—Will you please answer the following questions through the columns of "The Automobile," of which I am a subscriber and interested reader: Is there any danger of breaking or injuring the crankshaft of a four-cylinder engine having only two or three plain bearings by starting it on the battery without cranking it over? It seems to me that this puts a great pressure on the crankshaft while it is not in motion. Can you tell me of any cement or anything of that kind to stop small cracks in the cylinder walls? It is a very small crack, just enough to allow the water to seep through to the inside after it has stood for a long time. F. L. S.

Del Rio, Tex.

While the starting strains on a crankshaft are severe they are no more severe than the strains set up in pulling through deep sand, in climbing a steep hill with a retarded throttle and in many similar circumstances. Even if these strains were more severe it would be a poor make of crankshaft which did not have incorporated in its design a sufficiently large enough factor of safety to take care of these strains and still leave the shaft safe.

Elsewhere in this issue, you will find a car description, in which is given a reproduction of the working drawing of a crankshaft, with dimensions, finish marks, and everything necessary. A study of this, in comparison with the size and rated power of the engine, will soon convince you that the makers know what they are about in the matter of crankshaft sizes and proportions.

Very small cracks in the waterjacket, such as you describe may be fixed by putting into the water circulating system a small quantity of Sementol, a preparation made by the Northwestern Chemical Company, Marietta, Ohio. There are probably other similar preparations made.

Gear-Grinding Noise and a Remedy

Editor THE AUTOMOBILE:

[2.247]—Will you kindly explain through "Letters Interesting, Answered and Discussed" in your very good paper, what is the matter with the transmission gears in my model E Jackson car? The same has been noisy ever since I received the car, and after driving it about 800 miles developed a knock which was very noticeable on first and second speed, and even when not in either, but upon third could not be detected. I thought the jackshafts were loose and returned the same to the factory as per their request, but they inform me that such is not the case, but want to replace the gears because the same are slightly battered and chipped. Now, they are so very slightly battered and chipped that I don't see how they could have caused the continuous noise and the knock which developed, but has not grown worse. Kindly let me know your ideas in this puzzling case in regard to the trouble, as I cannot agree to their proposition. C. B. ISLEY.

Attica, Ind.

In a case similar to this, but which concerned another car, the transmission being located on the rear end of the unit power plant, the factory engineers stated that the principal trouble lay in the slight lack of adjustment of the bevel gears, which were nearly 30 inches away from the transmission suspected of making the noise. Gear noises have often been cured for good by a change of lubricant, such as the substitution of a heavy grease for a light one, or grease with graphite for grease without, or even in one case, of sawdust with graphite for all other lubricants. You might try one of these changes and see if it does not bring about a happy result.

THE AUTOMOBILE

Vol. XXII Thursday, April 28, 1910 No. 17

THE CLASS JOURNAL COMPANY
H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Grinding methods obtain in the plants devoted to the manufacture of automobiles as they never did before, and to an extent so great, considering complex operations, that it is almost a wonder. In these days, camshafts are invariably ground; even the contour of cams are so shaped by grinding methods that they assume great accuracy. This is a matter of more than a little moment; cams, unless they are precisely shaped, are scarcely likely to do good work, and, since they are rendered glass-hard before they go into place, it is obvious that no other method can be used to render them fit on a basis of grinding accuracy.

Crankshafts are difficult to make, unless they are rough machined, and then ground, and it is the common practice of the makers of automobile crankshafts to grind them. Pistons, rings, cylinders, and, in fine, all the parts of importance are ground, but the end is not yet. Gears may now be ground after they have their teeth fashioned and are rendered glass-hard by suitable heat treatment. It is this particular practice, which is the latest addition to grinding methods, that is attracting the notice of automobile engineers. The new grinder, despite the enormity of the undertaking, is proving to be of the greatest possible service; it is so made that after the teeth are approximated in the regular way, using gear cutters at high speed, the gears are hardened and they are then set up in the grinder to be finished.

The new type of grinder is so made that a nest of gears to be finished are pressed on to a mandrel and set up under the control of a dividing head. The dividing head rests on a table which is provided with a feed, and the teeth of the gears are passed along so that the grinding disk of the required shape takes off the requisite amount of metal from the teeth to bring them down to a true shape and to the right size. That the grinding disc would soon wear out of shape is well appreciated, and in order to avoid this, it passes up against a diamond cutter each time a cut is made over the teeth of the gears so that the shape of the grinding disc is corrected as rapidly as wear tends to reduce it from the standard set. The tool is automatic within limits, has a large capacity for work, and the gears finished by this process are so precise that they mesh perfectly on the pitch line and run without any noise at all. That this is the greatest advance in automobile construction, for at least a year, is quite plain, and it represents one of the grounds for assuming that the automobile of the future will be a most perfect device.

Predictions are frequently made that the automobile is now up to its limit of development; these prognostications come from users of some judgment; they are based upon experience, but they are not necessarily true. In order to be able to judge of the future, it is necessary to visit the makers of automobiles and see what they are doing. Men who devote their lives to the perfection of automobiles are too much in earnest to stand still; advances are bound to be made; if a convict can break out of a stout jail, despite the fact that he is being watched day and night, it is not too much to expect of men of great intelligence, that they will break out of trouble when it confronts them. Scarcely a month goes by without recording some noteworthy advance in the process of manufacturing automobiles, and the troubles of yesterday give way to the victories of to-day.

* * *

Testing automobiles as they are manufactured in a large plant devoted to the purpose is a problem which has to be coped with, and that it taxes the ingenuity of makers, is admitted. When an experimenter builds one equipment, be it an automobile or any other generic type of machine, his first concern is to test it and ascertain what it is good for. If one machine must be tested after it is made to determine its competence, remembering that it is made under the eye of the designer, how can it be that 20,000 machines can be built and placed at the disposal of ultimate users with assurance that each one of them will be all right, if they are not tested. It might be the claim that after the first machine is made and found to be in good working order, all the remaining machines may then be taken on trust despite the fact that the designer cannot spread himself out so thin that he will be able to give each one of them the benefit of his skill and judgment.

Experience has never shown that machines can be so well made that they may be turned out in vast quantities, even allowing that all the parts be carefully inspected, and never have occasion to make further adjustment after the machines are completed and started. The amount of attention that each completed article must receive may be but slight, but it is ruinous to a reputation to disregard this difference. The amount of expert attention required will decrease in proportion as process testing is resorted to.

First Annual Up-State Relay Club Run

MAY 28, the first annual Central New York Relay Club Run will leave Syracuse, New York, carrying messages from prominent men and officials of the National and State automobile associations, which will be relayed from club to club by the participants in the run. The messages will be relayed through Auburn, Cortland, Ithaca, Watkins, Elmira, Owego, Binghamton, Oneonta, Cooperstown, Richfield Springs, Utica, Rome, Oneida, and back again to Syracuse.

The arrival of the tourists in each place will be made the occasion of an informal entertainment, with the local club as host, at which the messages will be read, an interchange of views had on important subjects, and a good time enjoyed.

In order to add zest to the event, a secret time within the speed limits for each lap of the run will be set, and the car making this distance nearest the secret time will be given a prize donated by promoters of the run. An E-M-F "30" touring car was selected to lay out the route. The official pathfinder left Syracuse Saturday morning, and is expected to occupy a week.

The run will require four or five days, and the dates have been arranged so that they come not only at the season of the year when the country is in its prettiest garb, but also to include three holidays—Saturday, Sunday and Memorial Day.

NEW CLUBHOUSE FOR BUFFALO CLUB

With a burst of enthusiasm, the Buffalo Automobile Club raised $11,020 in less than an hour as the nucleus of a fund to be used to build a clubhouse at Clarence Hollow, seventeen and a half miles from Buffalo on the Main road. This action was taken at a smoker which was held in the temporary clubrooms in the Teck Theater.

The club has acquired a tract of seventy acres of land and the structure will be in colonial style of rough base-boards and stucco decorations. Plans and drawings were exhibited by Lawrence Enos, president and Robert Cartere, architect.

The whole expense of the project will be in the neighborhood of $75,000 and a bond issue has been authorized to raise the money. It is expected that the clubhouse will be ready for occupancy by July 1.

The bonds will be issued in two denominations, $10 and $100, and the whole amount of the fund, it is expected, will be raised within a few weeks among the club members.

WILL BUILD BIG BATTERY PANT

Storage batteries and other electrical appliances will be made on a larger scale at Niagara Falls when the new plant of the United States Light and Heating Company, ground for which was broken recently, is in operation.

The company already has three large factories and is incorporated in the new works. The initial outlay for building will be $300,000 and the plans, as far as they have been completed, include thirteen buildings, covering ten acres.

JOB FOR "GOOD ROADS" MAXWELL

Following the resignation of Charles J. Forbes, Jr., former secretary of the Cleveland Automobile Club, M. M. Maxwell, known as "Good Roads Maxwell," has been appointed to fill the office. He was formerly secretary of the Ohio Good Roads Federation. He was also for several years a writer on Cleveland newspapers.

Coming Events in the Automobiling World

Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
June 20-July 6....Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.
Jan. 7-14, 1911....New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Apr. 30-May 2....Philadelphia Roadability Run to Atlantic City, Quaker City Motor Club.
May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.
May 9-11.........Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.
May 18-19........Norristown, Pa., Third Annual Endurance Run, Norristown to Scranton and Return.
May 19-21........Hartford, Conn., All-Connecticut Reliability Contest.
May 21-22........Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.
May 21-22........Track race meet, Memphis, Tenn. Homer C. George, Manager.
May 27, 28-30.....Indianapolis, Ind., Automobile races including championship events on motor speedway.
May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill; Automobile Club of Bridgeport.
June 4............Worcester, Mass., Fourth Annual Hill Climb, Dead Horse Hill.
June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.
June 12..........New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.
June 15..........Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, through the Southwest.
July 4............Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.
July 30..........Wildwood, Pa., North Wildwood Automobile Club Race Meet and Club Run to Track.
Sept. 5..........Wildwood, Pa., Speedway, Labor Day Race Meet of N. Wildwood A. C.
Sept.............Chicago Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1............Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 8............Philadelphia, Fairmount Park race. Quaker City Motor Club.
Oct. 15...........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races.

Apr. 27-28........Brooklands, England, Two-Day Meeting.
May 1-Oct. 1......Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 25...........''The American Cup.'' Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.
May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.
May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.
June 2-8..........Prince Henry (German) Touring Competition.
June 13-18........Scotland, Scottish Reliability Trials.
June 20...........French Voiturette Race.
June 21...........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27...........Speed Trials at Kiev, Russia.
July 12-18........Ostend, Belgium, Automobile Week.
July 20-25........Boulogne, France, Automobile Week.
Aug. 1-15.........Ardennes, France, Meeting.
Aug. 15-Sept. 15..French Industrial Vehicle Trials.
Aug. 21...........Salon, France, One and Five Kilometer Trials.
Aug. 28...........Mont Ventoux, France, Hill-Climb.

MANY ENTRIES FOR QUAKER CITY CLUB RUN

ULTRA-modern—up-to-the-minute in every respect, will be the Third Annual Roadability Run of the Quaker City Motor Club, which starts Saturday morning, April 30, from the rooms of the club at the Hotel Walton, Philadelphia, and traverses the State of New Jersey to Atlantic City.

Indications point to many more than 100 entries and club officers believe that at least 150 cars will make the run. The entry box remains open until Wednesday midnight.

The course is about 68.2 miles long and the finishing line is opposite the Hotel Strand at Atlantic City.

Special arrangements have been made at Philadelphia and Atlantic City and at various intermediate points to police the route of the cars, and elaborate plans have been laid to welcome and speed the contestants at a number of places en route.

The trophies consist of five magnificent pieces of plate and five series of approximation prizes, all of which are well worth the effort of winning.

The unique feature of the run is the "secret time" arrangement by which the prize awards will be made. A plan has been followed in this particular, that is different from any of the usual ideas of a secret time and all that has been announced is that Mayors Reyburn and Stoy have agreed on a time within the New Jersey speed laws and the cars that most closely approximate their figure, will win.

BRIDGEPORT MAY HAVE AUTO TRACK

Plans for an automobile race track at Bridgeport, Conn., have been brewing for some time, and the idea has met with much encouragement in that vicinity. The plan, as most definitely outlined, contemplates the construction of a course back of Lordship Park, where conditions are said to be particularly favorable for such an undertaking.

The Bridgeport Automobile Dealers' Association is behind the tentative plans that have been put forward at this stage.

PREPARING TO TIME ROAD RUN

Details and plans of service for the newly organized Timers and Scorers Club of Philadelphia were discussed at a meeting of that body at the Quaker City Motor Club last Friday evening. The chief matter under discussion was the Third Roadability Tour of the latter club which commences April 30.

Work upon the revision of the system to be used in the coming Fairmount Park race has commenced. The club is seeking some means of improving the score-sheet and blackboard system in use last year and has under consideration two mechanical timers. The club is being drilled with particular care for the big event.

Paul B. Huyette, president of the new club, is a wealthy and enthusiastic automobilist. I. C. Minford, secretary, is the automobile editor of the *Evening Times* of Quakertown.

I. C. Minford, Secretary of the Scorers' and Timers' Club of Phila.

HARTFORD CLUB TO ENTERTAIN

At a recent meeting of the Board of Governors of the Automobile Club of Hartford the following committees were named: House and Entertainment—Albert M. Kohn, Wallace T. Fenn, Frank J. Knox, J. G. Hawley, Louis P. Strong. Contest—Hiram Maxim, Arthur G. Hinkley, Henry W. Nuckols, Albert M. Kohn, William T. Plimpton, Samuel A. Miner, William C. Russell. Rights and Privileges—George Pope, Dr. Harmon G. Howe, Edwin Y. Judd, Walter C. Faxon, Frank J. Knox. Good Roads and Signboards—R. D. Britton, C. D. Alton, Jr., F. A. Morley, John E. Bruce, Samuel C. Doty.

Plans were made for entertaining the selectmen of all the towns in Hartford County as well as the heads of all the granges at a near future date. The club has a number of important suggestions to make to the officers concerning the application of automobile legislation and regulation.

READVILLE TRACK FOR AUTOS

Earnest efforts are being expended to secure the racing plant of the historic Readville race track for a permanent motordrome and aerodrome. The track upon which so many gallant thoroughbreds and harness champions have appeared has seen its last Grand Circuit meeting, and as it has been proven that the track is admirably suited to some forms of motor racing, even in its present shape, the chances appear rosy that it will be taken over, possibly by the Bay State Automobile Association, and used for automobile racing.

STATE AUTO CLUB IN NORTH CAROLINA

With the object in view of forming a State automobile association, a general meeting of North Carolina motorists has been called to assemble at Greensboro, May 9 and 10. The objects to be attained by tentative organization are the furtherance of the interests of the automobile; the upbuilding and maintenance of the roads of the State; the formulation of adequate legislation for the benefit of all users of the highways; the enforcement of the rules of the road and the banding together of automobile owners for mutual protection and advantage.

TEXANS FORM AUTOMOBILE CLUB

With a charter membership of 90, the Beaumont Automobile Club of Beaumont, Texas, was formed recently at an enthusiastic meeting of motor owners of that city. Edward Stedman was chosen president; W. C. Gray, vice-president; S. S. Solinsky, secretary, and E. A. Blanchette, treasurer.

COMMERCIAL CAR CONTEST PLANNED

CHICAGO, April 25—The Chicago Automobile Club's contest board has decided to schedule for early September a commercial car contest in which it will be the aim to demonstrate to the business world the feasibility of motor transportation.

Atlanta - New York Tour Announced

PRACTICALLY identical with the rules for last year's run will be the regulations for the New York Herald-Atlanta Journal Good Roads tour, which will start on June 6 in Atlanta and finish June 14 in New York. Application for dates and sanction was formally granted and the entry lists will soon be submitted to the automobiling public.

The roads along the national highway, which were dedicated to the Good Roads tour last year, are reported in excellent shape, despite heavy rains. This proves the value of such preparation as was given prior to the run last Fall. It is planned during the next six weeks to put the whole route in the best of condition.

Interest in the tour is widespread in the South, and as soon as the preliminary arrangements have been completed, it is expected that the entry list will swell to large proportions.

A number of runs, all centering at Atlanta and tapping half a dozen Southern States, are being arranged as feeders for the trunk tour from Atlanta northward.

Officially the *Herald*-Atlanta *Journal* Tour of 1910 will be known as a contest of the "Fourth Grade," under classification A. This is the price class used in the 1909 tour, but for 1910 it includes seven divisions instead of six. The grades are as follows: $800 and under; $801 to $1.200; $1,201 to $1.600; $1,601 to $2,000; $2,001 to $3,000; $3,001 to $4,000, and $4,001 and upward.

This method of classifying cars serves to separate the lower priced machines, of which there are a very large number, making four divisions up to $2,000, as compared with $3,000 last year. It makes two divisions of cars between $1,201 and $2,000, instead of one division from $1,250 to $2,000, as required by the rules of 1909, thus equalizing the prize winning chances of many cars that heretofore were unduly handicapped. It will require a tour of the Good Roads type to fully demonstrate the value of the new classification, but the manufacturers are convinced that they have worked a big improvement.

Another change, and one that will be appreciated by the entrant who encounters trouble on the road or who lags behind through overconfidence, is that the rules this year allow three minutes before penalties begin at controls. Heretofore only two minutes have been allowed, and, while the added time is not great ordinarily, circumstances will undoubtedly make that extra minute look like a life saver in many towns this season.

POINTER FOR NOVICE DRIVERS

In a recent issue of *Harpers Weekly*, H. W. Perry writes some valuable pointers to the novice on the art of driving. Mr. Perry says that the beginner would do well if he took this advice: "Focus your gaze as far as you can see the road distinctly. The proficient driver learns early to watch the road far in advance of his car. On a straight, level road this may be several miles; on a winding road, only as far as the next turn; on a hilly road, the crest of the next hill; on a city street, as far as the condition of traffic permits the way to be seen clearly.

"By following this practice, small obstacles on the surface of the road may be seen long before they are reached, and, almost unconsciously, the machine is steered to avoid them.

"On the other hand, the novice or indifferent driver who concentrates much of his attention upon the road directly in front of his wheels does not see impediments far enough in advance to begin a gradual movement in avoidance of them, and is constantly in tight places on account of his lack of foresight. The difference in comfort to the passengers riding with a good driver and one who is not proficient is enough to prove of itself the soundness of this reasoning.

EMPLOYERS WANT TO BE SHOWN

Reliable chauffeurs are in sharp demand by private owners and taxicab companies, according to Charles A. Sibley, who conducts the Y. M. C. A. employment bureau for automobile drivers at 318 West Fifty-seventh street. Mr. Sibley says, however, that the employers are much stricter than they used to be with regard to qualifications.

Careful men who understand how to drive automobiles are at a big premium, but it is "bad going" for those who have blotched records, according to Mr. Sibley's observations.

LICENSED DEALERS ORGANIZE

Following the cue of other cities, Baltimore dealers who handle cars manufactured under the Selden patent formed an association known as the Licensed Automobile Dealers' Association, along similar lines to those laid down in New York, Philadelphia, Los Angeles, and other cities. There was a full attendance of the dealers at the Hotel Belvidere, April 20. Plans have been made whereby the members of the association intend to conduct their own show.

STATE TO INSTALL STONE CRUSHERS

MINNEAPOLIS, Apr. 25—Minnesota motorists, and especially those who use the country highways extensively for touring, found much comfort in the action taken by delegates to the State Roadmakers' convention. Much enthusiasm over the prospects for road betterment prevailed. Members pledged themselves to urge the State to install crushing plants in various parts of Minnesota for use in the work. A campaign was also inaugurated to urge a larger State appropriation for good roads, while plans for the expenditure of all State funds under supervision of the Highway Commission were mapped.

WILL MAKE AUTOMOBILE TRUCKS

ATLANTA, Apr. 25—Trucks capable of hauling from one-half to three tons will be built in this city in the near future, according to plans that have just been announced. The new vehicles will be called the McNeil truck and delivery wagons and they will be made by a company consisting of W. S. McNeil, W. S. McNeil, Jr., and J. McNeil.

It is planned to turn out the first of the trucks in two months. The weekly output will be not over five cars.

HILL CLIMB PROFITS FOR CHARITY

At a meeting of the South Bend Automobile Club, held in the Oliver Hotel last week, it was unanimously agreed that the club should co-operate with the city officials in the enforcement of traffic regulations.

It was agreed that the hill climb suggested by M. L. Williams of the 20th Century garage should be made a club event, and that all fees, entries and receipts be turned over to the Children's Aid Society.

AUTO PAYS FOR JERSEY'S HIGHWAYS

Figures compiled by J. B. R. Smith, State Motor Vehicle Inspector for New Jersey, show that during March the license fees paid into the treasury by automobile owners were about $52,000, or double what they were in March, 1909. Mr. Smith's conclusion, drawn from a digest of annual figures, is that the automobile pays more than sixty per cent. of the cost of road improvements in the whole State.

PLAN OUTING FOR ORPHANS

Between 3,000 and 4,000 orphans want to attend the festivities attending the annual automobile outing, which will be held this year at "Dreamland" Coney Island, June 2 ,but it is not certain that such a large crowd can be accommodated. Plans for transporting the children are being developed by the Automobile Day Committee of New York. The Women's Motoring Club will have charge of one section as usual and the New Jersey clubs have been invited to contribute cars and support. M. J. Budlong and William H. Haradon head the Car Committee.

NASHVILLE HAS AN AUTO CLUB

Nashville, Apr. 25—The Nashville Automobile Club was organized recently in this city and its birth was enthusiastically welcomed by many automobile owners. Despite the fact that this city is a motoring center, there has never been a club here until now.

Permanent organization will be essayed shortly and it is the intention to have the organization in full working shape when the Glidden tourists arrive on their trip South. Leland Hume was named temporary secretary of the club.

BUCKEYES TO TOUR HOOSIERDOM

Columbus, Ohio, Apr. 25—The Columbia Automobile Club has planned a reliability contest under the auspices of the club to be run to Indianapolis shortly before Decoration Day. The contest will be run at that time in order to permit autoists to attend the speed contests on the motor speedway at Indianapolis. The usual rules and regulations surrounding a reliability contest will govern the event. Already quite a number of the motorists of the Buckeye capital have signified their intention of participating in the contest.

WOMEN WORK FOR OILED ROADS

Women of Montpelier, Vt., representing the Woman's Club of that city have undertaken to influence public opinion so that a number of highways of the vicinity may be oiled. Last year an experiment was tried on about a mile of one of the roads just outside of town and the result was so favorable that the Woman's Club became interested. Montpelier is one of the favorite stopping places for cars en route from New York to the White Mountains.

RED CROSS SIGNS FOR DOCTORS

Baltimore, Apr. 25—Little signs, five inches square, containing a red cross on a white background, are being distributed to physicians owning motor cars by the Police Department of Baltimore, which give the medical men the privilege of speeding to calls without being held up by the police. These signs are to be placed on the left of the dashboard.

NATIONAL COMPILING RECORDS

The National Motor Vehicle Company of Indianapolis, Ind., has just from the press a leaflet giving a complete record of the winnings of the National car during the season of 1909. The information is concisely arranged, well printed, and should prove of much interest to autoists who follow this phase of the industry.

RUBBER TUBES ADVANCED IN PRICE

The Empire Tire Company of Trenton, N. J., has announced an advance of 30 per cent. in the prices of red automobile tubes and motorcycle tubes. The advance, according to the circular of the company, is due to the sharp rise in the rubber market.

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Pathfinder Crossing a Bridge Near Corinth, Mass.

Woodland Trail Near Essery Springs

BETTER GOING FOUND IN ARKANSAS

After wallowing through the muck of Mississippi back to Memphis, the official pathfinder of the 1910 Glidden Tour crossed the Father of Waters, and at last reports was having an easier time of it on the journey to Dallas.

The Alabama, Tennessee and Mississippi bottoms proved a thorough test for the Chalmers "30" during this stage of the tour, and literally dozens of streams had to be forded that will be good roadways when the tour itself passes that way.

There has been little ease and recreation so far for the exploring party, because a strong shoulder and a sturdy arm have been far above par and have been in almost constant demand.

From Memphis the course of the tour extends sixty-two miles along the river to Trotter's Landing, where the official crossing will be made. This part of the course lies through an alluvial country, where negro residents outnumber whites, about ten to one. The dry weather that had been enjoyed for several days made this stretch a little easier than what had gone before, and reports from Arkansas that reached the party before crossing were that the roads on the western side of the big stream were in even better condition.

These reports proved to be well founded, for upon crossing, the party encountered fairly good going into Helena. The promises held out by the weather and the rising ground were made good in a large measure and satisfactory progress through Arkansas was achieved.

So far as it has proceeded, the pathfinding tour this year has been a record breaker in some respects. Some of the route has been over roads that could hardly be improved, but from the Kentucky-Tennessee State line almost into Memphis, the trip has been a terror. Unprecedented weather conditions which made anything that looked like a stream a raging torrent and covered hundreds of spots in the road with water that will be high and dry by June 1, worked to augment the labor of the pathfinders. Actual physical force and muscular endurance were required of everybody connected with the party and a great deftness in prying the car out of the soup-like mud was developed in all hands.

The streams and rivers of Tennessee, Alabama and Mississippi will long be remembered by the explorers for the problems in transportation that they propounded to the party.

Along the way, Scout Lewis has had many opportunities to do missionary work among the natives. Frequently when the crew was engaged in prying the pathfinder out of the mud, he would make impromptu addresses on the wide subject of good roads, his audience being residents of the locality who assembled quickly whenever the big car became stalled.

At Memphis the party was received with acclaim by the civic bodies and hospitably entertained by the Memphis Automobile Club. The worth of the Glidden Tour as a means of spreading the propaganda of good roads was the keynote of the addresses at the Business Men's Club and the mission of the automobile in carrying this message to the people was dwelt upon.

The road from Memphis to Helena was found to be of dirt and gravel for about one-third of its length and then came a long stretch of light clay. Active work with the split-log drag will make this part of the road an enjoyable stage. The Helena Business Men's League assisted the party materially in mapping this part of the tour and from Helena on to Dallas and from Dallas northward, all the way to Chicago, there will be official

(*Continued on page* 823.)

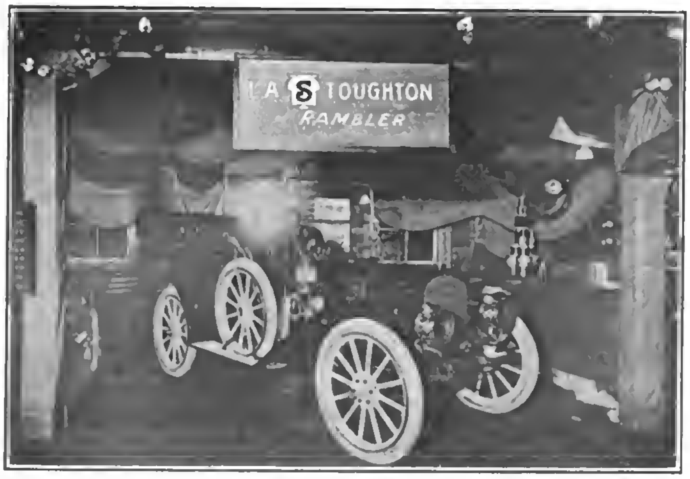
Where the Floods Covered a Lumbering Road

Fording a Stream Near Lawrenceburg, Tenn.

Crossing a Viaduct Nine Miles out of Franklin, Tenn.

Interior of Bangor, Maine, Automobile Show

Stand Where Regal Cars Held Sway at Bangor Show



Rambler Exhibit at Maine's Premier Auto Show

RAIN FAILS TO SPOIL BANGOR SHOW

Despite rain and cold disagreeable weather during a large part of the week, the Bangor (Me.) Automobile Show scored a distinct success. Many cars were sold and hundreds of possible buyers were interested observers of the numerous exhibits ranged about the Auditorium. Society night, which was Wednesday, attracted a representative attendance, and the later sessions of the show, being more favored by the weather, made up in large measure for the disappointing "gate" of the opening nights.

The automobile parade, which was scheduled originally for Wednesday morning, had to be postponed, but when it took place, the delay did not serve to dampen interest in it.

PREPARE FOR 24-HOUR RACE

Extensive preparations, involving many improvements to the Brighton Beach race track, are being pushed along to make the track ready for the first 24-hour race of the year which is scheduled to take place May 13-14.

Besides numerous improvements in the runway of the track itself, a field stand is in course of construction and a stand for the chauffeurs is also being built. Improved score boards will be in place when the gates open and in a number of other instances details will be added to make the races more easily intelligible to the public.

The entry list has filled and the field will consist of twelve contestants. These are: Two Buicks, two Stearns, two Rainiers, Simplex, Houpt, Selden, Marion, Fiat and Renault.

The Motor Racing Association will conduct the affair.

CHARLES L. McINTOSH DEAD

Milwaukee, Wis., Apr. 20—Charles L. McIntosh, president of the Pierce Motor Company of Racine, treasurer of the J. I. Case Threshing Machine Company and a banker of influential connections of Racine, died early Tuesday morning at Naples, Italy. Mr. McIntosh was stricken on April 6. With Mrs. McIntosh and several friends he was on his return from a tour of the world, began last January. Mr. McIntosh was a native of New York. He was born sixty-three years ago and was for many years secretary of the Jewel Belting Company of Hartford, Conn. About a year ago he played an important part in the reorganization of the A. J. Pierce Motor Works at Racine, now the Pierce Motor Company.

FOUR JOIN ACCESSORY ORGANIZATION

The following named concerns were elected as members of the Motor and Accessory Manufacturers at the meeting of the board of directors:

Sherwin-Williams Company, Cleveland, Ohio, manufacturers of paints and varnishes.

E. B. Van Wagner Manufacturing Company, Union Building, Syracuse, manufacturers of die moulded, finished metal castings.

George A. Haws, 73-75 Pine street, New York, manufacturers of greases and oils.

Gasoline Motor Efficiency Company, 1 Exchange place, Jersey City, manufacturers of "The Homo" device.

SHARPLY OPPOSE CALLAN BILL

Sharp opposition to the Callan bill, now before the New York State Senate is being urged in some quarters of motordom. These objections are being centered against two clauses of the proposed law. The first is that it fails to provide a universal speed regulation. The second is that the clause applying to taxation is exorbitant in its terms. The law as passed by the lower house provides for a tax according to horsepower of from $5 to $25.

AGAIN SECURES ENGINE CONTRACT

The Falls Machine Company of Sheboygan, Wis., which some months ago received the contract for building all engines used in the "Warren-Detroit" by the Warren Motor Car Company, during the present season, has been favored with a renewal and will produce all 1911 engines for this concern. The 1910 contract called for 1,000 motors.

TRUCK-MAKERS SEEKING SITE

The Minneapolis Motor & Truck Company of Minneapolis, Minn., is negotiating with business men at Beaver Dam, Wis., a stove and foundry center, for the purchase of the cotton mill property and move its plant. The concern produces motor trucks from one to six tons capacity, listing at $1,000 to $4,000.

ALL READY FOR HARRISBURG RUN

With a strong entry list and every prospect of a number of eleventh-hour additions, the Motor Club of Harrisburg has every reason to be satisfied with the outlook for the three-day road contest that is scheduled to take place May 9, 10 and 11. Many well known makes of automobiles will contest and the route, which is through virgin territory in large part, has been selected to give the cars a thorough try-out.

The interest in the run is shown by the fact that four cities through which it passes have donated nine cups and trophies in addition to those given by the Wildwood Automobile Club, the Harrisburg Board of Trade and several others.

The route of the tour is through Lebanon, Reading, Pottstown, Norristown, Philadelphia, Hammonton, N. J., to Atlantic City.

Southern New Jersey will be pretty thoroughly covered during the second day of the run and Wildwood will be the night control. The third day's run will be back to Harrisburg where the cars will be turned over to the technical committee of which David Beecroft is chairman.

W. R. Douglas will act as referee. Four classes of touring cars and runabouts ranging in price from over $2,001 to under $1,601 and classified under the general provisions of the A. A. A. rules will compete. The event is the fourth annual contest of the Harrisburg Club.

RACE MEET INTERESTS MEMPHIS

Two events, scheduled for the near future have caused much interest to be aroused in the Memphis Automobile Club, and as a result of the increased activity of the members in club matters, there is a movement on foot to elect a salaried secretary to carry on the good roads work and to attend to the welfare of the club in other directions.

The two events referred to are the Glidden Tour and an automobile race meeting which is scheduled for May 21-22. The race meeting, which will be held on the Tristate Fair Grounds, has a program of events varying in distance from five to 100 miles with cash prizes for the winners. The manager of the affair is Homer C. George. The meet has official sanction.

U. S. MOTOR'S DETROIT COMMERCIAL PLANT

It is announced that the United States Motor Company will commence within two weeks, the building of a large commercial vehicle plant at Detroit. This factory will cost $700,000 and its plans consider a building of enough size to turn out 4,000 light delivery wagons during 1911. The main building will be 1,000 by 150 feet, and will be supplemented by several others, including a drop-forge plant, and a foundry.

The project will not interfere with the Alden-Sampson factory which will be operated as the heavy duty department of the commercial vehicle division, while the Detroit plant will manufacture light cars.

NEW COMPANY TO MAKE SPARK PLUGS

During the past week the Fry Manufacturing Company, recently incorporated by Walter L. Fry, Charles J. Kleber and others for $100,000, opened a new suite of offices at 1779 Broadway, corner of Fifty-seventh street. Mr. Fry is president and general manager, while Mr. Kleber will officiate in the capacity of secretary and treasurer. This newly organized company now has the exclusive sale of the Fry Spark Plug formerly marketed by the Standard Sales Company, which is now in liquidation.

ECONOMY TEST OF C. M. C. POSTPONED.

Rough roads have caused the postponement of the annual economy run of the Chicago Motor Club from April 28 to May 5. The run will be 200 miles to Lake Geneva and return. The route was reported so rough that an adequate fuel test was considered out of the question.

Beautiful Scenery Marked Part of Pathfinder Route

Water in Quantities Met Jersey's Pathfinder Car

Near Hammonton, the Pathfinder Found Much Deep Mud

AROUND NEW JERSEY RELIABILITY RUN

One of the most interesting routes through New Jersey has been selected by the pathfinding party of the "Around New Jersey Reliability Contest" which takes place May 10 and 11. A Maxwell car picked out the route to be followed and on account of the extremely bad weather at the time that trip was made, the pathfinders experienced a trying time.

The run starts from Fifty-seventh street, New York, but the actual course commences at Jersey City. The route will be through Elizabeth, Rahway, New Brunswick, Red Bank, Point Pleasant, Lakewood, Port Republic, Oceanville, Pleasantville, to Atlantic City. The second day's run is via Pleasantville, Egg Harbor, Hammonton, New Brunswick to New York.

Present Status of Selden Patent Litigation

LITIGATION under the basic Selden patent has progressed rapidly recently. The present status of the matter is about as follows:

The original suits filed on behalf of the A. L. A. M. companies against seven unlicensed manufacturers in the Federal Court at Detroit have been supplemented by a similar action in that court against the Imperial Automobile Company of Jackson, Mich., and by suits against the Paterson Company of Flint and the Flint Wagon Works, both of which were commenced in the Northern Division of the Eastern District of Michigan.

Service was had upon each of the defendant companies and leave to plead was granted. The Columbia Motor Car Company and George B. Selden are plaintiffs of record in each suit.

Similar litigation was also commenced against the Parry Automobile Company of Indianapolis.

The complaints in all the suits allege that the defendant companies are infringing the patent, involving the principle of compression gasoline engines applied to the propulsion of carriages.

The defendants in Detroit and elsewhere announce that they will fight the cases to ultimate decisions and in a series of conferences tentative plans of action have been discussed. The Abbott Motor Company has taken a decided stand in the matter and several of the other defendants have gone over the situation with the Abbott Company's officers with a view to concerted action.

The Abbott Company gave out a statement a few days ago in which it was stated that the company does not believe in the validity of the Selden patent. The fact was alleged that while the matter had been in litigation for seven years, no final decision had been reached in the courts supporting the claims of the Selden advocates.

The suit of the Electric Vehicle Company et al. against the Ford Motor Car Company et al., which is pending before Judge Hough of the Federal Circuit Court of New York, progressed another step toward a final decision within the past week. The plaintiff prevailed at the hearing last fall and the present action is for the purpose of substituting the Columbia Motor Car Company as plaintiff in place of the Electric Vehicle Company, which it has succeeded.

A motion was made for leave to file a bill embodying such a substitution and after argument Judge Hough ruled in favor of the motion. The bill was accordingly filed and subsequent proceedings will follow in course.

In the meantime, the situation has been complicated to a certain extent by the filing of a suit against the various companies making up the A. L. A. M., on behalf of the Velie Motor Vehicle Company of Moline, Ill. This action was commenced in the Federal Circuit Court at Milwaukee and demands $500,000 as damages.

The bill of complaint sets up ten different causes of action or counts. The first of these alleges that the A. L. A. M. is an unlawful combination in restraint of trade within the purview of the Sherman act.

Second.—That the A. L. A. M. notified the plaintiff to enter the combination, demanding $17,000 and restricting the output of the company to 2,500 cars in 1910.

Third.—That when plaintiff declined to enter the combination, the defendants threatened to injure the business of plaintiff.

Fourth.—That the defendants conspired to prevent plaintiff from purchasing materials.

Fifth.—That they conspired to prevent proper advertising of plaintiff's output.

Sixth.—That the defendants through conspiracy prevented the Kopmeier Motor Company, agent of the plaintiff at Milwaukee from exhibiting the Velie car at the show in Milwaukee last winter.

Seventh.—That a New York advertising agency had informed the plaintiff that it could not handle the advertising of the Velie company because it would lose business of $75,000 a year by so doing.

Eighth.—That the A. L. A. M. in pursuance of the alleged conspiracy endeavored to prevent the extension of credits at banks.

Ninth.—That the defendants have conspired to prevent prospective purchasers from buying Velie cars.

Tenth.—That they have tried to get contract customers to break the terms of their contracts with plaintiff.

Service in this action has not yet been made upon the A. L. A. M., but it is expected shortly. Alfred Reeves, general manager of the association, returned Tuesday from the West. He made no statement with regard to defense.

Clark Enters Commercial Vehicle Field

WITH the reorganization of the Clark Power Wagon Company and the merger with it of the Ferguson Motor Company, the capitalization of the company has been increased from $50,000 to $500,000. The company will enter the commercial field with an adequate plant at Lansing, Mich. The men who compose the company are Frank G. Clark, president, who was the sole owner of the concern formerly known as Clark & Company. Mr. Clark became interested in the future of the commercial car some time ago and the present company is the result of his determination to go into the manufacturing of that type.

R. A. Radle, of Detroit, is treasurer of the new company. Mr. Radle is well grounded in the mechanical end of the business and has demonstrated much ability in selling. He is to be factory manager and in addition, he is connected with the Radle-Clark Sales Company of Detroit, which is closely allied with the Clark Power Wagon Company.

His history in the trade has been brilliant in both directions and much of the success of the Grabowsky Power Wagon Company, and the Rapid Motor Vehicle Company are credited in a measure to his efforts.

John Demmler, chief engineer, has been identified with the Packard Motor Car Company and was formerly connected with a number of European factories in important capacities.

B. H. Warner,, superintendent of machines for the Sheffield Car Works at Three Rivers, Mich., for several years, has been named vice-president and superintendent.

The car which will be turned out is a twenty horsepower, two-cylinder vehicle having a load capacity of 1000 pounds.

JOHN E. GEORGE, AUTO COMMISSIONER

BALTIMORE, Apr. 25—Governor Crothers has appointed John E. George, of Queen Anne's county, automobile commissioner, the position specified under the new Swann Motor Vehicle Law. He takes office the first Monday after May 1.

BRIDGEPORT HILL CLIMB IS DECLARED OFF

Owing to objections, raised by the city of Easton to the use of roads for such a purpose, the hill climb planned by the Automobile Club of Bridgeport, Conn., has been indefinitely postponed.

Court Ruling Upsets Second Offense Prosecution

EN an operator of an automobile is arrested for over-
peeding and is held for trial by the examining mag-
strate, he cannot be tried in the upper court in an
upon second or subsequent offenses, providing such
not alleged and investigated before the commit-
te.
tant ruling was laid down last Tuesday in the
eople of the State of New York against Walter
as prosecuted in the Court of Special Sessions
ffense of speeding.
ad in rendering the opinion of the court said:
was arrested and arraigned on a charge of
ting a motor vehicle at a speed of 25 miles an
ion 291, Chapter 30 of the laws of 1909. Three days afterward the District Attorney filed information against the defendant charging the crime of operating a motor vehicle at a greater speed than is allowed by law as a second offense.

"Counsel for the defendant moved to dismiss the action on the grounds that he had not been accorded a preliminary examination of the offense charged in the pleadings before the court. He contended that "second offense" was an aggravated misdemeanor under the statute and that the examining magistrate had not considered such a charge in holding him for trial.

"The defendant was not accorded his rights to examination before the magistrate as to whether he was the Walter Reppin who was once convicted for unlawfully operating an automobile. And in that respect a substantial right has been denied him. The case will be dismissed."

Better Going Found in Arkansas

(*Continued from page 822.*)

thfinder, furnished by the local organizations.
interesting phases of the tour proper will
oss the "Black Wax" belt of counties in
nder ordinary conditions this stretch of the
ful, but in stormy weather or after heavy
appalling. Local reports say that bottom
e surface, but of course such statements

of the route had experienced dry weather
he pathfinder found hard roads.
rd the route is across comparatively level
weather the sand storms are the features
owever in June such unpleasant results
or feared.

r. 23.—The last half of the run from
mapped out yesterday by Dai Lewis
are unexcelled in any Glidden tour.
issippi and White rivers, where there
time ordinarily, has already been ar-
e such ferry accommodations that an
ide, will suffice to get all the contes-

make a ten-mile detour in get-
se of the high water at this sea-
elena, Marvel, Blackton, Clarendon,
ducted the road hunters over the
ndon the White river was crossed.
take in Stuttgart, a city of 3,000,
d resembling a far western city
Sixty motor cars are owned here
e orders than they can handle.
a plateau of magnificent alluvial land, west of the White river. Rice is the chief product and the largest rice mill in the world is at Stuttgart.

The roads are at present almost perfect, being the typical winding prairie highways on which the only speed limit is the car's power. The last 14 miles into Little Rock is over macadam pike, the like of which has not been seen since the pikes of Kentucky were left behind. The night entry into Little Rock spoiled the reception planned by the local automobile club, whose enthusiasm resembled that which has been general during the past three or four days and which is centered chiefly in good roads. A delegation from Hot Springs brought the best information and blue print maps to Dai Lewis immediately upon his arrival.

Little Rock has 65,000 inhabitants and in almost every block there are building operations under way. Very recently the coal resources of Arkansas have been made available for her own capital and a manufacturing boom is expected. Here, as in the rest of the State, one remarks the initiative and hustile that has come to be associated with the new West.

The pathfinder experienced a delightful time on the last leg of the Southern trip. The black wax of Northern Texas had no terrors for the party and reports of the course during the final 215 miles into Dallas, show the roads in fine condition. The car made forty miles an hour in favorable localities.

The Glidden Tour will make Omaha a night control. This decision was reached during the Eastern trip of S. M. Butler, chairman of the Contest Board of the A. A. A., en route home from California. When he reached Omaha, a delegation from the newly formed Nebraska State Automobile Association waited upon him and brought such pressure to bear that Mr. Butler decided to have the official tour extended across the Missouri river from Council Bluffs. Mr. Butler ordered the pathfinding party which is now in Texas, to map a route into Omaha. The change in the original plans will make the tour one day longer.

OOSIER SPEEDWAY

r of the A. L. A. M. visited the
route east. When Mr. Reeves
oing about 100 miles an hour.
e rough from the edges of the
ve it and is hard on tires as it
working with cement levelers
and when the big meet takes
ll be in vastly improved shape."
her was cold in the West.

A. C. A. TO HEAR OLD MUSIC, MAY 3

A "Smoker Concert" at which Hans Kronold, 'Cellist, and a choir quartet will entertain the members and guests of the Automobile Club of America at the quarters of the club in Fifty-fourth street, New York, will be given May 3.

The occasion is one of the regular club nights of the organization, but special effort is being made to have the program considerably out of the ordinary course. The music to be given will all be of the ancient school. Refreshments will be served after the entertainment.

With the Agencies

Reception given to Ex-Vice-Prest. Fairbanks, at Indianapolis, on his return from around the world. Picture shows the Waverley electrics used to carry the ladies

C. S. Briggs, president and manager. K-R-I-T Motor Car Company, Detroit

A new depot at Newport, R. I., will be operated this season by the Foss-Hughes Company, which handles the Pierce-Arrow car in several big cities. The garage in connection with the depot will have facilities for handling 275 cars. Full lines of accessories and a complement of mechanicians, trained at the Pierce-Arrow factory, will be on hand.

During the past few weeks the Selden Motor Vehicle Co., of Rochester, N. Y., has appointed a number of new agents, among whom are the Gibbs Machinery Co., Columbia, S. C.; T. T. Maxfield, Bloomfield, N. J.; S. A. Whedon, Appleton, Wis.; Harrison Auto. Co., Birmingham, Ala.; Du Puy Motor Car Co., Houston, Texas, and E. B. Searle, Noank, Conn.

Renault Freres have opened a branch agency in Honolulu, H. I. The Van Hamm-Young Company (Limited) has secured the agency and will handle the new "American Special" 25-35, which is said to be well fitted to the exceedingly hilly country throughout the archipelago.

R. B. Edwards and H. D. Biggs, proprietors of the Broadway Garage & Sales Company, of Kansas City, Mo., have taken the agency of the Clark cars in adjacent territory. They will handle these cars exclusively.

The Brandt Motor Car Company, Cleveland, has taken the agency for the Acorn truck. The Acorn is a light delivery wagon. The Brandt Company is Cleveland distributor for the Kissel-Kar.

The Highland Garage Company, North Tarrytown, N. Y., has been granted the agency for the "Cole 30" by the Colt-Stratton Company, eastern distributors for the Cole Motor Car Company.

The Remy Electric Company, of Anderson, Indiana, manufacturers of the well-known Remy magneto, will open a branch distributing office in Boston, Mass., within the next two or three weeks.

Manager Harry Kortz, of the Euclid Automobile Company, Cleveland, has just opened agencies for the Atlas and Firestone-Columbus at Akron, Canton, Youngstown and Ashland.

After May 1 the location of the New York branch of the G & J Tire Company will be at 1924 Broadway. The branch at 10 West Sixtieth street will be discontinued.

The Apponaug Automobile Company, Apponaug, R. I., has taken on the agency of the "Cole 30" for Rhode Island. This agency was placed by the Colt-Stratton Company.

The Vail Motor Car Company, Northern Ohio distributors for the Clark and the Empire cars, have appointed agents in ten Ohio towns within a week.

The Smith & Rheineck Company, Rockwell avenue, has been appointed distributors of the White line for Cleveland and vicinity.

A. W. Lund, of River Falls, Wis., is a new agent for the Studebaker Automobile Company.

Cook and Carter, of Delaware, Ohio, have taken the agency for the Ford in Delaware County.

Personal Notes of Prominent People

George S. Patterson, who at different times has been sales manager for the Rambler, Reo and Premier cars, has been chosen general manager and director of sales by the Gaeth Automobile Company, of Cleveland. Paul Gaeth, president of the company, announces that the company will greatly increase the capacity of the Cleveland plant and manufacture over 500 cars during 1911.

M. Wertheimer has been taken into the Oxford Automobile Company, which handles the Brush car in Philadelphia, and with the addition to the company's personnel the company acquired the sales rights in the Quaker City and adjacent territory for the Inter-State car, the Muncie, Ind., product. The concern will still continue to do business at 518 North Broad street.

John D. Murphy, formerly with the Boston *Globe*, and the Maxwell-Briscoe Motor Company, advertising department, has accepted the position of advertising and publicity manager of the Selden Motor Vehicle Company, Rochester, N. Y. His many friends in the trade wish him success in the new venture.

John C. Perrin, superintendent and designer of the Lozier Motor Company will sail on April 28 for an extended trip through Europe. The Plattsburg works of the Lozier company will be in charge of Asst. Supt. Pollard during the absence of Mr. Perrin.

Gerald P. Hall, formerly identified with the sale of Midland Motor Company's product, has severed his connection with that concern to join the Pennsylvania Auto Motor Company, of Bryn Mawr, Pa., as general sales manager for the "Pennsylvania" company.

S. M. How, for two years with the Haynes Automobile Company, Kokomo, Ind., as special representative, has resigned to accept the management of the sales force of the Barger Automobile Company, of Cleveland.

Morris Grabowsky, for seven years secretary of the Rapid Motor Vehicle Company, has been appointed head of the commercial vehicle department of the United States Motor Company.

Marcus Allen has been appointed manager of the G and J Tire Company in New York. He will take charge of the new branch at 1924 Broadway as soon as it is opened.

Joseph H. Greenwald, Cleveland agent for the Marmon line, has leased larger quarters and will move to Euclid avenue and E. Sixty-fifth street.

Among the Garages

Maxwell four-cylinder car, of Sportsman type, in which R. M. Brown crossed the Alleghanies recently, being the first to make the trip this year

Morris Grabowsky, manager commercial vehicle division, U. S. Motor Company

The new garage of the Zell Motor Car Company, Baltimore, Md., is ready. Tapestry brick with tooled concrete columns and trimmings compose the front. The roof projects over the third floor line in front and its large, semicircular, green tile covering adds a live dash of color to the structure. On the first floor is the showroom, 50 feet square. At the rear of the room are mezzanine offices. In one of the corners of the showroom is a complete accessory department; directly underneath are stockrooms for carrying spare parts, supplies and tires. Storage facilities are provided on the entire second floor.

Motor garage opening is to be the central point of interest in automobile row in Minneapolis for the next two weeks. The Studebaker Brothers will be ready to move into their new building next week, as will also the management of the new electric garage, which will be the home of the Detroit Electric. The White garage is rapidly nearing completion, and the MacArthur-Zollars garage, at Thirteenth street and Nicollet avenue, is also about ready for a formal opening.

The Black Manufacturing Company of Chicago has sent M. E. Hoshaw to Elkhart as its personal representative in accepting completed cars from the Crow Company and attending to their disposition. He is to be manager of the traffic department and sales agent for that section. The Crow Company is turning out three to five cars per day.

As soon as the work of remodeling the building at 2337-2339 Michigan avenue, Chicago, is completed, the Federal Motor Car Company, recently incorporated to handle the Ideal electric car, will occupy the premises. This is expected to be about the first of June. The officers of the company are A. B. Carson, president, and J. L. Carson, secretary and treasurer.

The Powers Motor Car Company, Lawton, Okla., is erecting a two-story building with concrete floors and all modern improvements. The building fronts on E avenue, besides the 75-foot frontage opposite the postoffice. There will be an entrance driveway for motor cars to the north, south and east, giving easy access and egress.

Extensive alterations and additions to the garage of the Central Ohio Motor Car Company, at 61 East Spring street, Columbus, Ohio, have been completed. The office has been moved to the second floor giving more space for the showroom. An up-to-date repair shop has been installed and a large addition erected in the rear.

Southwork Brothers, Biddeford, Me., have just awarded the contract for the erection of a three-story garage of concrete. This will be located on Preble stret, between Oxford and Portland streets, will have a floor layout of 150 feet deep by 100 feet front, and will cost, it is said, $40,000.

George P. Lininger has opened a garage and repair shop in Greencastle, Pa. There are about twenty cars in the town, which is located on the old turnpike passing through Gettysburg, Waynesboro, Greencastle and Pittsburg, very well located to help cars over the direct route.

The new garage of E. S. Hessels at White Plains, N. Y., is approaching completion. The building is 50 by 125 feet, and is of brick and cement construction, about half of which is two stories high. It is expected that it will be ready for occupation about May 15.

In Ensley, Ala., the Morrison Motor Company, recently organized, will build on Avenue E, opposite the Elk's Home, a two-story garage of brick and concrete. John Morrison, a former lumber dealer, is president and financial head of the new concern.

The Studebaker repository at South Bend will be the headquarters for the E-M-F and Flanders cars in that city. The Studebaker Automobile Company has completed arrangements by which the cars will be sold from the repository.

A new garage with repair shop has been completed at Sixth and Walnut streets, Oklahoma City, Okla., by V. W. Shaler, to be known as the Standard Auto Garage. Mr. Shaler has the agency for the Standard Six and Halladay cars.

The Union Motor Car Co., 304-310 Central avenue, East Orange, N. J., has completed the erection of a large fireproof garage, immediately in the rear, in which a modern machine shop is being installed.

The McIntyre Automobile Company has moved into its new garage at 2203 Farnam street, Omaha, Neb. The garage is a commodious one, with all the modern appointments, the building being 25 by 128 feet.

A large fireproof garage, built at a cost of $25,000, will be leased by Harry Griffin and Chester Scott, Appleton, Wis. The garage will be 50 by 125 feet in dimensions, one story high, of solid brick and concrete.

Fred G. Hodges is building a $5,000 garage for the Foss-Hughes Motor Car Company at Wilmington, Del. A large stable is being remodeled for the purpose.

A. D. Foster has bought from Sherman & McConnell the brick garage occupied by the Electric Garage Co., at 2218 Farnum street, Omaha, Neb., for $40,000.

The State Garage is the name selected by the Auto Trading & Garage Company for its new headquarters at North avenue and Oak street, Baltimore.

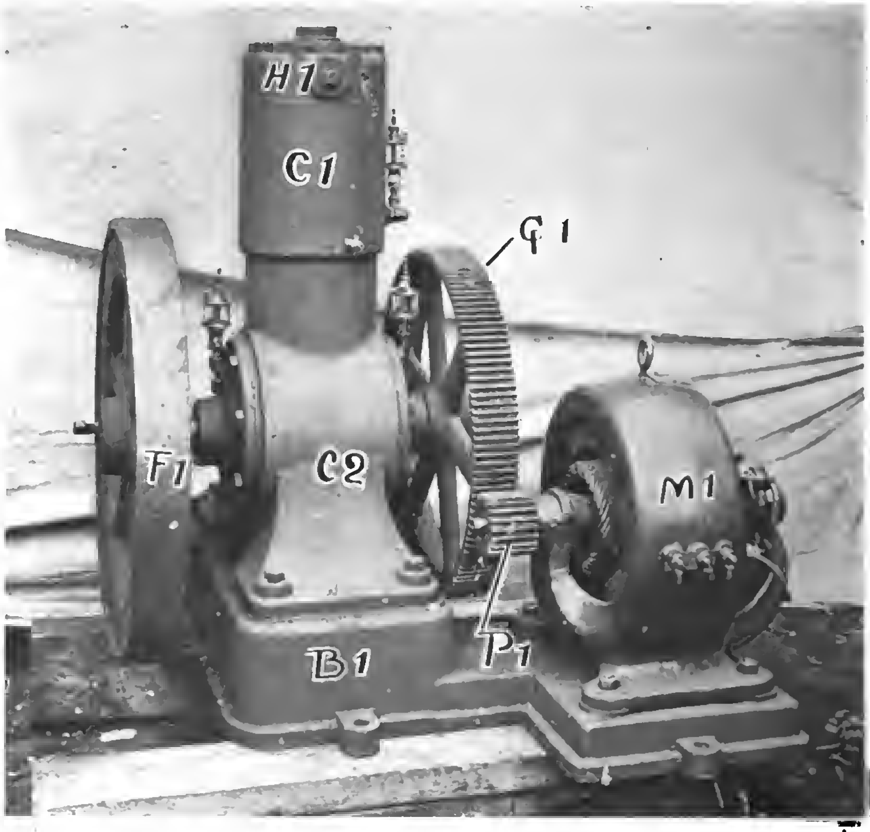
The North Shore Garage Company's new building, at Huntington, N. Y., is to be 50 by 225 feet, instead of 50 by 20, as first reported.

The Maxwell-Briscoe Motor Company, Indianapolis, Ind., is now located at its new three-story garage at Illinois and Vermont streets.

Charles Fenn will build a public garage at Antigo, Wis.

FAIRHURST AIR PUMP

The illustration here afforded is of the new Fairhurst Air Compressor as made by the American Air Compressor Works, 26 Cortlandt street, New York City, has been designed with a view to particular use in garages and plants wherein automobiles are made. It is intended to serve for any of the purposes to which compressed air is devoted, as in the inflation of tires, in connection with sandblast equipment, pneumatic riveting, etc. The compressor is of the single-cylinder, vertical type, with a separable head H1 securely bolted to the cylinder C1, the latter being integral with the crankcase C2, which is bolted to the sub-frame B1, the latter being extended out to take the electric motor M1, which furnished the power to drive.



Prominent Accessories

FIRESTONE DEMOUNTABLE RIM PRESENTS NEW FEATURES

One of the more recent improvements in demountable rims is the safety locking ring (in groove at extreme right of cut) that forms a part of the Firestone quick detachable rim with which Firestone demountable rims are equipped.

This locking ring is so shaped that it absolutely prevents the rim from coming apart and releasing the tire, no matter how severe the strain.

As illustrated herewith, the locking ring has a bearing not only on the under side of the clincher side-ring, but also on the outside edge of the base of the rim. It will be seen at a glance that the locking ring is held immovably and cannot possibly turn over in its grooves. The projection of the locking ring to an unusual height brings a strong support to the back of the clincher side-ring.


Firestone Rim With Locking Ring

The pins on the locking ring engage the slots in the clincher side-ring, forming a guide that ensures proper seating of the locking ring in its groove. They also prevent circumferential motion. In the quick detachable feature as well as in the demountable rim itself, the Firestone company regards safety as a prime requisite.

UTILITY IN GLOVES FOR THE WOMAN WHO DRIVES

Women are entering into the real pleasure of driving motor cars with added zest as the difficulties that formerly surrounded the sport are being removed.

In order to manipulate the steering wheel with comfort it is necessary to have the hands well protected and with that object in view the industry of making gloves for women drivers was instituted.

The Fried-Ostermann Company of Rockford, Ill., is marketing a full line of gloves of this description. They are said to be serviceable, well-appearing, daintily made and to embody all the latest practical improvements in glove-making of this character. The company announces that its catalog in colors, fully outlining the goods, may be had on application.

In the making of these gloves, the finest of leather is used, and the workmanship is also up to a fitting standard, much hand work being utilized.


New Style of Auto Glove for Women

Vol. XXII NEW YORK—THURSDAY, MAY 5, 1910—CHICAGO No. 18

THE AUTOMOBILE

Quaker City Third Annual Roadability Run

WITH the well-ordered precision of accurate machinery the Quaker City Motor Club conducted its third annual roadability run Saturday, from Philadelphia to Atlantic City, a distance of about 68 miles.

Scene at the Start, In Front of the Hotel Walton, Philadelphia
Where the Cars Finished In Front of the Strand, Atlantic City.
Above, at the Start, City Hall Beyond. Below, President Berger's Car

There was a snap and exactness about all the preliminaries and a certainty and vim in the run itself that savored of scrupulous care on the part of the officials.

It was a delightful affair, well handled, in which the maximum of pleasure and the minimum of discomfort were experienced. Under the conditions, speed was at a discount, the cup-winning cars being those that most closely approximated a secret time fixed in advance by Mayors John E. Reyburn, of Philadelphia, and Franklin P. Stoy, of Atlantic City.

This time was within the New Jersey speed limit and was decided upon by a unique process. Mayor Reyburn selected 3 hours 33 minutes as his time and Mayor Stoy fixed upon 3 hours 39 minutes and 19 seconds. These two times were added together and divided by two, the result being 3 hours 36 minutes and 9 1-2 seconds. The distance was approximately 68.2 miles, thus the running time required of the winner was only moderate, considering the magnificent highways included in the entire course.

The winners of the main prizes—for there were many, every finisher being awarded one—were all bunched within a short distance. It was merely a matter of guessing, as far as the operators of the cars were concerned, as any one of fifty entrants could have crossed the line at the exact moment of the secret time, if that moment had been known. As it was, scores of cars after completing the run were laid up alongside the curb on the near side of the finishing line while the owners waited until they thought the proper second had arrived to check in.

Winning Alco, Bitner Driving, at Atlantic City

In this regard a number of funny incidents occurred. One in particular resulted in woe for William J. Coghlan and his Chadwick car. Mr. Coghlan reached the finishing line at the Hotel Strand in 3 hours 36 minutes and 5 seconds. He could have gone on and checked in, but he had estimated the time at a little over 3.40 and he waited before taking the count.

The winner of the first prize turned up in the Alco entered by W. C. Longstretch. His time was 3.36.05, just 4 1-2 seconds less than the secret time.

Charles J. Swain's Winton was second, 2 3-5 seconds faster. B. F. Richardson's Mitchell and H. A. Rosenheim's Cadillac were tied for the third and fourth cups at 3.35.30, and F. J. Fanning's Thomas Flyer was fifth.

After the cup winners had been determined, the tedious job of awarding the approximation prizes was taken up. Every car that finished received some sort of an award and consequently much care was required in fixing the status of each entrant.

The twenty contestants that finished either just before or just after the cup winners were given humidors or fine clocks and each succeeding score of cars were given prizes of lesser value. The last car in was given a souvenir trophy of beauty and value.

Special factory prizes were awarded to the Stearns, Winton and Buick companies for the most numerous entries, classified on a basis of valuation. Each had five cars entered in the race.

There were 103 cars, including two electrics, entered for the run and of these eight did not start for one reason or another. All the rest finished except four. There were no accidents en route and the general comment after the finish was that the event was the most successful road run ever attempted under similar conditions.

Long before the hour designated for the start in front of the Hotel Walton the entered machines began to assemble. Philadelphia's most perfect downtown street was brilliant with bunting and color and life as the automobiles scurried about to find their stations.

These had all been marked off and numbered, and by noon Broad street was lined on both sides with panting motors. It seemed impossible to carry out the starting program without confusion of some sort, so great was the assemblage and so unwieldy seemed the mass of entries.

Two platoons of giant policemen in their best raiment had been assigned to preserve order, but they had little to do save to lend color to the beautiful picture and to give official character to the event by their presence.

In front of the Hotel Walton a specially synchronized clock, regulated from Washington, was the official timepiece. At the Hotel Strand, Atlantic City, the counterpart of the Philadelphia clock marked the seconds in unison with it. Exactly at 1 o'clock the word was given and car No. 1, Charles J. Swain's new Win-

TABLE OF PRIZE WINNERS AND SCORES MADE

No.	Car.	Driver.	Time Penalty.	Class. Prizes.
31	Alco	A. H. Bitner	0.00.04½	Grand
61	Winton	C. J. Swain	0.00.12 1-10	Second
66	Mitchell	A. E. Wright	0.00.39½	No. 58 won toss
58	Cadillac	H. A. Rosenheim	0.00.39½	
77	Thomas Flyer	F. J. Fanning	0.00.50½	Fifth
51	Elmore	G. R. Harvey	0.00.55½	A Class Prizes
82	Oldsmobile	E. R. Rusk	0.01.09½	
24	Oldsmobile	E. K. Schultz	0.01.14½	
8	Stearns	G. H. Gantert	0.01.28 9-10	
22	White	Evans Church	0.01.29½	
42	Halliday	A. Krouse	0.01.39½	
5	Warren-Detroit	Tom Berger	0.01.50½	
10	Elmore	F. Hardart, Jr.	0.01.51½	
17	Stearns	F. C. Dunlap	0.02.09½	
30	Mitchell	Thos. B. Smith	0.02.20½	
35	Buick	E. H. Lewis	0.02.36 1-6	
25	Buick	F. K. Worley	0.02.39½	
9	Oldsmobile	A. E. Adams	0.03.09½	
26	Oldsmobile	R. E. Ross	0.03.20½	
92	Dragon	J. Jacobs	0.03.30½	
15	Buick	Mrs. E. Wilkie	0.03.39½	
6	Woods Electric	Geo. W. Daley	0.03.50½	
73	Winton	Geo. E. Potts	0.03.54 1-10	
68	Chadwick	W. J. Coughlin	0.04.20½	
96	Rustler	R. C. Russell	0.04.29½	
38	Pierce-Arrow	Louis Lukes	0.04.39½	B Class Prizes
99	Buick	Tom Wilkie	0.05.09½	
14	Buick	Ed. Wilkie	0.05.09½	
79	Studebaker	F. A. Friend	0.05.09½	
101	Empire	W. Fulton	0.05.30½	
33	Locomobile	Frank Shaw	0.05.39½	
41	Peerless	Paul B. Huyette	0.05.41½	
84	Packard	W. C. Chambers	0.06.20½	
11	Packard	Otto C. Fell	0.06.50½	
21	Locomobile	Howard McTurk	0.07.09½	
39	Chalmers	E. B. Morgan	0.07.50½	
64	Palmer-Singer	C. U. Palmer	0.08.39½	
54	Kline-Kar	P. E. Swartley	0.08.39½	
4	Packard	P. D. Folwell	0.08.50½	
100	Rochet-Schneider	J. Brown	0.09.20½	
83	Marmon	J. A. Hudson	0.09.20½	
40	Warren-Detroit	Chas. Rudd	0.09.24½	
53	Stearns	J. F. Brown	0.09.39½	
63	Stoddard-Dayton	G. S. Smith	0.10.25½	
46	Peerless	S. A. Steltz	0.10.39½	



Premier Entry at Atlantic City, Secretary's Car, and Packard Near Egg Harbor ton, crossed the line and sped along toward Market street, through a lane of interested spectators.

As Mr. Swain passed the timers he was handed a card bearing the time of his official start. Half a minute later, car No. 2, a White, entered by A. T. James, moved over the line and followed the leader. Down through the whole list this was continued. In a few cases the cars were not sent away on their official time, but wherever this occurred the official time was taken and in the final reckoning it was used as the basis upon which the time of the car was determined.

There was no attempt made at speed in the run to the ferry, because of the crowded condition of Market street, and the cars trundled aboard the big boats without special incident.

The day was all that the most enthusiastic automobile owner could have desired. The sun was warm and bright, dispelling the clouds of morning, and the rain of previous days had laid the dust so that ideal touring conditions were enjoyed. The roads through Jersey could hardly have been in better shape for the event and in the bright sunlight the procession of gaily decked automobiles, carrying laughing loads of passengers, added an element of life and power and energy to the scene that was wonderfully effective.

Woods Electric, Which Acquitted Itself With Credit

TABLE OF PRIZE WINNERS AND SCORES MADE

No.	Car.	Driver.	Time Penalty.	Class. Prizes.
45	Marion	W. McCullough	0.10.39½	C Class Prizes
87	Winton	J. L. Brock	0.10.50½	
36	Apperson	A. M. Benson	0.11.09½	
90	Stearns	A. E. Margerison	0.11.20½	
85	Autocar	F. Browning	0.11.39½	
91	Brush	W. J. Aitken	0.11.50½	
95	Kline-Kar	J. F. Kline	0.12.09½	
74	Franklin	Geo. Kariavan	0.12.39½	
7	C-G-V	C. Edgar Shreve	0.12.50½	
63	Palmer-Singer	E. M. Haines	0.12.50½	
55	Pullman	C. A. Adee	0.13.09½	
44	Stoddard-Dayton	W. W. Randall	0.13.39½	
49	Speedwell	H. L. McCullough	0.14.09½	
18	Winton	A. E. Maltby	0.14.51½	
60	Warren-Detroit	J. R. Doolittle	0.15.20½	
86	Locomobile	John Scanlin	0.15.39½	
80	American Traveler	J. E. Mountain	0.15.39½	
67	Buick	H. O. Krause	0.15.59½	
89	Stearns	H. A. McNichol	0.17.39½	
69	White	T. H. Smart	0.13.20½	
72	Detroit Electric	R. L. Eberling	0.19.30½	D Class Prizes
88	Stearns	Frank McNichol	0.19.39½	
70	Buick	J. A. Wiggons	0.20.09½	
71	White	E. B. Stone	0.20.39½	
12	Winton	John Hohtenadel	0.23.09½	
97	Inter-State	M. Wertheimer	0.26.12½	
34	Cadillac	T. F. Seifert	0.27.20½	
33	Peerless	I. M. Koch	0.28.20½	
94	Cottin-Desgouttes	G. H. Hinckle	0.28.50½	
61	Regal	T. M. Turning	0.31.50½	
76	Mercer	W. Oliver, Jr.	0.33.39½	
93	Pennsylvania	A. Barnes	0.34.50½	
75	Chalmers	H. Ringler	0.35.09½	
20	Franklin	J. A. Paul	0.50.30½	
27	Premier	J. La Roche	0.50.52½	
2	White	A. T. James	0.51.39½	
47	Matheson	W. T. Taylor	0.51.50½	
19	Palmer-Singer	W. A. Miller	0.52.50½	
50	Packard	H. M. Lyman	1.31.20½	
104	Warren-Detroit	F. J. Titus	1.40.50½	
65	Palmer-Singer	L. E. French	1.57.50½	E Class Prizes
53	Kline-Kar	J. Mann	1.33.20½	
3	Jackson	I. L. Brown	Did not fin.	
98	Premier	W. G. Dyer	Did not fin.	
102	Stod.-Day. Wagon	W. Jackson	Non-contestant	

The route lay through Camden to Collingswood, Haddon Heights, Summerdale, Laurel Springs, Berlin, Waterford, Hammonton, Elkwood, Egg Harbor, May's Landing, Pleasantville to Atlantic City, a matter of 68.2 miles.

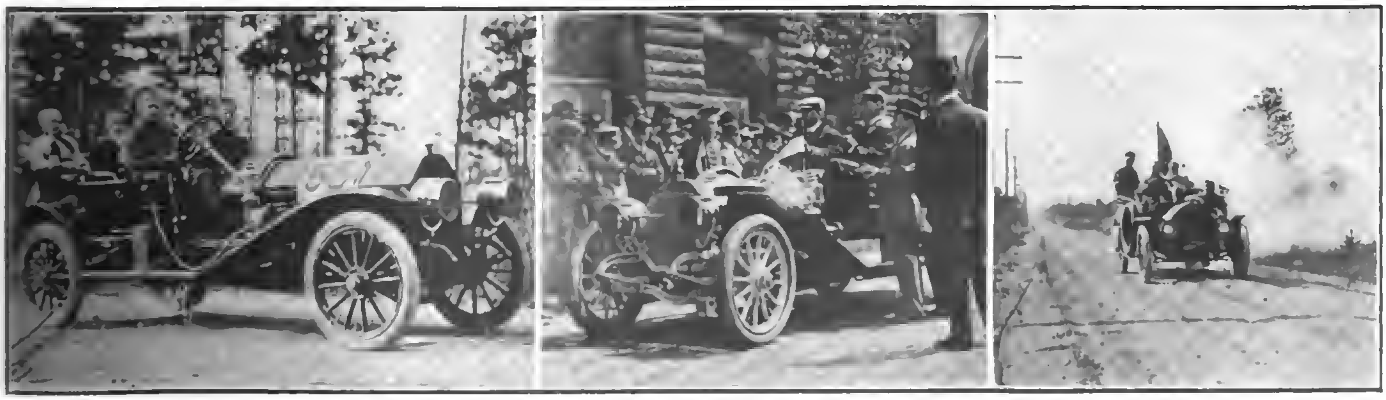
Conditions were excellent for speeding, but under the conditions framed by Secretary Harry C. Harbach and the contest committee, under R. E. Ross, speeding was useless and as a result the run developed into a nice, easy, genteel affair without mishaps and full of pleasure to participants.

These plans demonstrated their own wisdom more than once during the run.

The well-guarded "secret time" added just the element of uncertainty that was necessary to give everybody a good time.

The citizens of New Jersey exhibited intense interest in the affair. At every city, town, hamlet and cross roads, groups gathered and watched the flight of the cars. In most of these groups some person had a copy of the official booklet of the Quaker City Motor Club, containing the list of entrants, and as each car sped by heads would converge over the pages and when the car had been identified welcoming shouts and comments upon its position and speed greeted the ears of the tourists.

Approaching Atlantic City the participants got their first taste of salt air, for a cooling breeze from the ocean swept the great boulevard which swings out toward the point upon which the city is located. An express train moving at high speed toward Atlantic City gave the automobilists a passing temptation to show their best paces along this part of the route, but the participants did not take advantage of the opportunity afforded except in a few cases.



Big Six Chadwick, Locomobile at the Start, and Regal Plugger at Speed

Many of them arrived too soon, according to their idea of the "secret time," and for more than an hour the seaside resort was a riot of colorful cars that paced here and there awaiting the moment fixed by their owners to check in. As has been stated, some of these made fatal mistakes, but, on the other hand, the winners guessed right.

From the right side of the yard of the Hotel Strand a runway extends to the avenue, and when a car checked in it was run up this path, circled the yard and crossed the official line in front of the timer's stand in the porte cochere at the entrance to the hotel veranda.

As each car passed this line, the entrant handed in his signed timing card and the timers, under the direction of President Paul B. Huyette, of the Philadelphia Timers' and Scorers' Club, announced the second of the finish. This was noted upon the cards and the conditions were so well known by both officials and entrants that no chance for protest was given.

White Car in Q. C. M. C. Run Making Time

Pathfinder Crossing White River on Flat Bottomed Ferry Boat
Chalmers Pathfinder Near Little Rock, Showing Convicts at Work

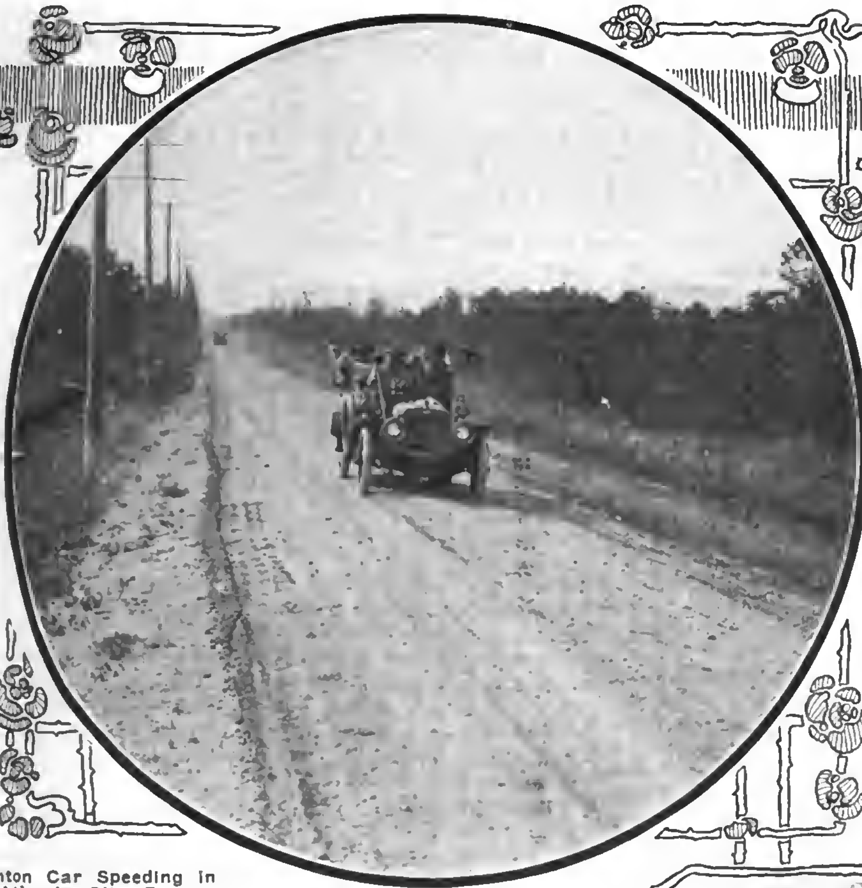
Glidden

Swinging northward at a rapid gait, the progress of the 1910 Glidden Pathfinder has been more than satisfactory during the past week. Road conditions have been superb. The weather one day was so hot that Driver Gardham was almost prostrated and was obliged to lay up for a full day's rest.

From Fort Worth to Oklahoma City the course lay over excellent going and northward from that place, the prairie roads extending into the foothills of the Wichita mountains, proved a treat to the explorers. At Lawton and Enid, and in fact, wherever there was a village along the route, enthusiastic welcome was extended.

It has been practically decided to make Wichita a Sunday stop of the tour. This conclusion was reached when it was found that Kansas City would prove too far to make by Sunday, as scheduled, if other points further South were to be covered.

Martin's Ranch, Texas, Apr. 29—The pathfinder crossed from the South into the West proper in its run from Dallas to Fort Worth Wednesday. Dallas has few marks of the cattle country about it, but Fort Worth proudly terms itself the "cultured cow town." The road hunters were entertained by the dealers' club of Fort Worth, and the *Star Telegram* and *Record* at a dinner in the Worth hotel, and found that men who have risen to fortune from



Winton Car Speeding in Atlantic City Run

The timers were equipped with a list of entrants in tabular form, containing the starting time of each car and as the announcement of the finish was made the time was noted opposite the car's number and in a few seconds the actual time of the contestant was figured out.

After all the cars were in, the cards and the tabulation were taken to one of the committee rooms of the hotel and in a very short time the result was ascertained.

Mayor Franklin P. Stoy and the contest committee had been called into session during the time this clerical work was being done and had given out the official figures of the time upon which the awards were to be based. Having determined the precise second, by averaging up Mayor Reyburn's time with that of the Atlantic City Mayor's, the timers selected the cars that had come close to the mark and within a little more than two hours after the last car was checked in the result was announced.

(*Continued on page* 860.)

Pathfinder

a cow puncher's saddle are now putting the same enthusiasm into motoring that they did into broncho breaking a decade or so ago.

Mayor William Davis, Col. Louis J. Wortham, general manager of the *Star Telegram*, Col. E. E Crowley, former secretary of the Cattle Raisers' Association of America and now president of the Dallas Dealers' Association, were all educated in the rough life of the plains and are all deeply interested in the development of motoring in this part of the country. Fort Worth has a population of 65,000 and 700 cars, mostly of the higher priced makes, are owned there. A million and a half was spent for motor cars in 1909.

The pathfinding car left Fort Worth Thursday following a pilot and spent Thursday night at Martin's Ranch, 29 miles north. Oklahoma City, via Terral, is the route for the next day's run.

Decatur, a town of 2,000, seat of Wise county, is the most important place between Fort Worth and Terral.

Pilots will escort the pathfinder into Oklahoma City. The roads through the stock country are, to a large degree, excellent, being of the resilient prairie type or macadam pike with exception of small stretches of cobble stone which would not total a mile between Fort Worth and Martin's Ranch.

Crossing Bridge Over Salene River, Out of Denton, Ark.
Pathfinder Met by Escort, Just Before Crossing White River

Owen Automobile and Methods of Production Involved

By THOS. J. FAY.

LATELY it has been the idea, considering the general situation, to advance along lines involving the popular conception and selling prices which agree with the average pocketbook. When the Owen Automobile Company, with its new plant at Detroit, Mich., decided to brave the 1910 market with a new-model, relatively high-priced, full-fledged automobile, the project took on divers important phases, and there was no gainsaying the fact that the quality of the car would have to be in full keeping with the financial situation, or the whole project would fall to the ground.

It will not be the purpose at this time to discuss car details, but the type of car and its main features will be found in the specifications given with this article. In order to show something of the extent to which the company has made preparation to build a pretentious automobile, an excursion will be made camera-wise through the plant, without forgetting that there should be a certain harmony of the manufacturing plan in the main; even so, close attention will be given to methods at random, rather than to follow out a systematic plan, it being the case that even were space available for a complete exposé, the story would become too heavy, and the great main situation would be lost in a mass of detail.

While the plant is less than half of the size which will obtain within a short time, the fact remains that the plant as it stands to-day is equipped throughout with absolutely new and modern machinery which was purchased especially for the manufacture of the new Owen car, so that the extensions which will be made when the new buildings are ready, will be of no especial interest from the point of view of this discussion, since they will be along the same lines, and will have interest in that the capacity of the plant will be increased, but the quality of the product will be that as reflected by the machinery equipment as it obtains at the present time.

Norton Milling Machine on Drilling Work

In a shop of this character devoted exclusively to the production of parts for automobiles of the highest character, large substantial and well-equipped universal milling machines serve an extremely important purpose. A of plate 1 shows a Hendy Norton Milling Machine, which, for the moment, is being used in a drilling operation, and the drill D1 is drilling a hole in the yoke Y1, which is blocked up on the platen P1.

Motors Are Assembled on Special Tilting Stands

In the assembling department, the idea of being able to get at every portion of the motor during the process of assembly counts in the long run, not only by way of saving time, but in the direction of quality of the finished product. B, plate 1, shows a cast frame F1 with sectors S1 and S2, which in turn support the motor arms A1, A2 at one end, and similar arms at the other end of the motor. By the means afforded, the motor is tilted so that the operator is enabled to examine the bottom B1 of the crankcase with the same facility that is afforded in the examination of the cylinders C1 when the motor is setting in the vertical plane. The motor, as it is shown in this example, is with the front end facing and the half-time gear train with the driving pinion P1, intermediate pinion P2 and camshaft gear P3 exposed to view, the cover of the half-time gearcase having been removed for the purpose. One pair of cylinders is mounted into place and the valve springs which are concentric with the valve stems are shown with a protecting cover C2 over them, there being one cover for each valve; this is a special feature used on this design of motor for the purpose of excluding dust or other foreign substances, and in order to assure a further degree of silence in the operation of the motor. One of the pistons P4 shows above the half-time gearcase, and since the bottom half B1 may be dropped down at will by the simple expedient of removing the holding bolts B2, of which there are a suitable number, it is to be seen that the connecting rods may be unbolted from the crankpins and let down so that it is not absolutely necessary to remove the cylinders from the crankcase in the process involved in the examination of the pistons, piston rings, or relating parts.

Gang Drill Utilized in Progressive Operations

When a gang drill is taken advantage of in connection with a series of jigging fixtures, one or more men may undertake to complete a given character of work, and speed as well as accuracy is thereby induced. C, plate 1, presents just such a drill, in which the spindles, S1, S2, S3, and S4, are mounted in the same plane, but the drills which they accommodate are not all within the same range. In this example, the spindle S1 will do relatively heavy work, S2 somewhat lighter, S3 falls lower in the scale, and S4 ranks as a sensitive drill. A combination such as this permits of a wide range of rapid work, and the accuracy phase of the situation is attended to through the use of jigs and drills or reamers, which are kept in good working order by tool makers in the tool room, thus eliminating the uncertainties which come if a plurality of workmen are permitted to follow the bent of their own inclination in the shop.

Radial Drills Serve Many Important Purposes

In the finishing of crankcases for motors and transmission gearcases, there are a considerable number of operations which may be done with precision and dispatch if suitable fixtures are utilized and radial drills are employed in the process. D, plate 1 presents a stout radial drill in connection with a fixture working on a motorcase, and a jig G1 guides the tool T1 into the work W1.

Straddle Mills Do Quick and Accurate Work

As an illustration of the utility mills E, plate 2 is offered, in which the work W1 is clamped to the platen P1 by means of the clamp C1, and the straddle mills S1 and S2 are utilized simultaneously in the facing off of the work. The distance between the straddle mills is fixed in view of the facing distance desired, and this idea has a wide application, provided the mill is sufficiently large and rigid to stand up under the increased rate of cutting.

Vertical Millers Handle Certain Work

Referring to F, plate 2, a vertical milling machine M1, with its spindle S1, has an end R1 engaged in routing out an aluminum half-time gear cover C1. In former times work of this character was done by means of vertical milling heads, which were attached to horizontal milling machines. For the lighter character of work this form of attachment served very well indeed, but the practice at the present time in the plants where automobiles are manufactured, demands far greater stability than is ordinarily obtained by means of an attachment of an auxiliary character.

Broaching Machine for Making Square Holes

One of the class of machine tools which was developed to a high stage in response to the demand of automobile makers was that which rendered it possible to broach square holes in gears as used in the transmission system. G, plate 2, shows a Lapointe broaching machine in operation, and the broaching tool, which does not show clearly, is actuated by the screw S1, which is of great power, which produces the square hole H1 in the gear G1 as shown. The capacity of this form of tool is so great that the old apathy to square hole work has entirely disappeared. This character of work is now done with substantially the same facility as obtains in connection with the drilling and reaming of a round hole.

Divers Automatic Machine Tool Equipments

It would be impossible to show even a reasonable few of the total number of splendid machine tool equipments employed in a plant such as the one of the subject. Many of the operations are completed on automatic machine tools, and the personal equation, which is so prone to interfere with the interchangeability of parts, is substantially done away with on the ground that the cutting tools, of whatever character they may be, are sharpened and sized by tool makers who are provided with every facility for the purpose, and a system of inspection in vogue renders it quite impossible for the artisans to make a mistake of sufficient magnitude to get by the work inspectors who take charge of the product from time to time as the occasion requires. Gear cutting is one of the classes of work which comes within the pale of the automatic system, and H, plate 2, shows one form of gear cutter which has a wide use in connection with the completing of sliding gears. The Fellow's shaper S1, with its reciprocating cutter C1, fashions the gear G1 by a progressive method of cutting, so that no one tooth is completed by a single cut; a series of cuts taken progressively one tooth after the other results ultimately in the completion of the cutting of the whole number of teeth, and the accuracy thus encompassed is beyond that rendered ordinarily possible, because the gear blank is cut at a constant temperature and the strains induced are but slight, so that distortions during the period of cutting are substantially eliminated.

Cylinder Design Indicates Engineering Skill

In view of the excellence of design of the cylinders, which is a matter of maximum importance in automobile work, it was deemed expedient to reproduce the working drawings and thereby more nearly portray the true situation, than will be possible in any other way. Referring to Fig. 1, (A) depicts the exterior of the twin cylinders on the valve chamber side, (B) is a plan in part section looking down upon the cylinders, (C) is a section through A A A A A, (D) is a section through B B, (E) is a section through one of the valves on the line B B, (F) is a section through D D and (G) is a section through C C C.

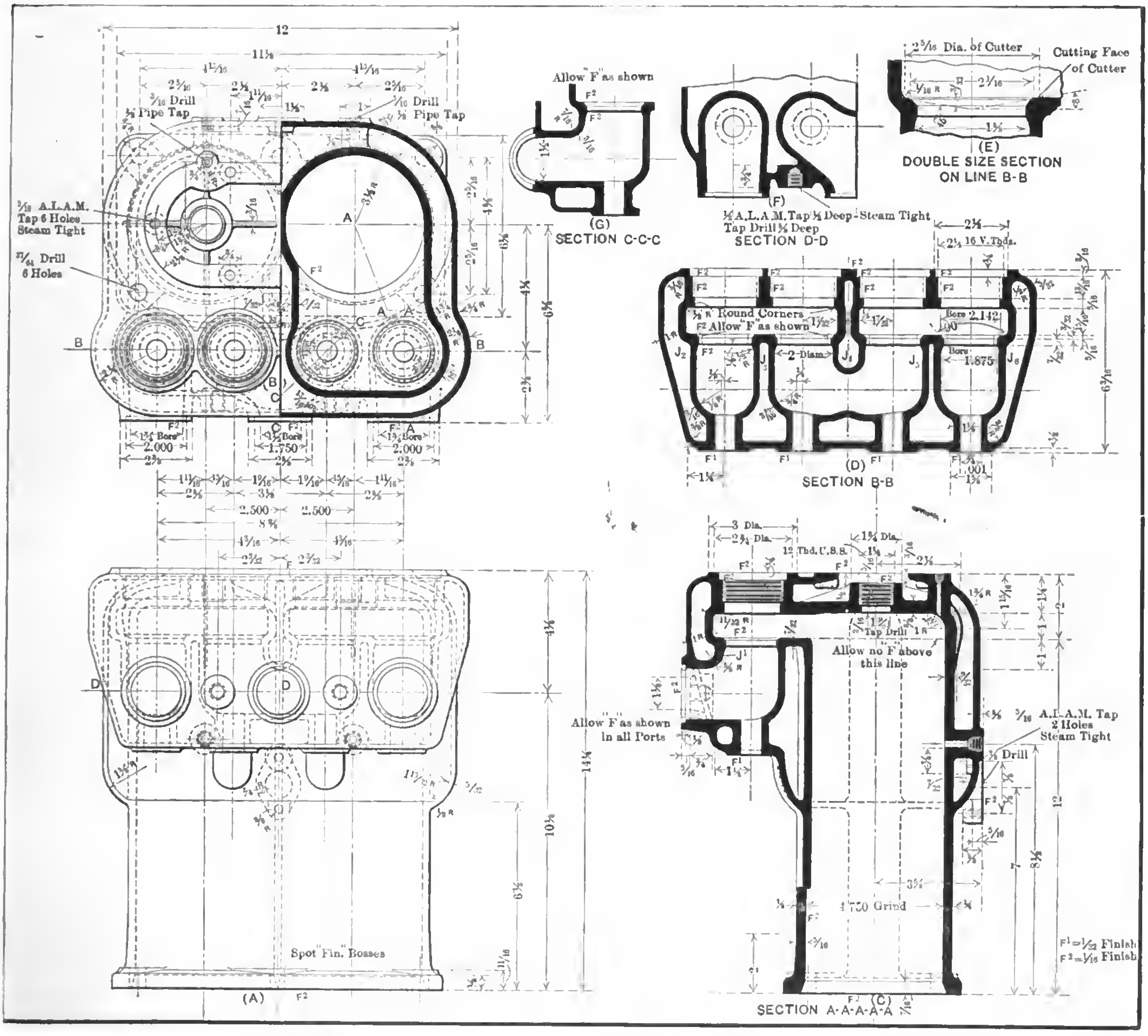
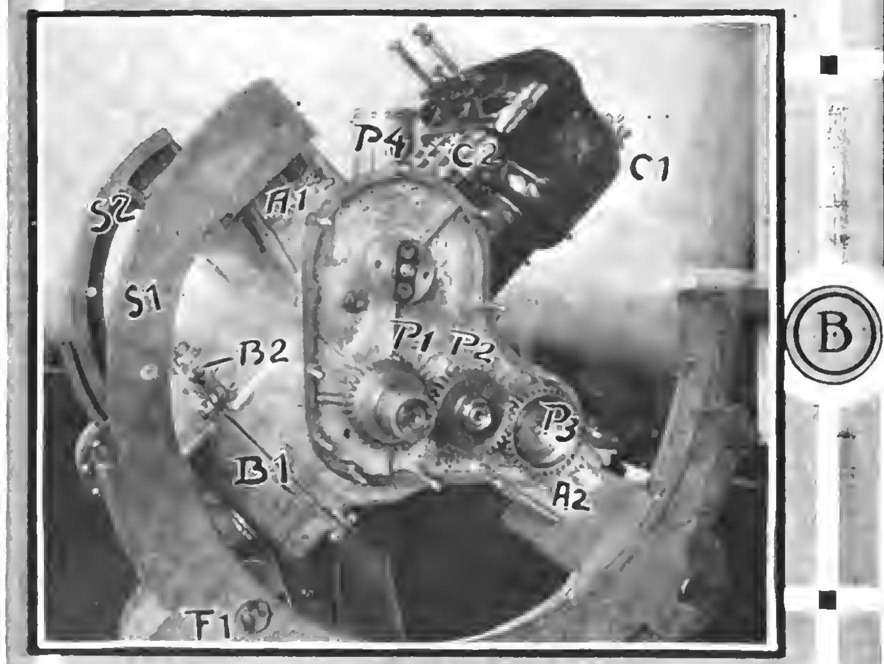
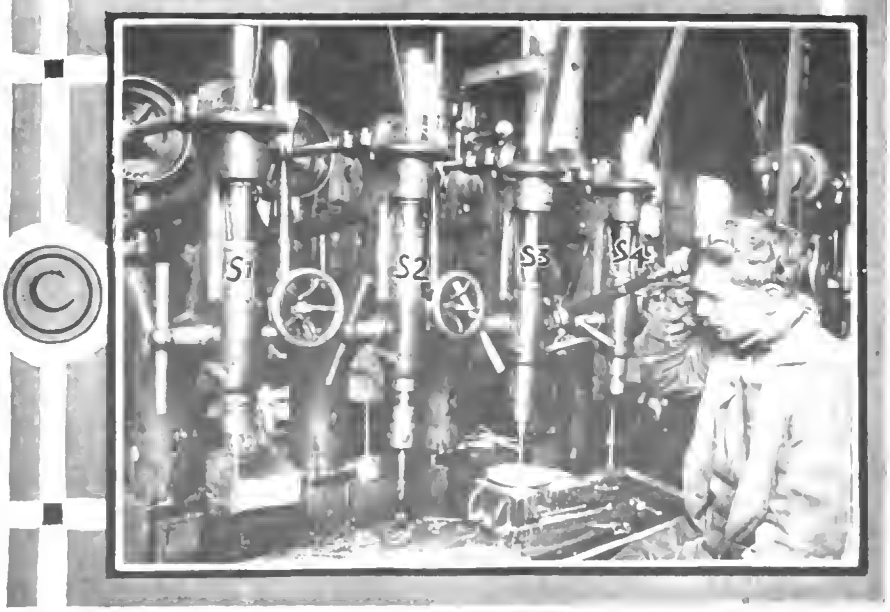


Fig. 1—Reproduced from working drawings of the cylinders of the Owen motor showing symmetry of design, uniformity of walls, and completely water-jacketed valve seats

Referring to (C) Fig. 1, the cylinder walls are 1-4 inch thick in the main, but at a point approaching the flanging at the bottom the thickness is increased to 5-16 of an inch, beginning at a distance of 2 inches above the bottom line. In order that the

PLATE No I

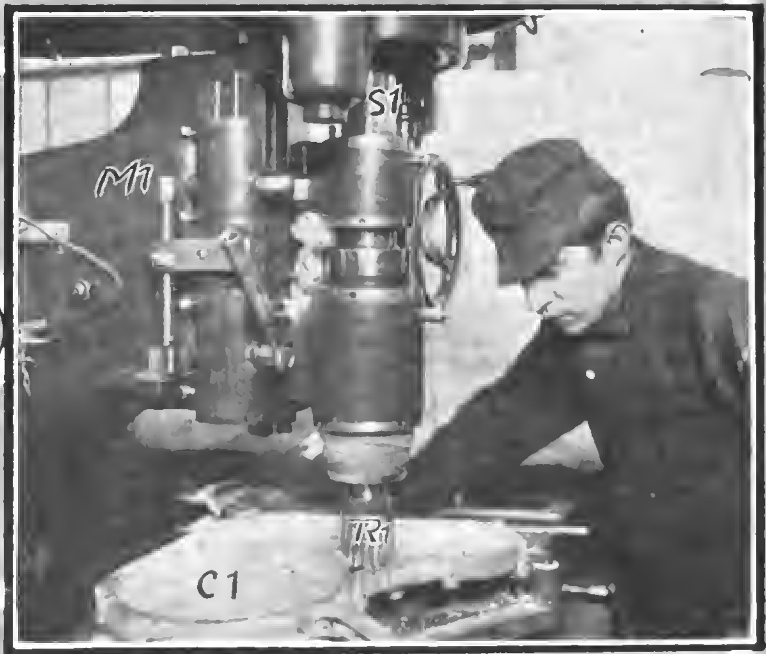




pistons may be inserted after the rings are slipped into their respective grooves thereon, the cylinders are beveled for a distance 7-16 of an inch up from the bottom, and the difference in diameter between the bore and the outer edge is greater than the distance represented by the expansion of the piston rings when the pistons are ready to insert. This detail represents the difference between success and failure, not necessarily when the car is being assembled by the skilled men in the shop, but later on in the hands of the chauffeur, who will destroy the piston rings in replacing cylinders if the beveled edges at the bottom of the bore are insufficiently designed.

The waterjackets are 3-16 of an inch in thickness, uniformly throughout, and the water sheet between the cylinder walls and the jackets is uniformly 3-4 of an inch, so that core difficulty in the foundry process is obviated. Care is exercised at every point to avoid the bunching of metal, and in this way the castings are rendered sound. Glancing at the valve seat, it will be observed that the wall at the point J1 passes downward for the better part of an inch before it intercepts the circular wall of the intake or exhaust. This is an important detail and the object in view is to maintain an even thickness of the metal around the seat of the valve, partly to assure soundness in the section of the metal, and again in order that the valve seat will be cooled at an equal rate all around its circumference. It has been found in prac-

PLATE No. II



tice that if the valve seats are only cooled for a part of the way around, the differences in temperature directly due to this inequality will produce an elliptical formation of the seat, and tightness will then be impossible.

Section E shows the valve seat detail, it being of the 45-degree beveled type, and above the valve the difference in diameter is increased enough so that the cutter which is used in fashioning the valve seat has ample clearance, and the metal on the top faces of the valves may be slicked down sufficiently to assure a perfect uniformity at all points in the diameter. Glancing at (D), which shows through the section B B, a further insight into the care with which the valve seats are water-jacketed will be given. J2, J3, J4, J5 and J6 are the points in the waterjacket adjacent to the valve seats at which trouble is wholly avoided, due to the provision of a uniform sheet of water around the exterior surface adjacent to the seats.

The valve stems are bushed, the idea being to maintain a certain tightness, and in the course of time as service shows effect the bushings may be replaced, if it is deemed expedient to do so. In order to assure a liberal heat transfer between the valve, its stem, the bushing, and the jacket walls to the water, the bushings are pressed in, and the character of the workmanship throughout is consistent with the objects sought.

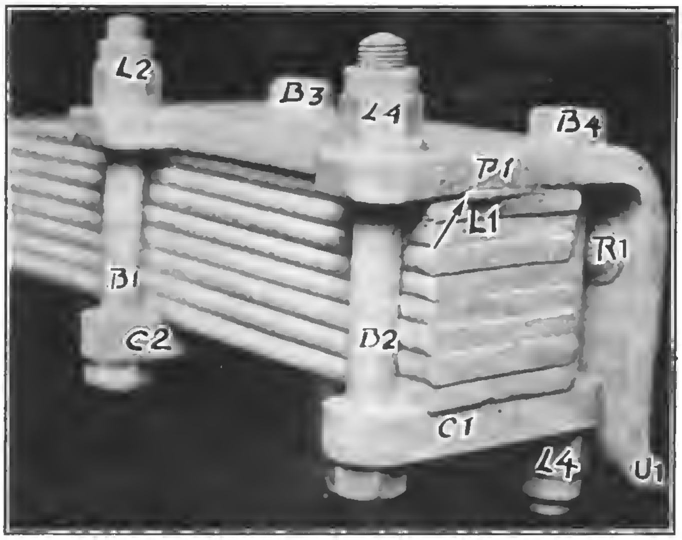


Fig. 2—Security fastening of the three-quarter elliptic spring suspension at the rear of the Owen automobile, utilizing a pressed steel bracket and locking methods

Glancing at the top of the cylinder in the view (C) the combustion chamber has an accommodation hole through which the core print passes, thus preventing the cores from shifting during the process of casting. This hole in each cylinder is threaded, and the plug which is threaded to match is provided with an overhang and a copper-faced gasket, so that when the plug is screwed home the copper-faced gasket is locked into place and tightness is assured.

There are divers other important features of design, which a closer study of the figures here presented will disclose, but the dimensions are all given, and beyond referring to the symmetry of the design and the general good appearance of the completed cylinders, the reader will be left to his own devices for the rest.

Conspicuous Design Features Throughout Chassis

The old idea of utilizing steel castings or malleable iron members in the construction of the chassis has lost favor on account of the uncertainties of castings. Fig. 2 shows how the three-quarter elliptical spring suspension is anchored to the frame and the pressed steel anchorage P1 is riveted R1 (of which there are a suitable number) to the chassis frame, but it also passes under the frame at the point U1, where it is also riveted to the flange of the frame. A cross-member at this point takes care of the stresses induced, and, as the illustration depicts, the metal is in sufficient presence in the pressed steel member to assure stability. The spring is held in place by clamping bolts B1, B2, B3 and B4, and pressure is induced between the pressed-steel member P1 and the cross-bars C1 and C2. There are eight flat plates in this portion of the spring; they are all of the same thickness and relatively wide. A measure of flexibility is induced by means of a thin strip of leather L1, which is placed between the top plate and the pressed-steel member P1. The whole system shows the earmarks of careful designing, and in view of the fact that springs will surely break if they are not tightly anchored, locking nuts L2, L3, L4 and L5 (the latter being hidden) are used in order that the clamping will remain tight in service, despite the tendency of nuts to back off.

Long Pistons Assure Tight Compression

Without attempting to cover all the points of merit, as they are presented in details of design, it will be considered enough to refer to one additional matter which supports the plan as a whole. The motor is of the long stroke type, and Fig. 3 shows the four pistons with the connecting rods and rings complete, in which P1, P2, P3 and P4 are the pistons, and the rings R1, there being three for each piston, are especially designed with a view to lightness, experience having shown that a light ring well designed will last longer and do better work than a wide and heavy ring. The joints J1 of the rings are cut on the bias. The connecting rods C1, C2, C3 and C4 are drop forged from a suitable grade of steel, are substantially of the H section, and are tapered so that the greatest strength in one plane comes at a point .6 of the whole distance up from the center of the large end at the crankpin. The caps C5 are held by four bolts, each

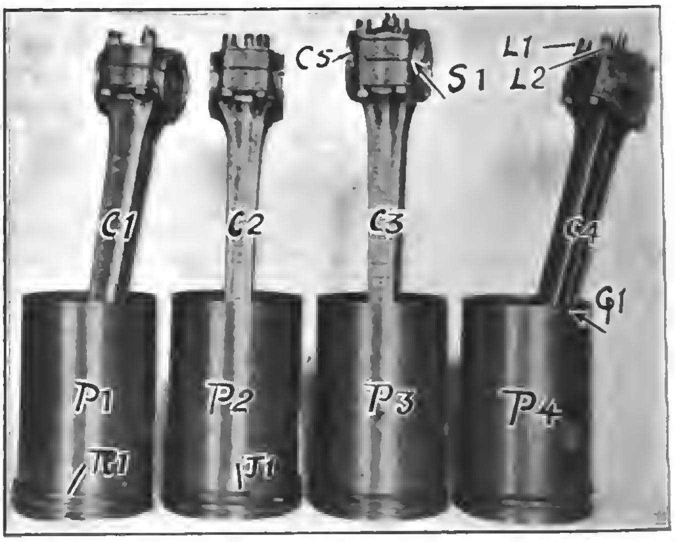


Fig. 3—The four piston units of the Owen motor showing an H-section connecting-rod system, long pistons, and relatively light packing rings

one of which is maintained in secure relation by locking nuts L1, L2, etc., and shims S1 are introduced for the purpose of permitting the autoist or his repairman to take up on the crankpin bearings, if in the course of time in service slack is induced. Perhaps the most important detail shown in this figure is the relatively great length of the pistons, not forgetting that an oil groove G1 is cut at the bottom of each of the pistons.

Specifications of the Owen Automobile

Type of body, six-passenger, fully enclosed.
Wheelbase, 120 inches.
Tread, 56 inches.
Tire equipment, 42 x 4-inch quick demountable.
Size of motor, 4 3-4 x 6 inches bore and stroke, respectively.
Motor rating, 60 horsepower.
Type of cylinders, L-head with inlet and exhaust valves on right side.
Crankshaft pins and bearings, 2 inches in diameter.
Crankshaft bearings, expanded Parsons white bronze.
Valve lifts, adjustable with rollers.
Water pump, centrifugal.
Ignition, high-tension magneto with coil and battery auxiliary.
Carbureter, float and nozzle type with auxiliary air valve.
Lubrication, splash system with pump for constant level and sump in crankcase.
Clutch, leather faced cone type with expanding springs.
Transmission gear, three speeds and reverse.
Transmission gear bearings, plain faced with Parsons white metal.
Transmission control, center line of car.
Driver's seat, left-hand side, making control right handed.
Front axle, drop forged special steel in one piece.
Rear axle, full floating type, with bevel differential.
Front springs, half elliptical, 2 1-4-inch wide plates, 40-inch span.
Rear springs, three-quarter elliptical, 2 1-4-inch wide plates, 50-inch span.
Emergency brakes, internal expanding emergency located on rear wheels, operated through beam equalizer and pedaled by right foot.
Service brakes, external contracting on drum on rear wheel, operated through beam equalizer and pedaled by left foot.
Steering gear, worm and babbitted nut with ball thrust through 18-inch steering wheel.
Location of steering wheel, left side of car.
Chassis frame, channel section steel with double drop, offset front and inserted wooden skids for transmission gear-set.
Half-time gears, helical type.

New Plant Where Selden Cars Are Built

By MORRIS A. HALL

FEW factories always interest, as showing just what "the other fellow" is doing in the way of buildings and equipment, but the new factory just occupied at Rochester, ., by the Selden Motor Vehicle Company, of which George lden is the president, carries an additional interest for the reason of Mr. Selden being connected with it.

be exact, the factory, which will be described in the folg pages, is not located right in the city of Rochester, being ighton, a suburb of that city, some two miles from the ss center. It is easily and quickly reached from the center city, however, by trolley lines which run within one block, by electric express running right past the plant, and omobile, through one of the most delightful of Rochesower-lined streets, and over excellent pavement.

factory is of brick, concrete, and wood, of what is techknown as slow-burning construction. The outer walls brick, the columns of concrete or 10 by 10 timber, in ases, with iron caps, while the floors present a novelty building line, being of two by eight timbers laid on edge, iled together sideways, while the floor surfaces, of sevenhard wood, are laid on top of this, being of matched The whole has all of the desirable qualities of a factory ing low in price, fairly good as a fire risk, easy and quick , simple and cheap to replace, strong to carry loads, and, not least, easy on the feet of the men.

ground floor has, however, concrete floors, while the fice entrance has tiled, and the offices ornamental hardoors. The master building, if so it might be called, is ries in height, and rectangular in section, being some long by 62 ft. wide. From the center of this projects ndary portion, this being another rectangle, closely apg a square, as to fingers, being 100 ft. long by 128 ft. rom this, again, there is a rectangular projecting part, r being the power house and heating plant. This is size, as compared with the other very long buildings, e for the purpose. In the location and planning of the ucture is to be found an example of the excellent pervading the whole layout. The factory has its own iding, and the upper end of this carries right past the use. The latter appears like any of the other buildthe outside, but, when entered, the floor level upon boilers and auxiliaries are placed is found to be lown much below the level of the other floors. At the reason for this is not apparent, but upon close it is seen to be for the purpose of reducing the of the fuels for the plant to a minimum. The end lroad siding carries up over the coal pit of the plant, orted in such a way as to leave plenty of open space. carload of coal, then, the car is run up, over the pit, d directly downward, without any handling.

coal lies upon the boiler room floor level, and the ndling it is reduced to the simple act of swinging it pit to boiler door. Since this entirely eliminates all imming, and similar work, considerable money is he operation of the plant. There are many other money-saving little economies in the plant.

to the buildings and their ground layout, another gular projection from the larger main building will the floor plans, given elsewhere in this article. This evator and stairs, and the rectangular building housentirely of brick and concrete, thus making that part ing wholly fireproof. This, combined with its isolahe other buildings, although in juxtaposition with the fire risk to employees and material very low. oo, other advantages in this planning which do not the first casual inspection of the plans.

he other two sides of a hollow square with the main buildings is a long, low, wooden structure, in which engines and cars are tested. This building, which will be scribed in more detail later, is but one story high, and is divi into three parts, one for engine testing, after the engines assembled in the cars, one for testing of the completed c and the third for experimental work and the construction special work. The whole building makes a home from wh the testers work out, the road testers making this their b from which to give all cars such a try-out as no purcha of the finished car will ever think of subjecting his prope to.

In the factory layout, the ground floor of the main build is occupied by the reception hall, timekeepers' offices, stairw to the second floor, dining room for the men, to be spoken later, storage for finished cars awaiting shipping order, ass bling of chassis as well as parts, stock room, testing and fi assembly room, shipping and receiving room, blacksmith sl and initial frame and axle assembly room, power house, testing rooms, as previously described.

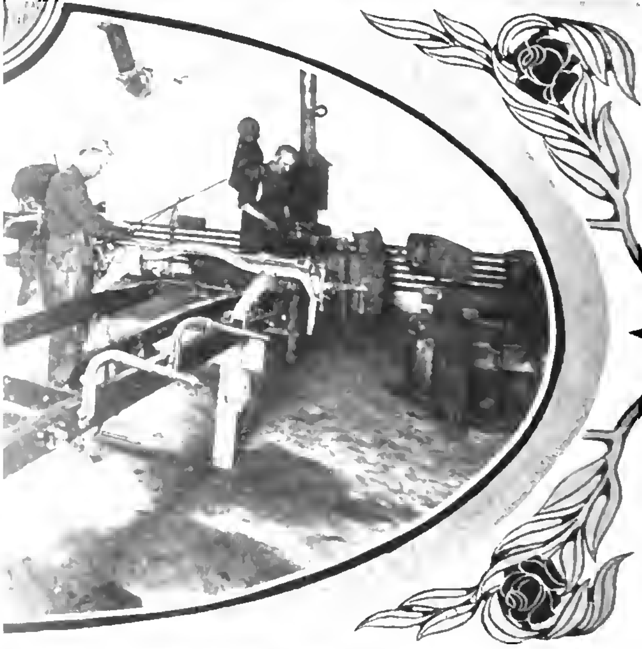
Second floor arrangement is as follows: Front end, offic rooms, general offices and bookkeepers' rooms, drafting roo and chief engineer's offices, back of which are the rooms final assembling of bodies, fitting of dashboards, wiring electrical system, etc. Beyond this, going toward the back, the chassis painting room, and, at the extreme end of the flo varnishing and body painting room. This floor level shows a the skylights or saw-tooth roof of the one-story building.

This saw-tooth arrangement of the building of lower hei is resorted to in order to give as much light as possible, same effect being obtained in the larger, longer building throu the very large number of windows along the two sides of comparatively narrow building. The result, at any rate however it is obtained, is that of an unusually light facto Since plenty of light always makes for cleanliness, by mak dirt more prominent, this results in the whole plant be unusually clean. The final or ultimate result is to give a bet place for the men to work in, and, consequently, do better w and more of it. It is thus an asset to the firm, which thou doubtless carried some weight when the planning was done.

As to factory organization, the firm has one head and s eral associate heads, the whole working downward in a sort pyramid, from the man alone at the top, to the two hundred-c employees, the latter being a number which is constantly a mented as employees of the desirable class are obtainable. Geo B. Selden is president, and with the vice-president, Louis Fischer, of Buffalo, and the secretary-treasurer, John H. St man, cares for the larger problems of finance and administ tion. Robert H. Salmons is vice-president and general mana in direct charge of the factory. Working down from the m ager, under him are the departmental heads of smaller calib such as factory head or superintendent, sales manager, advert ing and publicity manager, purchasing agent, and chief engin in charge of all design, specification of materials, as well general outline of the processes to be used in fabricating parts. Below these, in turn, come the smaller departmen heads, in charge of restricted and specific parts of the wo as the various foremen, shipping and receiving clerk, bo keepers, timekeepers, foreman painter, stock clerk, head test assembling foreman, engineer, chief draftsman, etc.

With this form of organization, the course pursued from r materials and assembled parts, bought outside, up to the finis and painted automobile, ready for shipment, is about as follov The raw materials, in the form of bar stock, flat and round ir etc., bolts and nuts, assembled steering gears, radiators, m netos, coils, batteries, carbureters, wheels, tires, and simi parts come in by freight on the company's own siding. Af unloading directly into the shipping clerks' room they are

B



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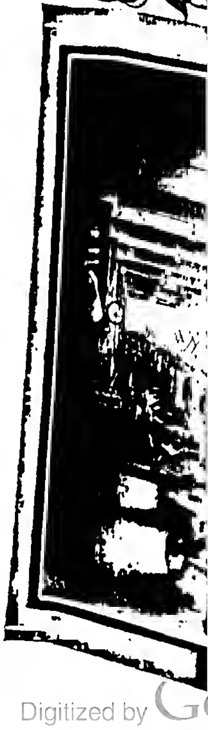
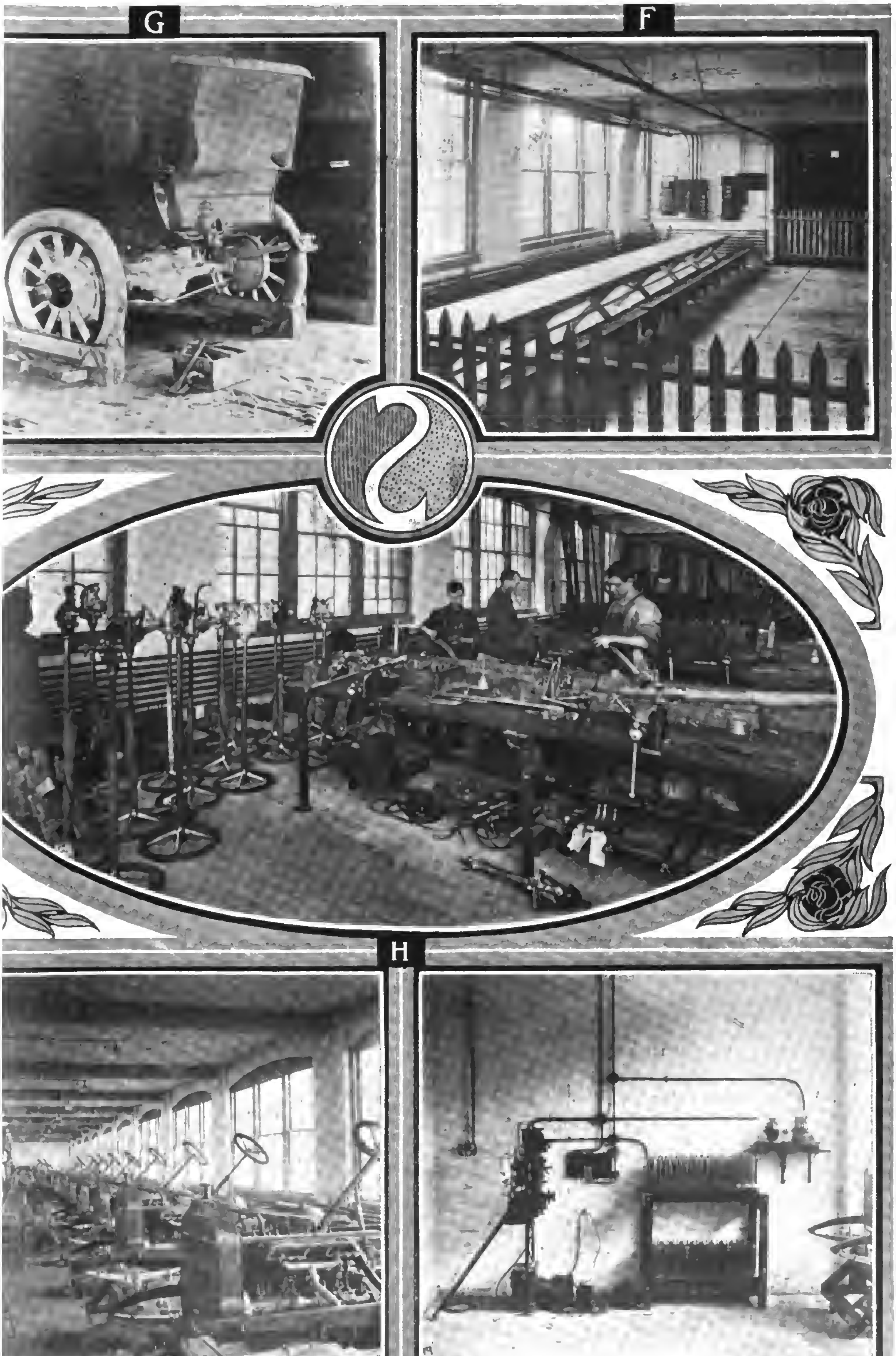



G
F
H

Selden Factory, Showing Electric Tracks

Second Floor Office View, Displaying Excellent Lighting and Plenty of Space

spected, and then go to the stock room, there to be drawn out for use as needed on departmental requisition. Both receiving department and stock rooms are on the ground floor and close to the assembling room, where the parts are to be used. This makes the travel of materials and parts about the plant as short and as quick as is possible.

In the panels on the previous pages, picture B of the first panel shows one corner of the shipping room, with its boxes and barrels of materials, coming in fast, for this company seem to have the railroad hypnotized to the extent of getting all of the freight cars needed for either ingoing materials or outgoing finished cars. At D of the same panel is seen the stock room, or at least a view of one corner of it. This stock room incorporates one very new feature in the tire room. The tire men have always asked for a dark, cool room, so when the factory was built a tire room was built to conform to these specifications. This is a basement proposition, being below the stock room, a vault specially built in for holding tires. It is reached through a trap door in the stock room floor, and has no windows.

In the same panel, picture A shows the chassis-assembling room, with a typical row of cars undergoing completion. The picture shows some 14 or 15 machines, but the exigencies of taking the picture were such as to preclude getting all those which were on the floor at that time, amounting to about 25. In a pinch, the floor space and arrangement are such that as high as 35 machines could be set up at one time. The picture also brings out one point not usually noted. This is the location of the gasoline tank on the chassis, under the front seat position, this being placed there at the start, and staying there throughout all of the strenuous testing of the car. In short, the gasoline tank is permanently affixed to the chassis at the start, the chassis then being tested with its own tank in place. In the usual case, this tank is carried on the body, and consequently is not attached until the body is put on, the testing being done with a special testing seat, carrying its own gasoline tank.

Picture C shows the blacksmith shop, where the assembling operations are commenced, the springs and axles being attached to the pressed steel frame, while the step and fender irons are also put on. The view shows clearly three or four frames being started, the one in the immediate foreground having the rear spring hangers in place, the front spring hangers, springs, and axle just being fastened. Also, the step and fender irons are in place.

At the lower right-hand corner is the assembling room for the chassis, another view being presented. This view reveals the tote boxes, in which materials, small parts, and all the little accessories needful to the men in assembling are carried around the shop. At the left a glimpse is had of a series of frames undergoing what might be called the second operation of assembling, this being the attachment of the secondary accessories, such as steering gears, etc. The view does not show it, but all frames after this second operation are mounted upon a special truck, designed for the work it has to do. This is a very neat, strong, serviceable little truck, and will be made the subject of future mention. In the main, it fits under the front and rear axles, interchangeably, and has four rollers, upon which the load may be wheeled around the shop, these being swivel mounted, so as to turn freely.

The second panel of pictures shows more features than corporate parts of the production processes. Picture F is the lunch room for employees, which the management has provided to enable the men to have a hot dinner without going out of the plant. While later plans may include the serving of such a meal at cost, the present situation is that the men employ someone from nearby to come in just before noon, bringing the noon meal, together with the necessary dishes and equipment. The photo gives small idea of the size of the room or of its clean, well-lighted appearance. The real size is such as to seat the whole factory force, with proper table space.

In addition to the dining room, the employees are well cared for elsewhere around the plant in other ways. On each floor, in every department, are provided a number of porcelain-lined wash stands for the men to wash up at, with both hot and cold water. Elsewhere, lockers are provided, while toilet rooms are many and well located. For the office force, the same arrangements, but upon a more generous and elaborate scale, are made.

Alongside of this, picture G shows a finished car placed in the box car which is to convey it to some happy purchaser. The wheels are blocked up and fastened in place, so as to hold the car firmly against the shifting and sudden starting and stopping which the freight car is sure to go through. This little matter th clearness the great care used throughout f the car to have everything come to the in perfect condition. Blocks, shaped to a fit, ie front and rear sides of the inflated tires, l with burlap. These are nailed fast to the o the second blocks, the purpose of which is om sliding sideways. Finally, the whole is ans of the longitudinals. H shows the cor- ssembling department in which the steering . adjusted, as well as the assembling of gear assembling and testing of reach rods, operat- r other of the important little parts.

e in, the small groups are assembled, then oom, after a very thorough test. This in- ccuracy of fits of shafts in bearings, side- or shake, tests for sufficiency of lubrication, shing of gears, for accurate fitting of keys any other similar little tests, all of which influence upon the character and worth of dy-to-use car.

:n, at I, the charging panel at which stor- irged, through the medium of the mercury : batteries, magneto, and other components and thorough telephone installation. This d by means of a series of signals, through bells, well distributed, by which any officer 'ocated in the shop and called to the office e.

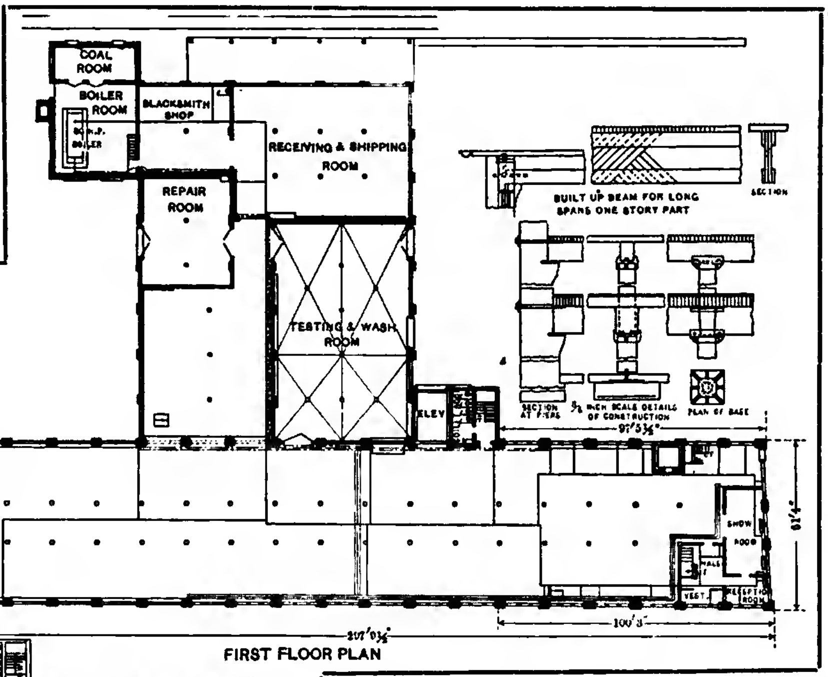
ant, electricity is used freely, the chassis- instance, having a lamp over the location ssis, or the space which each chassis would : shortage of good workmen keeps up so necessary to resort to extra shifts or night h the orders, the factory is well equipped ·k.

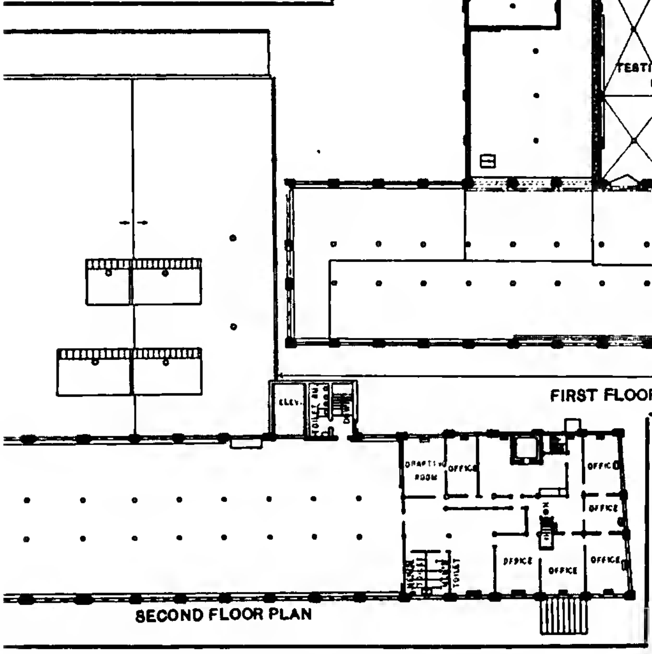
second floor, in the paint shop, to be spe- ssis are all being painted, and, does not bring it out, are in ;es of progression. The bird- left is the form upon which nnets of the cars are painted, Henry Selden's, a son of the rge over several of the larger ctory. On this and the pre- i views and plans of the new of which will be the subject of a future article, dealing specifically with the small details.

Testing taken as a whole, is very thorough, unusually so, and will be made the subject of later notice and comment. Not alone are the small parts tested during and after assembling, but the engines undergo a quadruple test, first the usual block test at the conclusion of the assembling process, and following the more usual run-in test. Second, the engine is tested after being put into the chassis, this being to make sure that everything is all right before going out on the road with it.

After that the wheels are put on, and when the chassis has been wholly assembled, the third or road test follows, this being unusually severe, both as to speed expected and as to hill-climbing ability. Next, the outside test having been completed, all the loose fits having been found and corrected, as well as all of the adjustments having been made, tested and proven, then corrected, the car goes to the paint shop, receiving its final dress, after which a body is placed upon it, and the latter is finished up, ready to go out. After all this has been done and the car is actually ready to ship, old wheels with still older tires are substituted for the new wheels with new tires, and the car gets its final test. This consists of two parts, one the outside road performance, and the other the dynamometer and stationary test. The two differ only in that in one the power is measured and in the other it is not. In these tests, the car is run into the testing shed, and the rear wheels run onto a pair of rollers, set into the floor, so as to project but an inch or so. There are a number of sets of these to take care of the large number of cars being turned out, namely, 600 for the current year, which figure will be raised to no less than double that, or 1,200 for 1911.

Of these a few have dynamometer attachment so that the power is measured, this being the actual power delivered to the road wheels, and not any formula or rating power. The others are just plain rollers, and the wheels just revolve idly, the idea being to test out the action of the engine and whole chassis, under actual working conditions. This test is one which brings out the sterling qualities of the radiator, and heat-dispensing system in a way that no other test could possibly do.





Floor Plans of New Selden Factory at Rochester

nd Floor Plan Showing Saw-tooth Roof.

In the appended floor plan, a sketch of some of the building details is also given, and will shed some light upon the construction of the buildings. This shows, for instance, the construction of the built-up long beams, which are made from two thicknesses of flat planks, cross-nailed and laid at angles.

The Magneto—Why It Makes Sparks

BY HERBERT L. TOWLE

A MAGNETO is in some respects a delicate piece of apparatus. It possesses many special characteristics which do not appear on the surface which can be learned by careful study, or as the result of ill-considered blundering. The best advice that can be given the owner of a magneto is to let it alone till he has both definite occasion to do otherwise and the necessary knowledge to act correctly. When a magneto does need something done to it besides the customary oiling and letting alone, the user's path is far easier if he understands the principle of the thing. To do so is not in reality very difficult, provided one starts with the elementary principles of electromagnetic induction. Most of the obscurity surrounding the subject is due to the fact that the average owner tries to skip the rudiments and begin at the top.

A magneto generates current in the same manner that a dynamo does, namely, by the motion of wires across the "field" between magnetic poles. To move these wires takes power roughly proportional to the electrical energy thereby produced; thus we say that mechanical is converted into electrical energy.

Precisely what is induction? It is the production of current in a wire (or other conductor) owing to changes in a magnetic field surrounding it. This magnetic field may be due to a magnet, or it may be due to an electric current flowing in another wire adjacent to the first, but not connected with it.

Take the familiar battery induction coil, Fig. 1. It has a primary winding of a few turns of coarse insulated wire through which the battery current flows. Surrounding the primary coil is the secondary coil, consisting of a large number of turns of small wire wholly insulated from the first coil. If the terminals of the secondary winding are brought close together as at *A*, and if the current flowing through the primary winding is suddenly broken, as by snapping the ends of two wires across each other at *B*, a momentary current is induced in the secondary winding. The potential of the induced current is higher than that of the battery current in rough proportion to the greater number of turns in the secondary winding, with the result that it is sufficient to jump the air gap at *A*. If the secondary winding had only the same turns as the primary winding, the potential of the induced would be that of the primary current.

A steady flow of current in the primary winding induces no current in the secondary. It is only the change of current that has inductive effect, and the more abrupt this change is the higher is the potential or voltage of the induced current. Current is induced on closing the primary circuit as well as on breaking it, but owing to electrical and magnetic lag it is not strong enough to make a spark at *A*. Lag occurs on breaking the primary circuit also, and to reduce it a condenser is used to absorb the extra current which would otherwise produce a spark at the point *B*. The condenser will be referred to later.

Instead of closing and opening the primary circuit, current may be induced in the secondary by moving one coil inside the other (see Fig. 2). If the primary coil be quickly inserted in or withdrawn from the secondary coil, a momentary current will flow in the latter when its terminals are joined. This current may be shown by connecting a voltmeter to the terminals.

The direction of the induced current follows a definite rule, as follows: When the primary current *diminishes*, the induced current takes the *same* direction as the primary current (see Fig. 1). When the primary current *increases* the induced current is *opposite* in direction.

The primary coil in Fig. 2 has no iron core. The action would be stronger if a core were inserted. The core and coil would then form an electromagnet, having all the magnetic properties of a magetized bar of steel, but in higher degree. A permanent magnet could be substituted for the electromagnet, and its motion into and out of the secondary coil would produce similar effects. In fact, the quick motion of either a permanent magnet or electromagnet anywhere in the neighborhood of the secondary coil will induce a momentary current in the latter, if its circuit be closed.

To explain the similar behavior of permanent magnets, electromagnets and coreless coils (known as solenoids), the theory has been broached that the molecules in every magnet, permanent or temporary, are themselves miniature magnets and that each has an electric current constantly circulating around it, see Fig. 3. In a permanent magnet, which is hardened steel, the molecules are more or less rigidly fixed. In the soft iron core of the electromagnet the molecules are plastic and assume a regular formation only under the influence of an electric current in the surrounding coil. When the current ceases, the molecules assume promiscuous positions like a heap of unmagnetized iron filings. This is only a theory, but it may help the reader to understand the relationship between magnets and electric coils.

Everyone has seen iron filings clinging to the poles of a magnet, and most readers of this article know that these filings group themselves in the direction of the magnetic lines of force

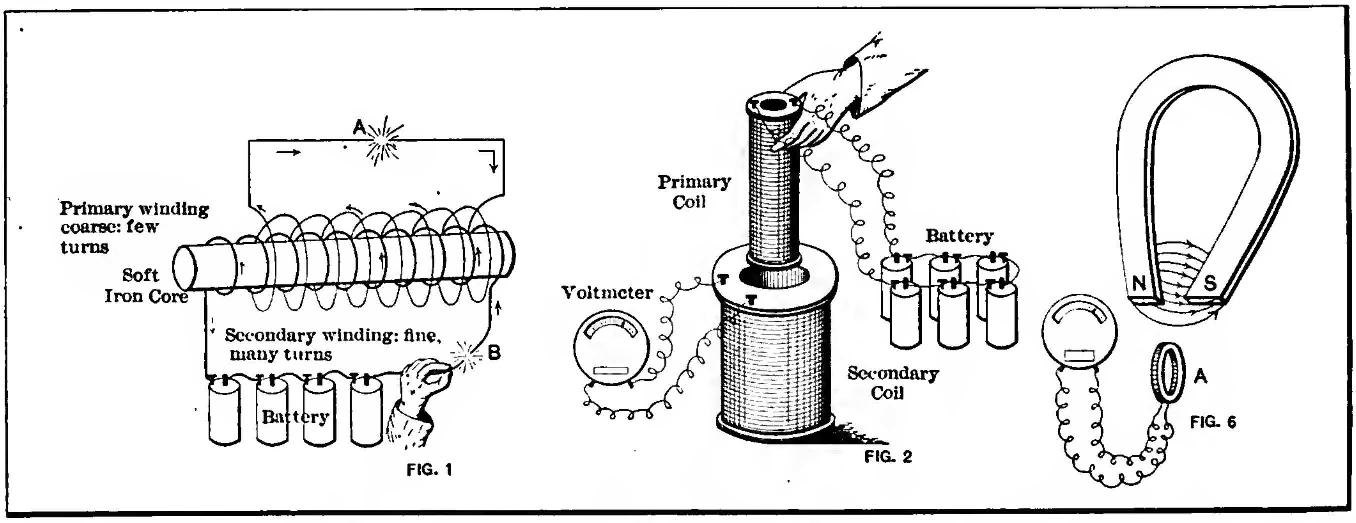


Fig. 1—Principle of ordinary battery induction coil, showing how current is induced in the outside winding by making or breaking a current in the inside or primary winding. Fig. 2—Showing how motion of an electric coil or magnet inside another coil induces a momentary current in the latter. Fig. 6—Lines of force of a horseshoe magnet, also showing how current may be induced in a coil. A, by moving it across the lines of force.

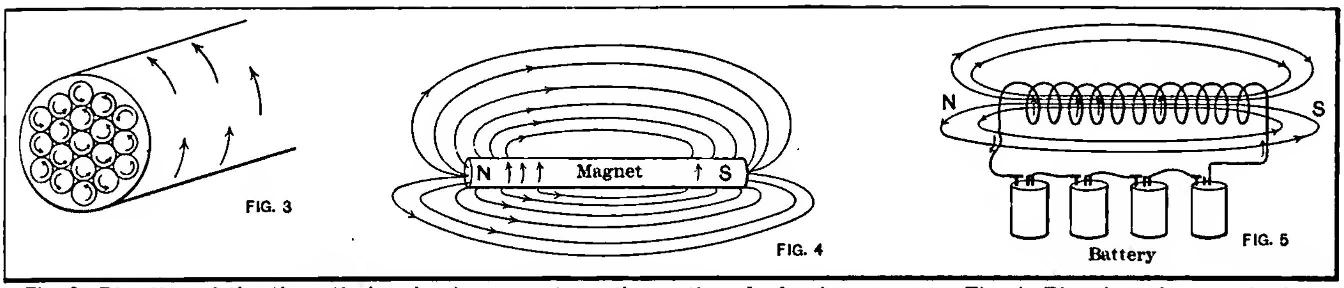


Fig. 3—Direction of the theoretical molecular currents at the north end of a bar magnet. Fig. 4—Direction of magnetic lines of force surrounding a bar magnet. The small arrows on the magnet itself show the direction of the molecular currents. Fig. 5—Showing that the direction of lines of force through and around a charged helix is the same as in Fig. 4.

which run from pole to pole of any magnet. Fig. 4 shows the directions of the lines of force about a straight bar magnet. If one were to take an empty helix, Fig. 5, and dust iron filings on the sheet of paper close to it, one would find that the filings would assume the same positions as in Fig. 4. In a word, the magnetic lines of force go through the magnet or helix, emerge from the north pole, and go into the south pole. They traverse iron much more readily than air. The smaller the air gap, therefore, the stronger will be the "field" produced by a magnet of given size. That is the reason why the poles of a horseshoe magnet, Fig. 6, are brought close together.

We are now in a position to see that what induces current in the secondary coil is in reality *a change in the strength of the magnetic field* as represented by the lines of force passing through the coil. In the experiment of Fig. 2 the lines of force are not as strong as they might be, because they must travel through the air outside the coil or magnet to return from one pole to the other. If we take a horseshoe magnet whose poles are close together, and move a flat coil *A*, Fig. 6, quickly between the poles, we shall get a stronger induction compared to the size of the magnet, because the magnetic field is stronger. This leads us to the action of the magneto with horseshoe magnets, Fig. 7.

In Fig. 7 the pole pieces are marked *N* and *S* for convenience, and a few imaginary molecules are shown dotted on the north pole to help the reader to remember the direction of rotation of the supposed molecular electric currents. This will assist in fixing the direction of the current in the single wire coil, which is supposed to be rotating on its own axis between the poles. The ends *a b* of the coil are supposed to be connected.

The theory of induction in a rotating coil is somewhat speculative. It will, however, be sufficient for our present purpose to state the behavior of the induced current and let the theory alone. This behavior is as follows: When the plane of the coil is vertical the flow of induced current reaches zero and changes direction. When the coil is horizontal the flow is a maximum. At intermediate points the induced potential is proportional to the rate at which the number of lines of force passing through the coil is *changing*. As the lines of force are horizontal it is obvious that for an instant, when the coil is vertical, a slight angular movement produces no change in the number of those passing through the coil. In that position, therefore, no current is induced. When the coil is horizontal the number of lines of force passing through it is momentarily *nil*, and the *rate* of increase or decrease in their number per degree of coil rotation is a maximum at that point. For intermediate angles this rate of change is proportional to the sines of the angles of the coil position; hence the theoretical curve of induced potential is what is known as the *sine curve*, Fig. 8.

As this diagram shows, the current fluctuates regularly above and below the line of zero current, which means that it reverses its direction at the zero point when the coil is vertical This action will be readily apparent if the reader traces carefully the motion of the single coil in Figs. 7 and 9. In Fig. 7 the coil is rotating counter-clockwise, and the lines of force passing through it are diminishing. Therefore the induced current will be in the same direction as the theoretical molecular currents indicated on the pole piece, i.e., from *a*, counter-clockwise following the arrows to *b*. In Fig. 9 the coil has got past the position of maximum current and the included lines of force are increasing. The flow is, therefore, opposite to the molecular currents; but meanwhile the coil itself has been reversed.

(To be continued.)

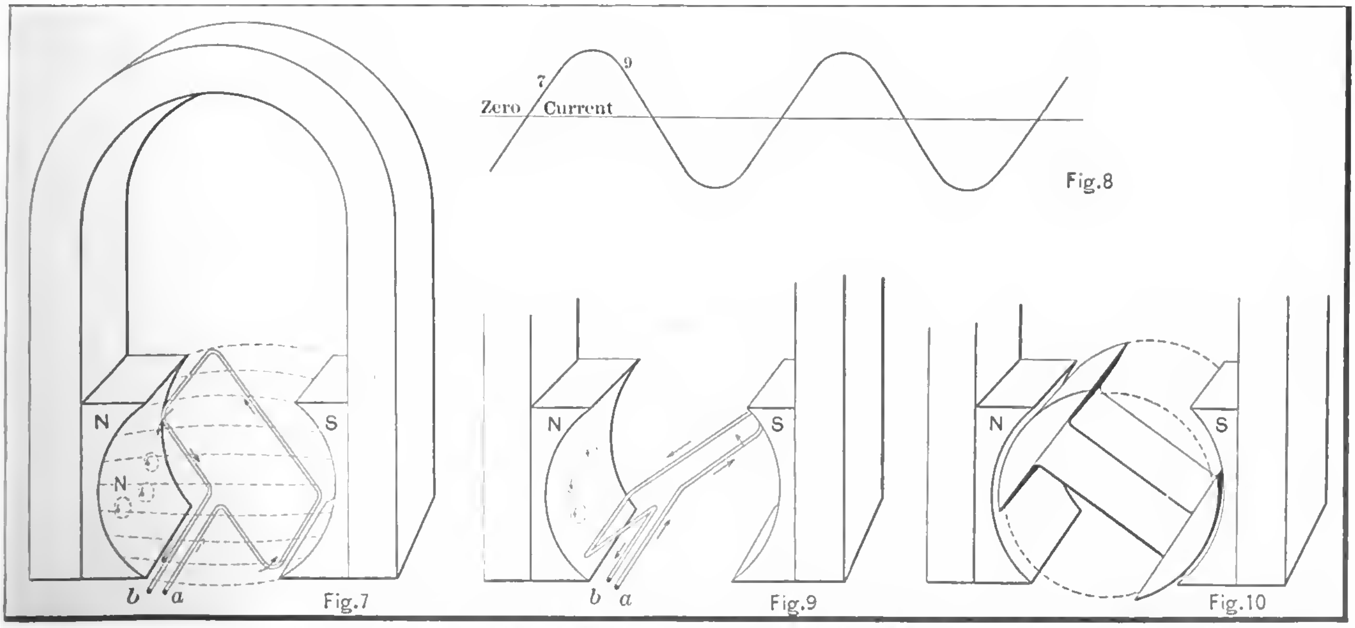


Fig. 7—Current induced in a coil rotating on its axis between two poles. Fig. 8—The theoretical sine curve of magneto current. Fig. 9—Showing direction of current with further rotation of coil. Fig. 10—Core of H armature.

Best Means For Dustproofing the Highway

By MARIUS C. KRARUP

(Continued from last week.)

coal tar, can possibly become popularly accepted in practice, the solution of the dustless road problem offered by the investigating engineers and the construction companies must be declared to be academic, so far as the problem and the public are concerned, though it may be quite practical for the companies and for those communities which take advantage of it quickly. The good roads movement, while giving thanks for one solution, must insist that no solution be accepted as final whose general acceptance will pile economical hindrances in the way of its own practical application, and that therefore all other methods which promise results in the way of dustproofing the thoroughfares, even if these results are at present inferior, shall be followed up and improved until all of them combined furnish a variety of road engineering materials competing with each other and sufficient for the permanent and increasing needs of the public, both in quality and quantity. The situation created through the demand for dustless construction is a new one in the annals of road-building. Heretofore, though local scarcity of stone or sand or gravel and of any other one of the needed materials has been common, there has never been an absolute natural or industrial limit to the necessary supplies, and engineers have had a free hand in specifying one material or another as best adapted to a given purpose, with due regard to current prices and freight. With the dustproofing problem before them, the engineer and road builder must in the long run, as the case seems to stand at present, find himself greatly assisted in his task by the public's inclination to accept processes of low first cost, for the less important roads, in spite of mathematical proof of greater economy in a method requiring a higher initial investment. This inclination must greatly facilitate the experiments required for developing materials and methods capable of meeting the competition with coal tar and bitulithic construction, and eventually placing at the public's disposal an unlimited quantity of the raw materials from which the luxury of road comfort is to be distilled—unless indeed the aeroplane is to solve the problem in another way.

While the present article does not deal with the technic of dustproofing methods, but only with the means for facilitating their adoption, it seems impossible to pass without mention the most obvious chances for making the annual supply of coal tar keep pace with the increasing demand for dustless roads, until other materials of equal merit shall have been developed. It is admitted by the authorities on the subject of tests, that all experiments which have been conducted in this country with coal tar treatment of old macadam roads, have been crude and wasteful, none of the special labor-saving machinery having been used, which immediately was designed and built in France and England as soon as the dust problem became acute. By the use of this machinery the time required for completing the treatment of an old road has been enormously reduced, and the quantity of coal tar has been cut in halves at the same time as the quality of the work has been materially improved. Pneumatic spray nozzles have made it possible to dispense with the heating of the tar and to gain, besides, a greater penetration of the roadbed and a more complete filling of the interstices. But here the old method of heating and spreading by brooms has prevailed, while improved methods and economy with materials have been restricted to new construction conducted by private corporations, nowise interested in teaching economy to aldermen, road supervisors or the public in general. The use of the pneumatic nozzle has also led to experiments elsewhere—in France—intended to secure a greater compactness of the crushed stone bed, so that the tar would have less space to fill and would be lodged more securely, as well as binding the stones more securely, and it seems from recent reports that these new methods give improved results, besides greatly economizing on the coal tar or its substitutes. Apparently, certain possibilities are in sight for economizing on the dustproofing materials still further, as by experimenting with small, pentagon-faced, dodecahedron-shaped brick, which, if small enough, may be packed almost solid, and would require a very small quantity of tar for completely filling all interstices.

Even more farfetched experiments, as with corn husks or other vegetable fiber for arresting and holding dustproofing materials, especially those of lesser natural binding qualities than possessed by good refined coal tar, from being washed away by rain or penetrating to an unnecessary depth, would be in order under the condition of a threatened scarcity of materials which may at almost any time obtain. In England, the mixing of "creosote-oil" with resin or tallow proved of no lasting value, but experiments of a similar nature are conducted in many places, where dustless roads are much desired, while considerations of economy are imperative.

As in the rubber industry it has been found necessary and useful to experiment industriously with admixtures to the pure rubber, so does the dustless road problem portend an era of attempted admixtures with coal tar and other tars, some of which may eventually prove wholly suitable.

It is now believed to have been shown that the conclusions of engineers on the subject of dustproofing methods cannot alone be made the foundation for dustproofing projects and work. They are too uncompromising for the complex situation and by no means final. On the other hand, there is no other foundation for intelligent decisions. They represent, in extract, a full technical knowledge of all which has been done, and to this must be coupled an equal knowledge of local conditions and a goodly amount of sturdy business sense. Suitable steps for rendering all technical knowledge on the subject, so far as it goes, accessible and directly applicable to any given case, have never been taken. Some of it is recorded in libraries and periodicals, for those who have the time and patience to dig it out in each instance, from a hundred scattered and disconnected accounts, but the most recent, most valuable and most detailed portions of this knowledge are lodged in the minds of a considerable number of engineers, road builders and municipal officers, who cannot be brought together or otherwise consulted when a decision has to be reached. The first step in the desired direction must consist, it seems, in devising a form upon which the main and leading items of the provisionally established data may be entered in such juxtaposition that it may be shown at a glance where they are incomplete, and what relations each possible process for dustproofing bears to each possible condition of any road project which may come under consideration, the principal relations being those referring to comparative costs and comparative merits, including first cost, durability and degree of dustproofing. If maintenance cost is understood to mean the cost of a maintenance so thorough as to keep the road constantly as good as new, durability is included therein. The higher the maintenance cost, the less the durability.

Such a form, when complete, must be large and elaborate, considerably larger than any which may be practically shown on one page of this journal. A tabular outline for such a form is illustrated, however, in the framework schedule presented herewith, which may be expanded by addition and subdivision as much as necessary.

By extending the horizontal list it may take as many types of finished, old or new-built, roads, as fairly represent the varieties actually existing or which have a right to exist, some of which are dustproof, by virtue of their original construction: and pavements for cities and suburbs may be included.

By extending the vertical list, every method of dustproofing may be included which is applicable to one variety of finished road or another, only those methods being excluded which have already been shown unfit at any cost or plainly less economical for every variety of road than some other method which produces equal or better results. An emulsion, for example, which may have been shown to disappear from the road surface in a week and costs as much as one which lasts a month, has plainly no claim to entry. Water sprinkling as a means for abating dust would have no claim to entry, except for being so commonly used.

While a "Normal Road Schedule" of this kind would in itself be very useful at present if compiled on the best judgment of the most knowing, even though the work be done hastily, and while it seems advisable that the work should be done first in just such a rough and ready manner, but fairly complete in scope, its full utility could probably not be realized, until it were accompanied with a "Normal Road Book" giving definitions or explanations of the most approved method of construction for each variety of road listed on the "Schedule," with definite statements of the quantities and cost of each kind of materials and each kind of labor involved in the prescribed construction. That the cost would be an arbitrary, local or average cost, would not matter, so long as the quantities involved in each cost item were given, and no bewildering digressions were made to explain discrepancies which the individual road builder should be able to take care of without special directions. The exact methods for dustproofing each type of road should probably not be given in the "Book," but be left open to be decided by the development of the art at any given time, with the latest information incorporated in the "Schedule," subject to correction from time to time.

On the completed "Normal Road Schedule" the cost figures would be those based on costs of materials and labor as given in the "Book," and in any given instance of consulting the schedule, the figures would be modified in accordance with local prices and the specifications of quantities given in the book.

After the first rough work is done, a commission of experts, covering in their knowledge a wide diversity of conditions, may, of course, be necessary, in order to have the specifications of construction in the book as authoritative as possible, and each set of these specifications should be accompanied with a statement of the machinery required for the economical performance of the work. As there can be no object served in catering to uneconomical construction methods, but rather in encouraging the formation of local corporations which will be equipped to do the work in accordance with best practice, the commission should arrive at a definite conclusion on the exact methods considered preferable for each type of road; all leeway and concessions to local conditions being expressed in having both the schedule and the book embrace types of road and materials for their construction, which are not in themselves technically preferable. In other words, the variety of types should represent the variety of local conditions, but the figures of book and schedule should represent the height of technical insight in getting the best engineering results from available materials.

The accompanying sketch of a schedule has been filled with figures representing only the cursory surmises of the writer, based on an insufficient number of facts, but they will serve to illustrate how a complete and authoritative schedule may be used. For example, a municipality has a macadam road faced with hard limestone and desires to make it dustless. By following the vertical from B3, it is seen that several dustproofing methods are available, but that method V is most economical for trial, while method I gives more complete results, protecting against the dust from a long-frozen road as well as against that of the hot summer time, and is in the end also more economical. But, if the road were faced with soft limestone, the schedule would give a somewhat different answer. Showing a higher cost for the oiling method, it would raise the question of the reason for this difference, and inquiry would bring it out. In a comparison among methods II, IV and V, which come close together in cost for one full year, the decisive element might be that II and V require frequent treatments and the ownership of an outfit, while IV may be more readily done under contract and gives results for the whole year. In other cases, the results of comparisons are more surprising, and true and correct figures on the schedule would no doubt make them highly interesting.

The figures given under the tarring process in the accom-

(*Continued on Page* 861.)

OUTLINE FOR "NORMAL SCHEDULE" RELATING TO DUSTLESS ROADS

		A—Dirt				B—Macadam				C—Bitulithic McA.		D—Tarred McA.		E—Brick	
		1 Clay	2 Gravel	3 Soil	4 Br'k'n Stone	1 Trap 8"	2 Trap 4"	3 Hard Lim'st	4 Soft Lim'st	1 Trap	2 Soft Stone	1 Trap	2 Soft Stone	1 Vitrified	2 Ord.
First cost per mile		1,000	1,500	300	3,000	6,000	4,500	5,000	3,000	9,000	7,000	6,600	3,600	13,500	10,000
Maintenance, as new, per year per mile		750	600	100	500	250	400	350	700	100	250	250	400	200	500
Annual cost per mile when paid by 4% loan, maturing in 20 years		793	671	114	650	559	629	606	848	567	611	590	582	900	1,014
Dust rating, 100–0		50	70	80	60	50	50	70	100	10	15	5	10	30	40
Road troubles and traction resistance, 100–0		80	80	100	30	0	10	5	20	0	10	0	10	20	20
Processes for Reducing Wear and Dust, Cost of Dustless Roads — I—Oil	Preparation of road	5,000	1,000	300	100	100	100	100	200					No	No
	Treatment per year—mile	200	250	250	200	200	250	200	300					No	No
	Road maintenance reduced to	100	300	100	300	150	250	150	300					No	No
	Annual cost, 20 years	556	595	361	499	351	499	351	603						
	Same, including first cost	608	673	377	655	663	733	611	759						
II—Emulsion**	Preparation of road	No	No	200	100	100	100	100	100					No	No
	Treatment per year—mile	No	500	500	450	300	300	400	500					200	250
	Road maintenance reduced to	No	400	100	350	150	300	150	400					No	No
	Annual cost, 20 years		884	603	796	450	598	549	894						
	Same, including first cost		962	619	952	762	832	809	1,050						
*III—Water Sprinkling	Treatment per year—mile	350	400	400	450	450	450	450	600					200	250
	Road maintenance increased to	1,000	800	250	750	300	600	450	800					No	No
	Annual cost, 20 years	1,334	1,186	642	1,186	741	1,037	889	1,383					198	247
	Same, with first cost	1,386	1,264	658	1,342	1,053	1,271	1,149	1,539					900	767
IV—Tarring	Preparation of road	No	No	No	500	200	200	200	300					No	No
	Treatment per year—mile	No	No	No	300	600	300	400	500					No	No
	Road Maintenance reduced to	No	No	No	200	250	300	250	400					No	No
	Annual cost, 20 years				520	850	603	653	905						
	Same, including first cost				676	1,162	837	913	1,061						
**V—Calcium Chloride	Preparation of road	No	No	No	No	No	No	No	No					No	No
	Treatment per year—mile	No	330	330	300	250	250	275	330					250	300
	Road maintenance reduced to	No	600	100	500	250	400	350	700					200	500
	Annual cost, 20 years		919	425	790	494	642	618	1,018					445	790
	Same, including first cost		997	441	946	806	876	878	1,174					1,147	1,310

*Dustless only 6 hours per day for 5 months of the year.
**Dustless only 5 to 6 months of year.
Excavation and drainage not included. Maintenance estimated for 500 vehicles per day.
Normal road width, 16 feet. 1 mile-9,387 square yards.

Aeronautic Progress Along Constructive Lines

By MARIUS C. KRARUP

(*Continued from last week*)

weighty parts resting on the main structure, including passengers, forward or backward. An adjustment requiring final decision in the building of the machine consists in placing the tilt-rudder nearly in line with the forces of propulsion and momentum, and there seems to be an unsolved problem in the placing of a tilt-rudder where it will act substantially the same manner whether the propellers are in operation or have been stopped. With a motor suddenly stalled while the machine is going at high speed, a tendency to swinging the machine around the tilt-rudder is observed, when the center of gravity is much lower than the propeller shaft, the latter being in line with the sum of normal air resistance against propulsion, while the momentum of the machine acts through the center of gravity.

This consideration has been used as an argument in favor of the monoplane and rear tilt-control, on the ground that the single plane, with its relatively large horizontal extension, offers a greater resistance against the turning moment referred to than the two planes, of which the lower would be in the path of the upper.

Of greater actual interest is the function of the tilt-rudder for assisting in leaving the ground. Most biplanes built by amateurs show it to be a common impression that the tilt-rudder should be used for this purpose, for the tilt of the main planes, as the machine stands on the ground, is usually insufficient for lifting the machine at the relatively small speed at which it is desirable that it should be driven while in contact with solids and exposed to bumps against inequalities of the ground surface. The start of such a machine leads frequently to an abortive series of hops, while the machine whose planes are set at an angle such as ten degrees with the base line of wheels or skids, leaves the ground without any use of the tilt-rudder, as soon as a moderate speed is attained, saving the machine many shocks calling for a strength, as a ground vehicle, for which there is no further use after the machine gets into the air. On the testing grounds of aviators, machines of insufficient tilt are also seen rearing on their hind wheels when the tilt rudder is applied too early, and this does not only subject the structure to special strains, but immediately retards it by the increased resistance to propulsion at the abnormally high tilt of the planes, and the retardation causes it to fall down upon its front wheels again. The same action causes the short hops and bounds. The best construction calls for a high starting tilt and motor power sufficient to produce speed quickly in spite of the additional resistance caused by such high tilt.

A mechanical element in aeroplane construction which is seldom considered as coming within the scope of the designer, is suggested through the use of the term "aviator's luck." In the trying out of machines many have fallen from considerable heights, but relatively few have been seriously injured, and this has been ascribed to "aviator's luck." Something more is involved. The seat of the operator is usually so arranged that, in whatever position the machine falls through the air, a more or less frail framework is interposed between the aviator and the ground, and the breaking of this framework protects the man against the full violence of the impact. By suitable handholds and some calculation of the strength of the materials which are to break, as well as some consideration of their forms, so that the aviator shall not be likely to break bones against this material itself, the aviator's risk of mortal injury could, according to all physical laws, be still further reduced.

A consistent development of the aeroplane's natural qualities as a parachute, which have always been kept in view by designers, may also be depended upon to minimize the risks of aviation. It should not be possible for the machine to submit to the laws of gravitation without its large surfaces taking an approximately horizontal position, either automatically or by a very facile control movement. The tendency of the heaviest parts to seek the earth with maximum speed, leaving the parts exposed to relatively greater air resistance to trail behind, should be enlisted to forestall any edgewise or endwise precipitation of the machine, as has already been done in a newcomer among French biplanes. The advantage of the dihedral angle of some monoplanes, as an element tending to impart staunchness, has here been borrowed without accompanying it with a tail nullifying the safety gained.

According to testimony given in court proceedings, the method of steering a biplane of the Wright type consists now in first turning the outer wing to a higher tilt, so as to raise its level, and a moment thereafter turning it back to less than its former tilt and increasing the tilt of the inner wing, simultaneously with turning the vertical rudder inwardly, as a ship's rudder is turned. With other biplanes, the aviator considers it necessary in some cases to shut off the power, before he applies the steering apparatus.

The first method takes cognizance of the momentum of the machine. The other is intended to eliminate the surplus speed in which momentum finds expression. If the outer wing were not first given higher tilt, the first effect would be to cant the machine to the wrong side, because the momentum would raise the inner side despite the rudder action before the latter could cause any notable decrease in speed on that side; it being understood that an increase of tilt without increase of propulsion increases the lift and reduces the speed, but also that the momentum, being an accumulated force depending largely on the weight of the machine, is less influenced by a control-change than the lift, which is a constant, so long as the machine is held to a horizontal course. Much depends on the areas of the tiller and the twisted wing tips. It is especially when a sharp turn is wanted, and the speed of the machine is high, that the preliminary increase of tilt on the outside of the curve is desirable. It produces a course as in Fig. 1A, while Fig. 1B shows that a machine 40 feet wide along the front edge, in order to be turned around and take an opposite course within 60 feet of its previous course, must be managed so as to give the outer wing tip five times the speed of the inner wing tip. And to effect this change in relative speeds of different portions of the machine, in a very short time, is a matter which tries the balance of the machine severely at the present stage of aeroplane design.

With regard to the canting of the machine—inwardly as a bicycle—it is not quite so clear on second thought why it should be necessary, as it seems at first impression. The mind untrained in aviation usually freely assumes that such canting plays the same part in offsetting the centrifugal force, as it does in a bicycle. But that which happens so easily at a slippery turn of the road when a bicycle is canted in the usual way, shows at once that canting in the air, which is very much more slippery than any road. while it may serve equilibrium, does not do so for the usual reason, the latter applying only where ground contact and friction afford a fulcrum, against which the resultatnt of gravitation and centrifugality can spend its force.

The centrifugal energy acts horizontally through the center of gravity, and the resistance it must overcome in order to drive the machine out of its intended circular course, at a turn, is the air resistance against sideways motion. In a biplane, the center of gravity *c*, Fig. 2A, is usually slightly lower than the sum of these air resistances *r*, and the centrifugal force itself has therefore a tendency to produce canting. If the machine could easily turn around its axis, this tendency would be sure to take effect. but in such a turning movement it is impossible.

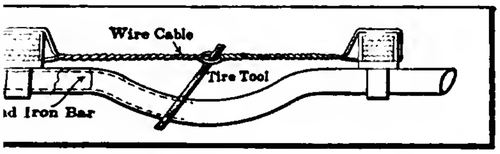
(*To be continued*)

Helpful Hints for Those Who Drive

EURS should seize every possible opportunity to rn about the mechanism of the car they are driving, learning to drive, and one way to do this is to gather ı be gathered from the unfortunate experience. By make roadside repairs expeditiously, and in such a to allow the car to limp home, the new driver soon ence in his own ability and this is reflected in his wheel. So, it is a wise plan to visit all the repair ›le, there to learn how repairs have been and are More than this, it is well to talk about these more experienced drivers.

y an amateur has had trouble with punctured floats rs, particularly with metal floats, for they are the at can be punctured. As a temporary method of unctured copper float, the use of sealing wax may cases where the float bas flooded, through the per- he solder, the first thing to be done is to bore a the float, in order to let out the accumulated liquid, ce should be carefully cleaned round the puncture. ıling wax should then be obtained, and a few drops lted over the hole, and should be pressed well r to fill it up. It will then be found that the float for any number of miles. One advantage of this the wax adds little weight to the float. It is ad- sten whatever is used for pressing in the melted to prevent its sticking.

give a new driver more trouble than a broken ly a broken front axle. If this be of the tubular river be fairly ingenious, a roadside repair may will allow of driving the car home, which is n. Thus, a case in which the tubular axle has to the spring chair, but inside of it may be ows: Obtain a piece of wire cable, or heavy ıay be used, or even in default of either of these rope. In any case, something which can be wo parts of the broken axle together. Attach gs, leaving lots of slack between them. Then roken end a piece of wood, which has been fit, or a round iron bar, or something similar ng driven this into one broken piece, drive the then keep them from separating by tightening r cable. This may be done by inserting any iece of iron, as for instant a tire iron, and

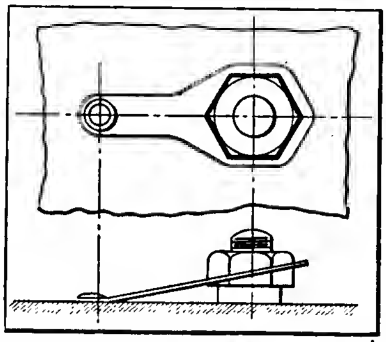


Repairing Broken Tubular Front Axle

hole is as tight as possible. Then, the tight- be so fixed in position as to render it im- ›me loose. It will then be possible to limp en axle, slow speed being a necessity.

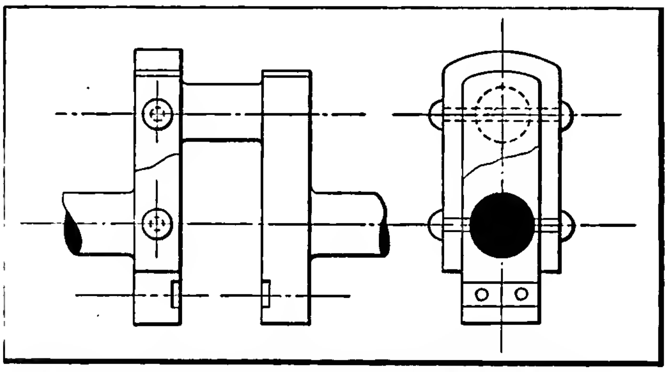
'e not a little attention whether in use or ater they will come into use, and then the manifest itself. One thing every automo- not to fiddle around with tbe wicks of his hould be left as they stand when the lamp ıe average motorist extinguishes his oil vn the wick, in order to save the clips of becoming slack by frequent usage. He d down till the lamp is next required, and vay to revolve the button, with the result that he frequently turns the wick right down into the oil reser- voir and has sooner or later to fish for it in the dark with a bent pin. Moral: If you extinguish a lamp by turning down the wick, turn it up again before you quit hold, so that you may never forget which way to revolve the button. The best way, however, to extinguish the lamp is to open the door and blow out the light, as that leaves the wick right for the next time of lighting.

One little subject which always gives trouble is the matter of nuts working loose, so that nut locks are a necessity. A simple form which every automobilist baving a hammer, cold chisel, some sheet steel, and a little patience can make for himself is that shown in the accompanying cut. A short piece of sheet steel is on a block of hard wood, and a hole punched through one end, this being a round hole to accommodate a screw or rivet. At the other end, the nut for which the lock is to be made is laid on the steel and its exterior shape scribed on the steel, using any sharp point, as the end of a file. This outline serves as a guide for the cold chisel which is brought into use to cut away the metal. The cut shows one which was made forming a full hole around the nut, but if the work is carefully done, this is just as ef- fective when tbe three sides only are done, the outer end being left open. When the end has been formed to fit the nut, one end is put in a vise, and the other end bent, to give the whole something of a spring. To use, the small end with the round hole is fastened down, by means of a rivet or screw, according to the kind of a job wanted, which, in turn will depend upon its location, and the party doing the work. This end being fastened down, the other will stand up at a slight angle. To screw the nut down, this must be held up above the top of the nut, out of the way, but as soon as the nut has been screwed home the lock can be dropped down over it, preventing it from backing off.



Simple Home-Made Nut Lock

Crankshafts will break at times, and the amateur should not start out with the idea that they will not, nor, more to the point, that they cannot be repaired. This particular repair is concerned with a shaft which breaks off in the cheeks or flat part. To re- pair, the nearest blacksmith makes a flat strop making it over one of the good parts of the shaft. Then with this flat strap over the broken parts, a couple of holes are drilled through and pins, bolts, or rivets put through.



Showing How a Crankshaft May Be Temporarily Fixed

Three-Point Suspension Explained

Editor The AUTOMOBILE:

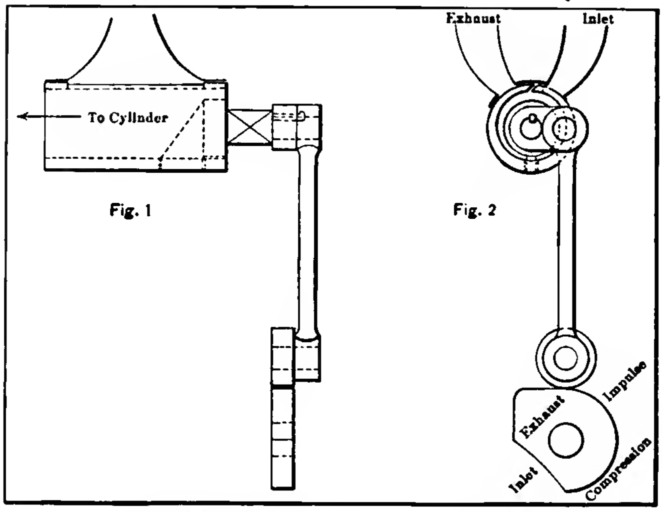
[2,248]—Will you please explain what is meant by a car being better because of a three-point suspension? I overheard the above statement relative to a certain car, and would like to know what it means. A CONSTANT READER.

Providence, R. I.

By three-point suspension is meant the hanging or fastening of some one or more parts of an automobile by three points only, instead of the more usual four, six, or more. In hanging an engine from three points for instance, this may be one in front and two at the rear end, or two in front and one at the rear. In actual practice, however, the former method is followed more often than the latter. The same, of course, applies to transmissions, and other parts as well as to engines.

The advantage of this form of suspension lies in the fact that at times one road wheel rises higher than the other by an appreciable amount, or sometimes both wheels on one side rise quite a little distance above those on the other side. This naturally twists and thus strains the chassis frame. The latter has, however, some slight freedom, but if the engine is rigidly bolted to a subframe by four or six points, when one side rises above the other, or when one side of the frame is twisted, the result is to twist the supporting arms of the engine. This may easily result in a breakage of the same. With the three point suspension, on the other hand, the single point is pivoted and the whole thing may turn on that point. This allows the plane of the two-point-supported-end to twist out of the former plane, but carrying the engine with it as a whole, and consequently doing no damage whatever. There are other supposed advantages of this form of suspension, but this is the principal one. In some form or another, nearly every manufacturer uses the three-point suspension.

That is to say, the three-point suspension for some one or more parts is used by many manufacturers, who do not make much of it in their advertising or other literature, but the fact remains that the suspension is a true three-point one, nevertheless. This would explain the apparently small number using it.



Drawing to Show Action of Irwin Type of Valve

Can't Find the Misfire

Editor The AUTOMOBILE:

[2,249]—I am repairing a Buick, Model F (1909) double cylinder opposed engine, and am having trouble with the rear cylinder missing fire. When it misses fire, the vibrator does not vibrate. I have changed spark plugs, but that does no good, the miss is about the same on high and low speeds. I have tried all kinds of adjustment of the vibrator, but nothing seems to do any good. Please give the cause of the misfiring and how to cure it through "Letters Interesting, Answered and Discussed." H. L. RICE.

Chilhowee, Mo.

There may be many causes for a misfire, among which may be the weakness of or stiffness of the vibrator spring on your coil. This is not usually counted in as one of the causes, but since you speak of the vibrators, we mention it. If the spring is too weak, the current will hold the vibrator down at all times, so that no spark will jump in that cylinder, while if the spring is too strong, the current will not be able to draw it down, with the result again, that no spark will occur. It would be well to try new and different vibrators, before experimenting with any thing else. The causes of missing are so many, and the things mentioned are so few, that it is hard to even estimate what the source of trouble may be. Broken wires, defective coil, loose wires at a binding post, worn out cells, water in the gasoline, spark out of time, water in the coil, and many other things may be the cause of the trouble.

Wants a Self-Starting Device

Editor The AUTOMOBILE:

[2,250]—Do you know of any one making an efficient self-starter for automobiles? I have a 50-horsepower 4-cylinder roadster of 5 3-8-inch bore and 5 1-2-inch stroke. Have just undergone an operation, as a result of which the doctor has forbidden me to crank a car for at least a year. If you can give me the address of any of the above parties, I will consider it a great favor. Expense of installation is no object if I can get what I want.

Stafford, Conn. CLAUDE PINNEY.

Self-starters have not progressed very far, and the best that can be done is to give the address of makers of devices for this work. Any one desiring a starting device can then write to these makers and obtain their estimate of the value of the various devices, as well as an estimate of the expense of attaching. Among those who make and sell a starting device, the following may be mentioned:

Auto Improvement Company, 302 Hudson street, New York City; Automatic Starter Company, 1512 Michigan avenue, Chicago; Gardner Engine Starter Company, Michigan avenue, Chicago; W. H. Herbert, 3312 Wabash avenue, Chicago; Monarch Motor Mfg. Co., 3145 N. Halstead street, Chicago; Starter Mfg. Co., Houseman Bldg., Grand Rapids, Mich.

Another New Type of Valve

Editor The AUTOMOBILE:

[2,251]—To the many interested in the development of the slide valve, and other substitutes for the poppet type of valve, the one shown in the accompanying figure may be of interest. In this, Fig. 1 shows a side view of the valve and its driving mechanism, while Fig. 2 is an end view. Both views show the relative ports in the valve chamber. No method of connecting a returning spring or dash pot is shown, but something of this sort is a necessity. The bore of the valve opens into header or passageway leading to the cylinders. The exhaust is delivered directly into the exhaust pipe, and the charge is taken directly from the inlet passage so no auxiliary valves are required.

Bradford, Pa. G. W. IRWIN.

The design appears to have much merit, and to be worthy of some further study. Thus, if the cam arrangement were used, a guide of some sort would have to be used, else the cam would throw the arm to one side at the first rising of the exhaust part, the device then being inoperable. Granting a guide, and a spring or dash pot for the return, the device might not be so simple as it seems in the sketch. The idea, however, of a narrow though very long opening into a large diameter circular passage communicating with the combustion chamber, is a very good one.

More About Bissell Helicopter

Editor THE AUTOMOBILE:

[2,252]—In your issue of March 3, I notice a letter from J. U. Baker which is in criticism of my "flyer." Why, if the propeller cannot work well as shown, can't the rim be made of some light material, such as wood or aluminum? A wood pulley 18 inches in diameter will not burst at over 4,000 r. p. m., and then, if the engine is geared (like some of the French engines are made) to run at say 1,200 revolutions for 400 of the helicopter, it seems to me the desired result can be obtained. To overcome the torque he speaks of, it is only necessary to turn the steering handle to th right or left according to prevailing conditions. The whole business with man and 10 gallons of gasoline would not weigh over 450 pounds, and they guarantee a six-foot, two-blade propeller at the above rate of speed to pull 200 pounds, so I should think at a rough guess the above figures are approximately correct. JOS. E. BISSELL.

Pittsburgh.

Unfortunately, it is impossible to have light weight and flywheel capacity at one and the same time, so if the device depends upon the flywheel ability of the rotating weight, as incorporated in the rim of the so-called gyroscope, it will be impossible to have light weight, that is, for the purpose, the materials mentioned cannot be used. As far as the figures given are concerned, it is impossible to verify any such figure as given, namely 4,000 r. p. m. for an 18-inch diameter wheel. This would give a surface speed of 18,840 feet per minute, which is far beyond the ability of glued wood (as all wood pulleys are made up) to withstand. Kent gives the following formula for the strain per square inch of sectional area in flywheels of wood:

$$S_1 = .00000225\ V^2$$

in which S_1 is the strain per square inch of sectional area for wood and V is the surface velocity in feet per minute. This, as just found, is approximately 19,000 feet per minute, so substituting its value, we get 812.25 pounds per square inch. Wood will not stand such a strain.

Torque cannot be overcome by turning the steering wheel to the right or left, as per Mr. Bissell's naive suggestion, for torque is a positive and definite force, and the simple movement of a wheel would neither add to nor subtract from its amount, action, or direction of action.

Counterboring of Engine Cylinders

Editor THE AUTOMOBILE:

[2,253]—Will you please tell me in your columns of "Letters Interesting, Answered and Discussed" about the following matter: Which is it, if any, of the automobile manufacturers that have a counterbore in the ends of their cylinders, and why is it that all of the high grade makes do not have it, as it is in all high grade steam engines, for there must certainly be some wear on the cylinder walls, where the piston and piston rings travel? I have spent part of my life amounting to about 20 years operating steam engines and similar machines, and in every case where the cylinders had no counterbore, the same would give trouble after they were used some length of time. W. S. REED.

Smyrna, Kent County, Del.

The writer of the above letter must be misinformed, for the great majority of gasoline engine and automobile manufacturers have the cylinders so cast that there is a natural counterbore formed at the upper end; either that, or the counterbore is machined in the casting. If this were not so, it would be impossible to machine the inside of the cylinders, as they are machined with a boring mill and an inserted blade cutter, or something on that order. In case no counterbore were left in the casting, the boring would not stop at the right point, and the piston in its travel would be likely to strike the unfinished part, causing trouble.

Moreover, were there no counterbore, the grinding process by means of which the cylinders are finished would bring out more trouble, for the grinding wheel, which is somewhat brittle in that direction, would break when the side of it struck the top of the bored part. Even of greater value than this is the matter of proper combustion chamber volume. If the cylinder diameter were not enlarged at the top, the length necessary to give the proper compression space would be excessive, resulting in very high cylinders.

Answered and Discussed

Four-Speed Gear with Two Direct Drives

Editor The AUTOMOBILE:

[2,254]—In several of the show issues of "The Automobile" there appeared an advertisement of a car, the "Keystone Six-Sixty," made by the Munch Motor Car Company, Yonkers, N. Y. Therein was mentioned that the transmission affords four speeds forward, with direct on the third and fourth, a feature which no other American shaft-drive car has. Could you give a full description of this particular transmission mechanism? Could you also publish a description of the Mea high-tension magneto?

New York City. A SUBSCRIBER.

At this writing, no details of the particular transmission gear mentioned are at hand, although the idea of two direct drives is not new, having been shown on a Hotchkiss car over three years ago. Other makers have also experimented with it, but apparently none of them found it of sufficient worth, or at least, in sufficient demand to be worth adding to the car as a regular feature. The main idea of a direct drive is that of reducing noise, and to some extent, friction, on the speed likely to be most used. Some makers consider this the high speed, and make that direct, while many more consider the second of four speeds as the one most used, and make that the direct, high in that case being a geared-up speed for exceptionally fast work. There are in this country 22 makers now fitting cars with four-speed gear boxes, and the fact that but one of them all uses the double direct drive speaks volumes for it.

The Mea magneto has been described in the columns of THE AUTOMOBILE on two occasions, being mentioned in the Boston Show issue, dated March 10, also this magneto was described in another later issue.

Peculiar Action of Confined Gasoline

Editor The AUTOMOBILE:

[2,255]—Possibly the following would be good reading for those who read articles under "Letters Interesting and Instructive."

In talking to a friend of mine who has the greater part of his life worked with oils, acids, etc., I mentioned the fact that I had filled a bottle with gasoline and corked it up tight and placed it in a cool pantry, when I went for it an hour afterward the bottle wss in a thousand pieces. This friend claims that it proves that the gasoline was doctored up with acid, otherwise it never would have acted this way. He claims that the gasoline dealers adulterate with acid in order to give it a higher test. He further claims the acid is very bad indeed for the engine. As a solution to test the gasoline for this acid he says that a few drops placed upon a varnished board and left for half an hour will show no bad effects upon the surface if the gasoline is free from acid, in fact, it brings out the color: on the other hand, if acid is present the surface will change color. Have any of your readers ever brought up this matter before and do you consider it a test worthy of investigation?

A cylinder jacket showing a crack four inches long through which only a drop of water seeps through every now and then, how can it be repaired? The crack is as fine as a hair and hardly think I could get "smooth on" or any other substance to penetrate the crack. The manufacturere advises me to get new cylinders, as brazing or pasting up the crack is money thrown away. What is your opinion? In case I fill the crack would you advise boring a hole at each end of the crack and putting in a bolt or screw to prevent it cracking any further. F. H. THOMPSON.

New York City.

The crack may be fixed, at least temporarily, by inserting in the water cooling system a solution, or powder, which will form a jelly or thick substance and fill up such small cracks as the one mentioned. One of these substances is called Sementol which is made by the Northwestern Chemical Company, Marietta, O.

In the Building of a Private Garage

EXPERIENCE must be taken advantage of in an undertaking such as this, and account must be taken of limited knowledge especially in view of the influence which public garages must necessarily have upon this phase of automobile undertaking. It is something of a question as to whether or not it pays to build and operate a private garage, if a public establishment of this character is located within a reasonable distance, provided it is run in accordance with the dictates of standard practice. It may cost from $25 to $35 per month to stable a first-class touring car in a public garage, and $300 to $400 per year seems to be a considerable sum to devote to this service.

In a public establishment, the monthly stipend pays for not only the housing of the automobile, but washing and polishing as well. In a private establishment, a car may fall into a low state of upkeep, if it is not promptly washed when it comes in off the road, or if it is improperly cleaned. In a private establishment, under the circumstances, while the monthly expenditure may be less than the figures given for the cost of stabling in a public garage, the fact remains that the cost of repainting

Fig. 1—Showing a limousine passing through the door with the front wheels on the runway and an incline such as will cause the back of the limousine to strike the top of the door framing

at the end of the year may wipe out the apparent saving, and the cost of replacing a disrupted cylinder might make heavy inroads besides.

When a car is placed in a private establishment, the facilities required for its proper maintenance must be provided, and unless the owner is fond of washing and cleaning the car, and is in a position to maintain the temperature of the garage above the freezing point throughout the winter season, he will have to cope with freezing troubles, which is a matter of removing the jacket water, or having to do with anti-freezing solutions, which latter products are not in the category of "all sunshine."

Simple Problem When Details Are Cared For

All the requirements in the maintenance of a car are simple, nor is there any mystery attached to the details involved, but the things to be done take on some of the characteristics which obtain in the maintenance of a horse; when feeding time comes, there is only one thing to do, that is, feed the horse. When an automobile comes in off the road, if it is besmeared with mud, it spells ruin to the finish on the body and the running gear, to defer the cleaning operation until morning. If it happens to be 10 o'clock on a raw night, after a 200-mile drive, it is highly improbable that the owner, if he acts as his own pilot, will accept the additional burden, which means that the automobile will be ruined if it is not cleaned.

If the owner is disinclined to give the automobile the attention it requires in service, one of two courses lies open to him. He may incur the extra cost of refinishing the car every few months, or he may engage and maintain a chauffeur. In the latter case, the cost of the private garage must include the salary and expenses of the chauffeur. If an owner elects to drive his own car, and desires to reduce the cost of maintenance to the lowest possible figure, the probabilities are that public garage service, if it is up to the standard, which is generally claimed for it, will compare favorably with the cost of a private establishment in the absence of a chauffeur, assuming, of course, that the owner will elect to retire for the night after he comes in off the road, rather than to stay up and clean the automobile.

All such problems will bow to common sense treatment, and a little investigation, and in all probability solution must be varied to suit the individual requirements, and the practical capabilities of the owner. In the planning of the structure, whether it is to hold a plurality of automobiles, or only one, the mere fact that the automobile to be stored therein is without a top, is not good reason for making the height of the door below that which will accommodate a limousine, and care should be exercised to have the door register with the greatest height likely to exist for any limousine type of automobile built. It is discommoding to discover that while the door is high enough to accommodate the owner's car, it will not let his friend's limousine in for temporary storage during a visit. In any case, the time must come when a car will cease to be valuable, and the new purchase may include an automobile with a top, when, if the door is not high enough, it is a little disconcerting and at some cost to prop up the structure, cut out for a new door, and have the new doors fitted to the enlarged opening.

Fig. 1 shows a condition which is brought about if the runway leading up to the door is a little steep, and if the height of the door gives bare clearance, measuring the body on the chassis in the vertical plane. When the front end of the car is tilted down, provided the wheel base is a little long, the back of the deck of the limousine will scrape against the door framing, with no good result to the car. This condition represents a practical

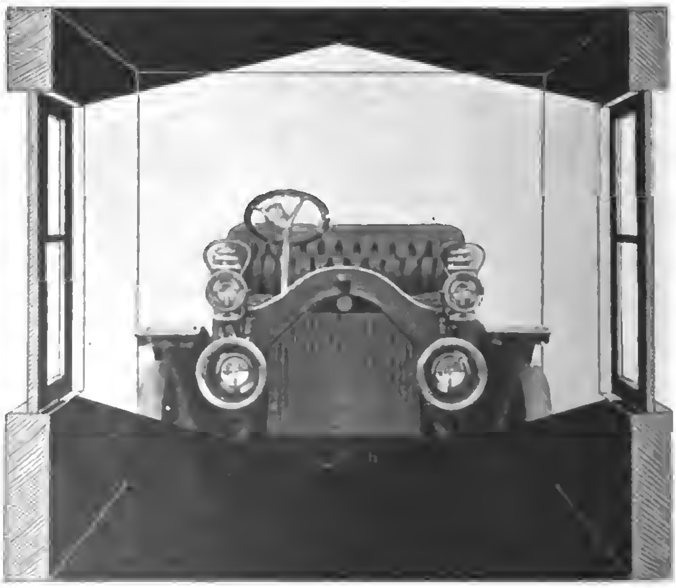


Fig. 2—Presents a narrow structure, with the windows the customary height, showing inefficient illumination with the machinery part in the darkness

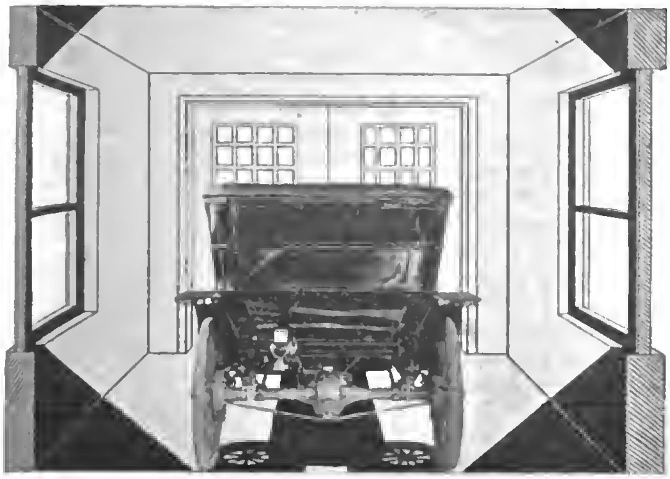


Fig. 3—The width of the building in proportion to the width of the car is such that the light strikes the floor outside of the line of the wheels with a good lighting effect

difficulty which was induced by the increasing length of wheel base in later day models of automobiles, whereas garages were built to accommodate earlier types of cars having a short wheelbase. This way of attacking the problem rather points to the futility of making the dimensions of the garage in bare conformity with the dimensions of the car. Liberal provision for a given type of automobile, while it represents very little by way of extra cost, takes care of the future, which, in view of the history of automobile designing, is the only safe thing to do.

Lighting Problems Influence Garage Dimensions

In congested districts, where space is at a premium, the owner who may have enough room for a one-car garage, is prone to limit the space to the barest necessity, and at first blush will reach the conclusion that a clearance on each side of the car, if it represents a comfortable passageway, is all that the occasion requires. As a dead-storage proposition, this is an excellent way of looking at it, but Fig. 2 is offered to show how the light from the windows, as they are usually placed, will fail to reach the vitals of the car, and will keep a large portion of the floor in utter darkness by contrast, so that if it is desired to examine the automobile, it will have to be run outside of the garage in order that the owner will be able to utilize daylight in the examination of the machinery, which, during inclement weather, is an undesirable act. In this kind of trouble, interior lighting whatever its character, aids very little, because of the shadows thrown.

By adding to the width of the building, provided the windows are to be the customary height from the floor, daylight may be utilized to better advantage, since it will strike the floor at a point outside of the line of the wheelbase of the car, as shown in Fig. 3, and, incidentally, more room will be found of advantage in many ways which do not appear upon the surface, even when a garage is being planned in the light of limited space, and perhaps with a view to limiting the expenditures as well. These lighting problems may be disposed of by taking advantage of artificial illumination, which adds to the cost of maintenance, and something of dangers, which will have to be recognized and treated according to their merits.

Artificial Illumination is a Necessary Evil

In case room is much restricted, the ill effect of a narrow space on each side of the automobile may be overcome by having the windows extend down to a point near the floor, as shown in Fig. 4. Another way to dispose of this angle of the situation would be to insert dead lights (the method of porthole lighting as used on ships) in the concrete work, having a row of these inserted lights built into the concrete all around within, say, 12 inches of the floor line. There is still another idea which is practiced to some extent in Germany, in which some of the blocks of concrete are displaced by blocks of transparent (glass) material.

While it is of the utmost importance to furnish windows and other means by which daylight may be taken advantage of to the maximum extent, primarily due to the fact that daylight is furnished free, also on account of the non-inflammable character of this sourse of light. Gasoline, as it is used for its fuel value in automobiles, is not at all dangerous when it is handled in accordance with its well-appreciated characteristics. The fact remains, however, that a very little liquid gasoline, if it is turned loose in a small enclosed room, becomes a source of danger in the presence of substantially every form of equipment used in the process of artificially illuminating. Substantially 2 per cent. of the weight of the air in a room represented by gasoline provides an explosive mixture, which is not only readily ignited, but sets free its energy with maximum force. In a small enclosure, it does not take a large amount of gasoline in liquid state to approach a condition of danger, and this will be particularly true if there are no outlets at the floor line, through which the vapor, as it forms, may spill out and float away on a current of air.

A Pit in the Floor Increases the Hazard

In former times when the working parts of automobiles were concealed under the deck of the body, and inaccessible, excepting by approaching from below, repair pits were much in vogue,

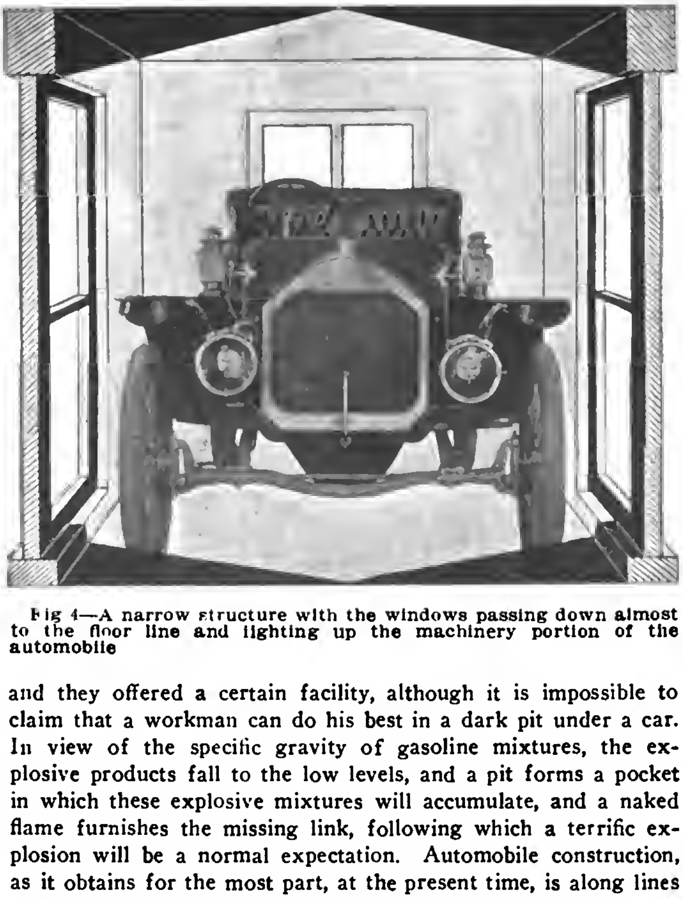


Fig 4—A narrow structure with the windows passing down almost to the floor line and lighting up the machinery portion of the automobile

and they offered a certain facility, although it is impossible to claim that a workman can do his best in a dark pit under a car. In view of the specific gravity of gasoline mixtures, the explosive products fall to the low levels, and a pit forms a pocket in which these explosive mixtures will accumulate, and a naked flame furnishes the missing link, following which a terrific explosion will be a normal expectation. Automobile construction, as it obtains for the most part, at the present time, is along lines which permit of getting at the working parts from above, and a pit becomes unnecessary if the automobile is properly made.

If a pit must be used, some means must be provided by which the accumulation of gasoline-tainted air will flow out from the bottom of the pit as fast as it may be formed, and it is highly improbable that a means may be readily at hand for the accomplishment of this necessary purpose, with sufficient certainty to make it desirable to plant a small garage in the vicinity of a dwelling house.

(To be continued.)

Long Island Automobile Club

TO those who have given the matter any degree of thought, the real purpose of an automobile club, its mission to motordom generally and the public at large, is beautifully exemplified in the work of the Long Island Automobile Club.

This organization is not a sporting club in the contracted meaning of the term; neither is it a map-maker and seller, and yet its influence in sport is far-reaching, and it has done a great work in making the highways of Long Island intelligible to automobile tourists, by its industry in placing signs.

Its real significance to motordom lies in its legislative activity, its social power and its service and convenience to those who avail themselves of its privileges. The club is almost ten years old, having been formed Nov. 27, 1900. It made a good start and soon swelled its roster to several hundred members. About a year ago it moved into its new quarters, situated at the gateway to Long Island, the plaza of Prospect Park, Brooklyn. It had about 400 members at that time, but now its rolls show that there are over 700, and before the last of this year a full 1,000 is predicted.

Historically, the club was the second organization in America formed in the interests of automobiling, and was the third to own its own clubhouse and garage. It has held and been identified with endurance runs, economy contests, race meets, tours and everything tending toward the uplift and development of motoring as a sport and pastime.

The club has three trophies for which the members contest annually, besides numerous prizes for the winners of races, runs and tours of various sorts. The three permanent cups are awarded as follows:

One handsome cup for the greatest mileage by a member during the year. In this contest the odometers are read May 1, and the owner of the car must be at the wheel in order to have the mileage count.

The second cup is presented to the owner of the car that tours through the largest number of States during the year.

The third cup is one presented by William Schimpf, but the conditions of its award have not yet been published.

In addition to these "annual" cups, the club each season puts on several runs based upon interesting conditions. The first of these for the present season will be the inter-club contest arranged between the Long Island Automobile Club and the Crescent Athletic Club, May 21 and 22. About a score have entered on each side, and the cars will be driven by active members of each organization. The system of penalization is mild. The total penalization of the contesting clubs will determine the winner.

The course of the run will be to Riverhead, via Easthampton and East Quogue, with check at the Long Island House. The return trip will be by way of Northport, and the total distance something under 250 miles. The trophy becomes the property of the club winning it twice.

While there is a strong probability that there will be some sort of a three-day run to end May 30, and another for July 4, the next event that is actually scheduled is the annual Orphans' Day outing, which will be given under club auspices June 7. This event is one of the most beautiful charities of its kind, and the interest in it is intense, not only from the viewpoint of the children, who look forward to the ride and the fun at Coney as the event of the year, but also by the members of the club who join to give the little ones a taste of real enjoyment. This year arrangements are being made to entertain 1,200 children and over 100 members.

At the Vanderbilt Cup race and other national events, the club provides its own pavilion for members, and assists them in every way to enjoy comfortably the big races.

The entertainment committee is one of the busiest organizations of the club. Twice a month there is "something doing" at the luxurious clubhouse. Two or three times a year the club indulges in "stag" affairs, but all its other social functions are open to the ladies. About once a month there is an able lecture delivered by some speaker of commanding knowledge of his subject. These affairs have proved very popular during the past year and have drawn large audiences. Aviation, ignition, mechanics, steel, rubber, law and motive power are some of the things that club members have heard discussed recently. Vaudeville is by no means unknown, and the lighter side of clublife is not neglected.

As a force exerted in the direction of reasonable law-making, the club shines. Every measure touching the interests of the automobile is scanned closely by the legal lights of the club, and the action taken to prevent imposition upon motorists is one of the refreshing things about its activities. Practically single-handed, the club has fought adverse legislation and unjust prosecution, and in a gratifying percentage of its undertakings it has been successful.

With regard to the pending Callan bill, the club has taken a strong position against certain clauses, and a series of compromises by which the original tenor of the bill has been modified to some extent, is claimed as an achievement for this organization.

The new clubhouse, a comfortable structure of modern architecture, is located at 920 Union street, within a stone's throw of the lordly entrance to Prospect Park. It is four stories above ground, with a basement, fully equipped for washing cars. The lot is 50 by 100 feet, thus giving the club 25,000 square feet of floor space. The club rooms are on the second floor and are

(*Continued on page* 861.)

Coming Events in the Automobiling World

June 20-July 6....Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.
Jan. 7-14, 1911....New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Apr. 30-May 2....Philadelphia Roadability Run to Atlantic City, Quaker City Motor Club.
May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.
May 9-11.........Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.
May 14...........Kansas City, Mo., Hill Climb, Automobile Club of Kansas City.
May 18-19........Norristown, Pa., Third Annual Endurance Run, Norristown to Scranton and Return.
May 19-21........Hartford, Conn., All-Connecticut Reliability Contest.
May 21-22........Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.
May 21-22........Track race meet, Memphis, Tenn., Homer C. George, Manager.
May 27, 28-30.....Indianapolis, Ind., Automobile races, including championships events on motor speedway.
May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill; Automobile Club of Bridgeport.
June 2...........New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.
June 4...........Worcester, Mass., Fourth Annual Hill Climb, Dead Horse Hill.
June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.
June 15..........Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, through the Southwest.
June 16-22........Albany Automobile Club, Albany, N. Y., Sixth Annual Tour. To Atlantic City and Return.
July 4...........Indianapolis, Ind., Cobe Trophy Race. Held on Speedway Track, Chicago Automobile Club.
July 4...........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.
July 30..........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.
Sept. 5..........Wildwood, Pa., Speedway, Labor Day Race Meet of N. Wildwood A. C.
Sept.............Chicago Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1...........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 8...........Philadelphia, Fairmount Park race. Quaker City Motor Club.
Oct. 15..........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 25...........“The American Cup,” Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.
May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.
May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.
June 2-8.........Prince Henry (German) Touring Competition.
June 13-18........Scotland, Scottish Reliability Trials.
June 20..........French Voiturette Race.
June 21..........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27..........Speed Trials at Kiev, Russia.

THE AUTOMOBILE

Vol. XXII Thursday, May 5, 1910 No. 18

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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Entered at New York, N. Y., as second-class matter,
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

THE farmers control the destiny of the automobile in proportion as they influence legislation, and that it rests in good hands is shown by the 2,000,000 miles of good roads that now offer an invitation to autoists to try out the newer mode of transportation. The automobiles for which farmers are willing to make expenditures for good roads are the very kind of automobiles which will be of the greatest benefit to the farmers. Short-sighted individuals may reach the conclusion that farmers will confine their interest to farm-wagons; they fail to give the farmers credit for having acumen enough to know that the banker must be taken to the bank; the banker's wife to the department store; the miller to the mill, and the money spender to the place wherein he will be accommodated in proportion to his ability to pay.

✦ ✦ ✦

JUST now there is a decided tendency to invest money in the manufacture of commercial vehicles, and that this year will see the commercial output go up on a basis of at least five to one, is predicted. It has taken all these years to bring about a realization of the fact that it is in the commercial vehicle that the future of the industry lies; a future in relation to which all attempts at prediction fall short, due to the vastness of the industry as it is reflected by the preparation which is now being made. Mistakes, as they were made in the past, and as they retarded the growth of the commercial phase of the industry, will scarcely have any influence on the future; if a storekeeper is now reluctant to put his deliveries on a basis which is possible with commercial automobiles, he will have to go down in the wreck of his business.

✦ ✦ ✦

FROM now on, for the whole of the warm season, contests will attract the notice of the makers and the users of automobiles to a greater extent than ever before, and it is well for the industry that all contests for the year will be conducted in accord with the rules of the "Contest Board." Chairman S. M. Butler has the matter well in hand; the rules are better than they ever were before and the chances of having a car of no merit receive credit for what it is not capable of doing at all are sufficiently remote to be disregarded. The Contest Board is the creation of the honest makers of automobiles who desire to maintain a condition of glowing health in the industry and they prefer to put the whole matter in the hands of a board of control, under the guidance of a chairman who understands his business and is known for his competence to act for the best interests of the industry, rather than to go in for the old time squabble and unfair rulings.

✦ ✦ ✦

AFTER awhile, when the makers of automobiles have a chance to breath, it is believed that the question of standardization will be given far more thought than it has heretofore received. Perhaps the Society of Automobile Engineers will take the matter in hand. President H. E. Coffin is the right man in the right place and it is assured that he fully realizes the necessity of clearing up many of the questions of standardizing which now hamper makers of automobiles, especially as they relate to the procuring of material. As it is at the present time, certain of the materials used in the construction of automobiles are difficult to procure, merely because the sizes specified by the engineers who are responsible for designing are so numerous that the mills are compelled to fill orders after they are received rather than to stock up. Certain sizes, referring to the respective materials, are carried in stock, and it is believed that designers might find it convenient to specify just these sizes when making out lists of materials required, in which event the mills would be enabled to make quick deliveries, and, what is more to the point, work on stock orders during the slack season with a chance of lowering the cost.

✦ ✦ ✦

YEAR after year the automobile situation has had its serious phase as represented by pneumatic tires, and for a long time it was considered necessary to try to find some substitute for Sea Island cotton and Para rubber, on the ground that these materials would never prove satisfactory for the character of the work imposed upon them. Time has shown that our worries were attached to the wrong chariot; the real question is, how may the price be held down to a reasonable level in the face of a scarcity of both cotton of the desired grade and rubber of suitable qualities? This great question is about to receive the distinguished consideration of the Association of Licensed Automobile Manufacturers, and it no doubt has worried the tire makers more than a little.

S. A. E. Activity Along Broad Lines

RING has been given an impetus by the coming
utomobile, which, from the point of view of history,
equalled when the electrical art became the foun-
eat industry. The other day it was said that the
moved up so that it stands as the fifth industry of
night have been stated at the same time that en-
along transportation lines, which were con-
e automobile, became responsible for what is
the fourth industry of the world. In the com-
e prosaic and hard-working engineer finds him-
or another classified in a manner as follows:

ERECTED BY AUTOMOBILE ENGINEERS

comment—A dangerous person has had the
ty to attach a gasoline motor to a carriage and
ot to do away with horses.)
rd car on Gordon-Bennett Course made the enor-
listance of 351 miles in nine hours and nine min-
which is an average speed of 38.1 miles per hour.
comment—Terrific speed most extraordinary pro-
; police regulations wholly inadequate.)
an driver Heath in Panhard on Vanderbilt
raveled 284.4 miles in 5 hours, 26 minutes, and
nds, which is an average speed of 52.2 miles per
(Press comment—The automobile, while it has
iance to reach a basis of utility in a commercial
ers wide opportunity to sports.)
in an Itala wins Florio Cup, making 313 miles
urs, 46 minutes, and 47 seconds, which is an
speed of 65.5 miles per hour. (Press comment—
have the speed disorder, too.)
a Renault for the Grand Prix in a contest
ut over two days, made 774 miles in 12 hours,
es, and 5 seconds, with an average speed of
s per hour. (Press comment—It looks as if
mobile is improving somewhat; engineers are
to appreciate the necessity of the use of
naterials.)
n a Fiat wins in Grand Prix, making 478.3
hours, 45 minutes, and 33 seconds, which is
e speed of 70.6 miles per hour. (Press com-
rvelous performance of Nazarro * * *)
lager in a Mercedes wins in the Grand Prix,
8.3 miles in 6 hours, 55 minutes, and 44 sec-
h is an average speed of 69.5 miles per hour.
nment—Automobile is going backward; per-
of Lautenschlager below that of Nazarro who
inner last year.)
Fiat makes flying mile in 37.71 seconds.
ment—Going so fast the question is, Would
to close his mouth if he opened it; must be
d pressure; automobile engineers are now at
e of their success.)
Benz makes flying mile in 27.33 seconds.
ment—A very creditable performance.)
automobile industry, according to Alfred
eral Manager of the A. L. A. M., $485,000,000.
is devoted to the manufacture of automo-
roit and vicinity only—$85,000,000.
phase of the automobile industry forging
ate to indicate that the value of commer-
year will exceed $100,000,000.
itomobile Engineers, which numbers among
ip a large proportion of the formost auto-
eers in America, has grown from its nom-
of some four years ago, to the point where
d as the representative body of engineers
e manufacture of automobiles.

rrived for Prompt Action

iety was first formed, and A. L. Riker
idency, the whole situation was under
anical Branch of the A. L. A. M., and
to induce the engineers of the respective
there was room for an abstract society,
of the Mechanical Branch. The first
cumstances, represented very little by
e first annual meeting, which was held
New York, there was so little interest
e held over so that Mr. Riker served
ver president for the second year.
of the second year of the Society
e fact that the Mechanical Branch
he industry, it was rendered apparent
direction of companies, as in the Me-
or less handicapped, and the character
d through such an association is only available to the companies involved; morever, it is plain in the light of experience, that commercialism puts limitations upon the members. During Mr. Riker's second year, matters took on a more serious phase, and the membership of the Society grew sufficiently to warrant further activity, so that at the second annual meeting which was also held at the New Grand Hotel, New York, plans were made for a campaign of education, and a new set of officers were elected for the ensuing year with instructions from the Council to increase the membership in every way consistent with the high aims of the Society, with the result that the third annual meeting brought together upwards of 280 of the first engineers in America.

This last year, under President Henry Hess, has seen the crystallization of many of the important phases, the entire elimination of the idea that engineers should be in any way tied to companies when they go to meetings, and while it is true that the Society has not doubled its membership within the last year, it is equally true that it has advanced the position of automobile engineers so that they are no longer under the shadow of the salesman, whose advantage lies in the fact that he has his foot placed directly and firmly on the money bag.

For 1910, the new officers included H. E. Coffin as president, and that this was a wise choice is being proven at every step. In the past, the work of the secretary has been done by voluntary service for the most part, although it is true that some payment was afforded to the secretaries of the last two years, but it was found that the best interests of the Society would be realized were the affairs of the same placed in the hands of some capable man at whatever cost. What Mr. Coffin proposes to do to satisfy this important situation is to put enough of stability into the situation to make it possible to engage and pay for the most capable managerial secretary possible.

With this idea uppermost, President Coffin approached Coker F. Clarkson, who will be remembered as the Assistant General Manager of the A. L. A. M., and it is now announced by the A. L. A. M. that Mr. Clarkson has severed his connections therefrom, with the understanding that he is to assume new and important duties in connection with the Society of Automobile Engineers. Mr. Coffin, at a recent meeting of the Council of the Society, expressed himself in relation to the future activities in fitting language as follows:

"The fast-growing motor car industry now stands, I believe, fifth in the schedule of the world's greatest industries, and no single branch of it out-ranks in importance the engineering.

"Among the main functions of the present and of the future of the S. A. E. are the publication of a digest of current technical literature; a bureau of technical information; collection of data for a standard handbook of motor car design; exhaustive motor and metallurgical tests; an intelligent direction of the work of standardization of automobile materials, parts and accessories; a comprehensive card index of automobile engineering; the presentation and discussion of technical papers of the highest class.

"We must place in active direction of this work a man of a rare combination of training and ability. He must have had experience in this line of endeavor and an adequate knowledge of automobile engineering conditions; he must be an organizer capable of originality, and above all he must be a tireless worker. We believe that we have the right man in Coker F. Clarkson."

The S. A. E., having 350 members, is absolutely representative of its field, and is without a rival or competitor, having maintained its identity and individuality, as it will continue to do. Most of the men experienced in automobile engineering are active workers in the society, and have a deep-rooted professional interest in it. Fifty new members have voluntarily joined the society since it became known that Mr. Clarkson was to direct it.

Collapse Foretold for Artificial Rubber Market

Price Level Outrageously High Trembles on the Pinnacle

A. L. A. M. Calls Meeting While Tire Makers Shun Buying in the Corner

HANGING by a single thread, the whole rotten fabric of the present manipulated and cornered rubber market is dangling and ready to fall, like an over-ripe and fly-blown peach.

Cable advices from London tell of another slump in crude rubber and another drop in the inflated issues of various companies that are alleged to produce it, but the most significant thing about the market abroad is the fact that American manufacturers will have nothing to do with it. In fact, the buying orders at present levels for crude are so small that something akin to dismay has already begun to find entrance into the minds of the speculative public of England.

The situation is critical and a decision on the part of the automobile tire makers of America not to submit to the exorbitant prices asked now, would undoubtedly lead to a crash that would make the South Sea Bubble's explosion seem like profit taking on a small line of long stock.

A. L. A. M. Calls a Special Meeting.

Such a decision is not unlikely to be announced at any time and indications point to some such action immediately following the meeting of the A. L. A. M. next Wednesday. The association has been called together to consider ways and means of providing tires for next year's turnout and the situation has developed a number of unusual angles.

The price of rubber is so high now, due entirely to the artificial conditions that prevail abroad, that tires made of crude rubber purchased at present price levels would be a prohibitive luxury. Consequently the tire makers are loth to buy.

The tire makers and the Association are really not at odds over the situation, and the proceedings of the meeting will probably uncover a common ground of defense for both sides.

The effect of an agreement not to purchase at this time would have a very definite result in the market. England has been crazy over speculation in rubber shares and crude rubber for months and many big fortunes have been made. As far as the purchase of shares in companies that are actually producing rubber is concerned, the movement had more than a tinge of legitimacy, but as the prices soared, the general public, including charwomen and hackdrivers and ill-paid clerks went into it with all the resources they could command. Much of the speculation was conducted on margin and on the installment plan, and yet the shares continued to climb.

But now, the first "bear" news has arrived and the market for both shares and crude rubber is hanging and drooping at the summit of the pinnacle. One little touch; one little breath, and the gold-mad gamblers will be engulfed in the most sudden crash ever witnessed in stocks.

If such a result only affected the rubber gamblers it could be viewed with equanimity by the public at large, but when the pyramided long accounts begin to crumble, the first effort will be to bolster them up with real collateral, including the British holdings of American dividend-paying securities. It may be predicted with certainty that in the event of a crash, wild-cat rubber shares will not be valuable enough to paper a spare-room in a New England farmhouse. Rubber itself has an intrinsic value and will always be in good demand, but its price will have to come down to something like an equitable basis before the demand for it will revive after the smash in shares.

A special meeting of the board of managers of the A. L. A. M. has been called for Wednesday, May 11, and according to the official announcement, one of the important things to be considered at the meeting will be the tire situation.

"This is extremely critical," says the letter sent out by the association, "and one that demands consideration at this time by the entire membership, as it affects every manufacturer as well as the present and future owners of motor cars.

"In this connection, it is requested that each board member before attending the meeting, will endeavor to investigate the rumors which are current to the effect that there exists among certain tire manufacturers of this country an understanding or 'gentlemen's agreement,' to increase the price of tires and to refuse to sell or deliver to manufacturers at this time any tires for 1911 equipment.

"It is hoped that you will obtain all the information available relative to the tire situation, so as to be prepared for an open discussion at the meeting, which promises to be one of the most important, from a makers' viewpoint, that the association has held.

"A number of other important subjects will come up for consideration at the meeting."

Tire Makers Advance Ideas; Will Not Be Quoted

The tire men shed some light on the subject and one of the prominent members of that branch of the trade said: "The present condition of the crude market, is, we believe, manipulated and far above legitimate levels. We sympathize with the automobile makers and appreciate their wish to contract for tires for their 1911 output, but our whole effort at this time is to avoid purchases of crude rubber while the market is in a cornered condition.

"If we contracted to sell tires right now, we would have to double the price asked last year, because of the remarkable rise in the crude material. If we contracted to sell at the prices of last year, we would all go broke if we had to buy our crude under current conditions.

"Consequently, we want to simply stand by for a while and wait for the bubble to burst.

"Reckoned on the price of crude rubber to-day, the price of tires would be practically prohibitive. We realize that fact and are quite as much interested in correcting conditions as the A. L. A. M. can be."

Tire Maker Tells of Conditions

F. A. Seiberling, president of the Goodyear Tire and Rubber Company of Akron, O., has given out a statement in which he says: "High prices prevailing for crude rubber are fairly attributable to two primary causes: First, the abnormal draft upon the world's supply; and, second, the wild speculation in rubber and rubber shares in England."

In the meantime, the consolidation of the Massachusetts Chemical Company, the Walpole Varnish Works, the Walpole Shoe Supply Works, all of Walpole, Mass.; the Valveless Inner-tube Company of New York City, and the Walpole Rnbber Company of Granby, Quebec, has been announced. The consolidated concern will be known as the Walpole Rubber Company. The factories are at Walpole, Mass., Boston and Quebec with branches at New York, Chicago and London. A new factory building has been started at Walpole which, it is announced, will have a floor space of 100,000 square feet. The company makes, among other things, a seamless automobile tire.

Detroit Automobile Makers Pushing Deliveries

May 2—Activity in automobile manufacturing
d a scarcity of skilled labor in this city, which
of commerce has attempted to alleviate by ad-
in numerous promising fields. The fields in
ising appeared did not relish it much and
ere received by the Detroit authorities.
al manufacturing, which is being carried on
uilding and expansion are apparent in every
M-F Company has completed its big factory
quisition of the Glazier stove plant at Chelsea
d. This will probably be converted into an

Power Wagon Company has purchased nine
ott avenue and the Belt Line tracks and has
ts main factory buildings.
ercial Car Company has leased the factory of
undry Company and will proceed with the
mercial vehicles.
; industry will be represented next year in
is considered a Detroit suburb. The Swift
oken ground for a factory, 60 by 250 feet in
a cement foundation. Detroiters have been
nd a sample car is already in operation.
ompany will be permitted to erect its pro-
owroom at Woodward avenue and the
ovan refusing Wednesday to issue an in-
Mary D. Randall.
itomobile garages in the United States will
this Summer, on property recently pur-
evard and Woodward avenue, according
of Thomas D. Buick, president of the
arage Company, of Saginaw, which was
nths ago. The property purchased comprises 36,750 square feet, nearly all of which will be covered by a fireproof two-story structure, 100 by 245 feet in size.

The Regal Motor Car Company, of Detroit, is building another addition to its plant. This new structure is a combined brick, steel and concrete construction of the latest type, covering an area 249 by 598 feet.

The Taxicab Co. of America has purchased the building formerly used by the Henkel livery, and is equipping it as an up-to-date garage. The Henkel barn was recently the scene of a dispersal sale of horses and cabs, the business being given up as no longer profitable, since the advent of the taxis.

Alexander Byron Mohler, representing Mohler & DeGress of Mexico City, the largest dealer in motor cars in old Mexico, has been spending several days in Detroit, the guest of officers of the Hudson company. He says there are 2,300 cars in the City of Mexico, but warns manufacturers that nothing but sturdy cars will appeal to the purchasing class there, due to the altitude, the road conditions, and the amount of hill-climbing necessary to any prolonged trip.

The Sibley Motor Car Company has purchased a factory at Solvay and Mackie avenues, on the West side, and will start immediately installing machinery for the production of 2,500 twenty-horsepower pleasure cars. The facilities are considerable at the new location, the plant itself being 60 by 280 feet in size and the deal by which it was secured bringing with it two acres of ground, providing room for a large amount of expansion. The property adjoins the Wabash and Pere Marquette tracks and affords ideal shipping privileges.

Among the recent incorporations were the following: Oliver Motor Car Company, $300,000; Detroit Carbureter Company, $25,000; Johnson-Kellam Motor Sales Company, $10,000; Rotary Valve Motor Company, $100,000, and Robison Motor Car Construction Company, $20,000.

. Y. to Atlantic City and Back

lity Contest from New York to Atlantic
y 10-11 has developed to the point of
ig it considerable importance as a tour-
the entries that may now be regarded
ing list of standard makes, of which
, not counting a considerable number
inted upon:

FOR THE ATLANTIC CITY RUN

ational, Auburn, two Franklins, two
ds, Croxton-Keeton, Regal, Mitchell,
axwells, three Cadillacs, Marion, Glide,

the Glidden Tour

lidden Tour of 1910 include fifteen
idden trophy, two Premiers, four
xwells and a Parry. For the Chicago
ie Auto Company cars, one Lexing-
y. In the non-contestant class, two
Cadillac chassis, have been entered
y Academy.

Cup Race Is Changed

relation to the Cobe event is that
July 4; it was originally given as
Indianapolis will be the scene of
promised.

Fuller Buggy Company Prices

Two of the models by the Fuller Buggy Company of Jackson, Mich., were illustrated in the April 21 issue of this journal. The price of one of these models, which is fitted with solid rubber tires, was given as $1,500, and that of the other as $2,000. These prices should have been $850 and $1,165, as stated in the company's new descriptive catalog, which also illustrates and describes six other models, including one delivery models, including one delivery wagon. In this total of eight distinctive cars, two are equipped with a four-cylinder motor of 25 to 30 horsepower, while the other six, including model K, touring car, and model F, runabout, and the four models shod with solid tires, have a 22 horsepower engine of the two-cylinder, horizontally opposed type, placed crosswise under the hood.

Makers Forming an Association

Some progress has been made in the formation of the new automobile manufacturers' association in Detroit. The concerns so far identified with the project are the following: Anhut Motor Car Company, Carhartt Auto Company, Demotcar Company, Flint Wagon Works, Imperial Automobile Company, Paige-Detroit Motor Car Company, W. A. Paterson Company and the Warren Motor Car Company.

Woman Starts Across Continent

Miss Blanche Stuart Scott, accompanied only by her maid, left New York May 1, in an Overland 38, en route to San Francisco. No time limit has been set for the trip. If she is successful, Miss Scott will receive $1,000.

Philadelphia Activities on the Increase

PHILADELPHIA, May 2—Some idea of the activity of the various borough and township officials hereabouts in keeping tabs on automobilists may be gathered from the warning issued last Saturday by the Automobile Club of Delaware County giving details of the location of no less than 48 speed traps on the roads radiating from the city into the surrounding country, and within less than a score of miles of the City Hall. The warning notice also specifies a score or more of places where the officials are strictly enforcing the "Blow Horn" law; those localities where the powers that be are inclined to be lenient are also mentioned. The club is following up its good work along these lines by posting flagmen (at its own expense) on the more-traveled roads.

Much chagrined by the eleventh-hour decision of the Contest Committee of the Quaker City Motor Club not to include a commercial car class in last Saturday's roadability run to Atlantic City, Manager Daniels, of the Philadelphia Buick branch, will endeavor to bring about a contest on similar lines open only to various classes of self-propelled business wagons.

The Taylor Motor Distributing Company, agents in six States for the Warren-Detroit "30" and Matheson cars, and with Philadelphia as its distributing center, is now fitting up the entire ground floor of the big concrete building at Nos. 210-212 North Thirteenth street as its main headquarters, and will give up its temporary offices in the Real Estate Trust Building at the close of the present week.

South Bend Is Active Automobile Center

SOUTH BEND, IND., May 2.—Marvin Coppes, agent for the Chalmers-Detroit and the Hudson, and M. G. Smith, who has been chauffeur for Col. George H. Studebaker and in the testing department of the Studebaker Automobile Company, have formed a partnership and will open a garage at 333-335 South Main street, South Bend, the location being that occupied until recently by the White garage. The men will handle the machines for which Mr. Coppes is agent. Mr. Smith will look after the repair and mechanical department, and Mr. Coppes will have charge of the sales department. Mr. Coppes whose home is in Nappanee, Ind., will move to South Bend.

Glidden Pathfinder on the Homestretch

EMPORIA, KAN., May 4—The Pathfinder arrived here this afternoon after a 120-mile spin over roads unexcelled anywhere on the 1,900-mile route thus far. The Chalmers was piloted from Caldwell to Wichita and Emporia by Sam Hess of Wichita. An escort from the Kansas City Automobile Club met the trailblazers here and will lead the way to Missouri.

WICHITA, KAN., May 3—The final 1,000 miles of what is to be the longest of any Glidden tour was entered to-day by the pathfinding car, which ran from Enid, Okla., to Wichita, a distance of 115.8 miles, over roads which are on a par with the first section of the 216 miles run from Oklahoma City to Wichita.

There was something resembling a cloudburst in this district Sunday night, but it did no damage to the hard dirt highway.

Caldwell, an old-time cow town from which the glamour has been rubbed by agriculture and prohibition, was the first place passed after the pathfinder left Oklahoma this afternoon.

Scene in Busy Dallas, Tex., Upon Arrival of Glidden Pathfinder

Change in Official Makeup of A. A. A.

Frederick H. Elliott has resigned from the secretaryship of the A. A. A. Robert Bruce has succeeded to the place thus made vacant.

Pathfinding Car Arriving at Huckin's Hotel, Texarkana, Tex.

Paulhan Breaks Record; Wins $50,000

Louis Paulhan, aviator, broke the cross-country flying record for heavier-than-air machines when he flew his big Farman biplane from London to Manchester, 186 miles, making two stops en route.

Paulhan won a purse of $50,000 which had been offered by Lord Northcliffe on behalf of the London *News*. The French aviator came near having company on the flight, for White, the British enthusiast, starting nearly twelve hours after the Frenchman, made a gallant effort to accomplish the same trip.

Paulhan was greeted with a tremendous ovation when he gracefully guided his machine to the ground at Manchester He complained of the bitter cold of the upper air.

The third annual Hill Climb of the Yale University Automobile Club will be held on Shingle Hill, June 7. The contest will be given under the auspices of the A. A. A. and the referee will be C. H. Gillette, president of the Hartford Automobile Club There will be nine classes.

The first annual Hill Climb, to be promoted by the automobile dealers in Paris, Ill., will be held at that city May 11. Silver loving cups will be awarded the winer of each event, a fifteen-inch cup being hung up for the Edgar County championship.

Atlanta Event Has a Representative Field

THE three-day race meet, which opens on the speedway here to-morrow, does not give promise of being so big an event as the opening meet last Fall, when practically existing speedway records established at the Indianapolis speedway were shattered. Since that time, however, the mile board track at Los Angeles has sprung into existence and holds many of the free-for-all records established last Fall at Atlanta, so that the big thing with many who are here waiting for the three-day programme to open is, what board-track records are going to be beaten at this meet. So far as entries go the meet which will open to-morrow promises a disappointment in that the field will not be as big as it deserves tó be. The programme for the three days shows 20 events in all, seven of which will be run on Thursday, and in these there is a total of 23 cars entered, or little more than three cars to the race. One reason for this small entry list is the refusal of the management to give appearance money. Many drivers said they would bring their cars down if they were given from $1,000 to $1,500 appearance money, and in addition, have their hotel expenses paid, as well as the expense on their cars to and from Atlanta. This, the management refused to do, on the just grounds that it wants to encourage stock car contests. In spite of this handicap, the field is a representative one and includes such cars as Marmon, National, Fiat, Stearns, American, Cole, Pope-Hartford, Knox, Allen-Kingston, Buick, E-M-F, S. P. O., and Firestone-Columbus. Although one or two makes represented last Fall have not arrived, the number of each make present is sufficient.

The programme includes two excellent events, both 200-mile races for special speedway trophies. Both are new trophies, and were not contested for at the meet last Fall. It was the intention to have the two big trophies put up last Fall, contested for this Spring, but both the Buick and Rainer people claimed they had a right to hold their trophies for one year and refused to allow them to be raced for at this meet. As a result two new ones have been made, each costing approximately $3,000, and of better value than those of last Fall. Each will have to be won three times in succession. One is known as the Atlanta Speedway Trophy, and will be raced for Thursday, and the other, Atlanta Automobile Association Trophy, will be raced for on Saturday. The Thursday race will bring out two Nationals, one Knox, one Marmon, and one S. P. O. This is for cars rating at 301 to 450-cubic-inch piston displacement. The Saturday race is for 451 to 600 Class and has a good entry list. Of the 21 events listed for the three days, ten will be strict stock-chassis events, and the stock requirements of the cars will be gone into with the greatest care. It might be remembered here that at the Los Angeles board-track meet not a single stock-chassis event took place, so that not one of the stock-chassis speedway records have been effected.

Capt. William Mitchell Lewis and Family Sailing for Europe

C. M. C. Completes Important Sign Work

CHICAGO, Apr. 25—Saturday marked the completion of the first step of the Chicago Motor Club's signboard campaign, when the last of the four routes selected for by the local organization, the one to South Bend and return, was finished. This work has been delayed by the severe winter. A two-ton Rapid truck, donated by Siegmund-Baylies Company, of Chicago, agent for the car, helped the motorists in carrying on this work.

The truck has been on the road for a week now and the latter part of the week it encountered the snowstorm, but despite this handicap it daily carried a heavy load of signs and posts and finished the task on schedule time.

The Chicago Motor Club now has spent more than $2,000 in erecting signs on the roads leading into Chicago. It has put seventy-eight signs on the Lake Geneva route, sixty-nine on the South Bend, 110 to Beloit and eighty-three on the Milwaukee stretch. Now there are signs on 369 miles of roads in this vicinity, and the club has marked the four main arteries of motor traffic running into the city.

The new plant of the **Victor Lamp Company** at Cincinnati is ready for occupancy. The company is turning out equipments for 300 automobiles a day and when the whole factory is in full operation, there will be about double that number produced.

Effimoff Wins Everything at Nice Meeting

This picture shows a remarkable scene. Three areoplanes are in full flight along the edge of the sea at Nice. The one in the foreground is Effimoff, in his Farman biplane, speeding along the beach. The one to the right is Latham in his Antoinette monoplane, and the distant gull-like figure is Olieslagers in his Bleriot monoplane.

Capt. Lewis Sails Abroad for Rest

Captain William Mitchell Lewis, president of the Mitchell Lewis Motor Car Company, with his family boarded the Cunarder Mauretania just as she was preparing to sail for Europe, where Captain Lewis and his party will enjoy an automobile tour and other recreation under most auspicious circumstances.

Remarkable Aeronautical Picture Taken at Nice Aero Meeting

Hub Doings Attract Much Attention

BOSTON, May 2—The legislative committee that heard the motorists on proposed changes in the present law, made their report last Friday when a draft of a bill was sent to the House and Senate. When the motorists realize what the bill provides they will not be pleased. There are some commendable changes such as not compelling chauffeurs to wear badges; a clause under which many of them were fined, frequently, and allowing number plates to be 48 inches from the ground instead of 36. But the two clauses in which most motorists were interested, the revoking of the section compelling the blowing of horns at every intersecting street, and the reciprocity clause allowing non-residents the same privileges that their States give us, are not what was expected. The latter is particularly bad, for under the guise of a reciprocity clause the committee has reported a change that simply draws the lines tighter and says no non-residents shall operate for more than 10 days in any one calendar year. Then follows the psuedo reciprocity clause, providing that other States from which non-residents come grant the same privileges to our motorists, with the highway commission as final arbiter. So it matters not that Maine allows Bay State men to roam all over its State without restrictions; that New Hampshire allows them to go in and out as often as they want unless they stay 10 consecutive days; and that Vermont allows them to travel around from 10 to 60 days, the Massachusetts legislature under this law proposes to say to them: "Thou shalt not cross our border more than 10 times without paying tribute, no matter how liberal your States are to our motorists." It is a most unfair advantage and will lead to a lot of trouble, for motorists in those states, who traded in Bay State cities, will refuse to do so and look around to make purchases at home. The first draft of the noise-making clause attempted to bar the blowing of some of the well-known makes of horns in the different cities and towns, but this has been modified. There is also a clause forbidding motorists to allow too much smoke to escape.

If the plans outlined by Chester I. Campbell, manager of the Boston motor shows, materializes there will be a real outing for children this year in the Hub on June 8 which will attract much attention. In other years the dealers were the only ones who could be induced to loan cars and the limit generally was about 25, so that about 125 youngsters were all that enjoyed an outing. These comprised blind children. Mr. Campbell now thinks that he may be able to reach a sufficient number of owners to insure a better showing. Last Saturday he sent out 2,000 letters to Boston motorists asking them to help this worthy cause and if the number of cars are sufficient more than 800 children will be taken care of on a trip to Sharon. In addition to the blind children it is planned to give the crippled children an outing.

Delaware Valley Run Decided

Around a figure eight course, the crossroads of which were at Trenton, N. J., the Delaware Valley Endurance Run was successfully held Tuesday. The entries, numbering 24, were divided into three classes as follows: Class A, cars valued at $2,001 and over; Class B, from $1,001 to $2,000, and Class C, $1,000 and under. Class A and B ran 300 miles, three times around the course, and Class C traveled 200 miles. Four cars in Class A finished with perfect scores: Speedwell, Locomobile, Sharp Arrow and Crawford. In Class B, two Mercers were not penalized and in the other class a Maxwell had a perfect score. Twenty-one out of the 24 starters finished the run.

Quaker City Third Annual Roadability Run

(*Continued from page* 831)

After checking in, the cars were trundled around to Young's Million Dollar Pier and were parked in the big ballroom. At least many of them took advantage of this arrangement, although a few turned around immediately after the finish and started back for Philadelphia.

The scene on the pier was one full of life and color. The cars, including many of the well-known makes and styles, were stationed in lines and series and presented a brilliant picture to the eye of the observer. A big crowd assembled at the Strand, the streets were filled with sightseers, the boardwalk was comfortably filled and the automobile was the center of attention.

Up to the moment of the official announcement, those who had been successful in winning one of the coveted cups were in complete ignorance of their success.

After the clerical work had been cleaned up, hands adjourned to Young's Pier where Mayor Stoy made the announcements and felicitated the winners and those who did not win.

The cups awarded were as follows: First prize, Mayor Franklin P. Stoy's cup; second prize, the Hotel Strand cup; third prize, President L. D. Berger's cup; fourth prize, the Hotel Walton cup, and fifth prize, the board of governor's cup.

The officials who had charge of the run were as follows: Honorary referees, Mayors Reyburn and Stoy; assistant honorary referee, Alfred E. Burk; referee, R. E. Ross; official starter, G. Hilton Gantert; associate member contest board A. A. A., P. D. Folwell; official timer, Paul B. Huyette; pacemaker, J. Fred Betz, 3d; press, George M. Graham and Secretary Harry C. Harbach.

The reception committee at Atlantic City consisted of the following: Harry B. Cook, C. Stanley Grove, Walter E. Edge, Warren Somers, Louis Kuehnle, David R. Barrett, Philip B. Grove, Col. Lewis T. Brown, M. B. Woodruff, S. S. Phoebus, Jacob Weikel, Harry Wootton, C. D. White, Col. Thos. Potter, Jr., Frank B. Off, A. J. Royer, William J. Black, Edward S. Lee, Henry Bolte, Jr., Charles R. Myers, Isaac Bachrach, George W. Carmany, Howard Bennett, Gustave Kessler and Martin E. Keffer.

Paul B. Hayette, president Timers' Club

The Regal "Plugger," decorated with credentials from various cities in which it has visited recently was the object of considerable interest at the start and finish and along the way. During Saturday night and Sunday an impromptu automobile show was held on the steel pier under the auspices of the Automobile Trade Association.

Long Island Automobile Club

(*Continued from page* 853.)

shed. In the front of the big room is the assem- its dais for the presiding officer. Ranged in front ı are half a dozen varieties of comfortable seating ing swings, lounges and big, comfortable chairs. kept at hand and a bulletin board gives oppor- ıb for publication of announcements. A case of series of speaking pictures completes the room. embly hall is the grill-room, adequately equipped the wants of the inner member, and to the right resided over by a chef of demonstrated merit. the kitchen and behind the grill-room is the ıartly furnished and of comfortable size and

floors are used for car storage and maintenance round floor contains the main garage of the ent, as has been noted, is devoted to the wash- ɔrk on the cars. All told, the garage equip- is sufficient to accommodate seventy-five cars. ıll occupied. The charges are moderate and facility for furnishing oil and gasoline, and supplies of other kinds.
'on, and a big elevator for communicating be- floors of the garage, complete the facilities

he Long Island Automobile Club includes New York State Automobile Association and the A. A. A., with all the influence and advantage that may accrue from those connections. The utility of the club is shown emphatically in one direction. Arrest is not impossible to the most careful driver of an automobile. It may come at a time when the motorist does not happen to have the formal but necessary $100 in his pocket to be used as bail. In that case, the member of the club has only to telephone to the club house, and a surety bail bond will be filled out and rushed over to him.

The club held the first 100-mile endurance test ever held in America and the first one-mile straightway speed contest over the Coney Island boulevard, and has handled numerous other important and epoch-making events.

The officers of the club are as follows: Allen C. Aldermen, president; Louis T. Weiss, vice-president; Charles C. Cluff, treasurer, and C. Stewart Cavanagh, secretary.

The Board of Governors: Herbert G. Andrews, Dr. H. R. Price, Dr. William P. Richardson, Frank G. Webb, William Schimpf, and Dr. C. B. Parker. The manager is Charles S. Ellis.

The heads of the various standing committees are: C. Stewart Cavanagh, House; Frank G. Webb, Entertainment; William Schimpf, Garage; Louis T. Weiss, Contest and Tours; Charles Jerome Edwards, Good Roads; Jay S. Jones, Press; Allen C. Alderman, Membership; Louis T. Weiss, Technical; Herbert G. Andrews, Law and Legislation, and Dr. H. R. Price, Finance and Auditing.

Best Means for Dustproofing the Highway

(*Continued from page* 845.)

perhaps particularly unreliable, because e economical work methods which should have been applied only under European have this improved machinery, or some- tter, applied in America under test con- olves of saving in dustproofing materials to be one of the most important require- in the cause of dustless roads.
records vary so widely and fail so uni- as on maintenance cost, and the failure to lack of time, but mostly to lack of possibly lack of appreciation of the al- ıate relations which exist between the the cost of the maintenance. As types h reference to the heaviest and fastest ıin, and the proportion between heavy t vehicles is nearly constant on any ving the average number of vehicles day, month or year would be of the inging the available data on mainte- mon basis for comparison. The little his respect tends to show that on all l maintenance cost are nearly pro rata of the traffic, after this reaches 500 ve- umed that no road carrying less than sually be considered in a dustproofing ost at this volume of traffic should or an estimate, and it has been so sketch for a schedule. For this nance cost will appear low, in com- ed on denser traffic, and the cost of relatively high, as the figures for the ı data from stretches of roads where its volume could not be taken into proper account, because it was not given. Whether the cost of dustproofing processes increases pro rata with the traffic or at a much slower rate, is a question which it seems impossible to even guess at, for the present, but those competent to prepare a complete and technically correct schedule will doubtless be able to fix a ratio which will be sufficiently accurate.

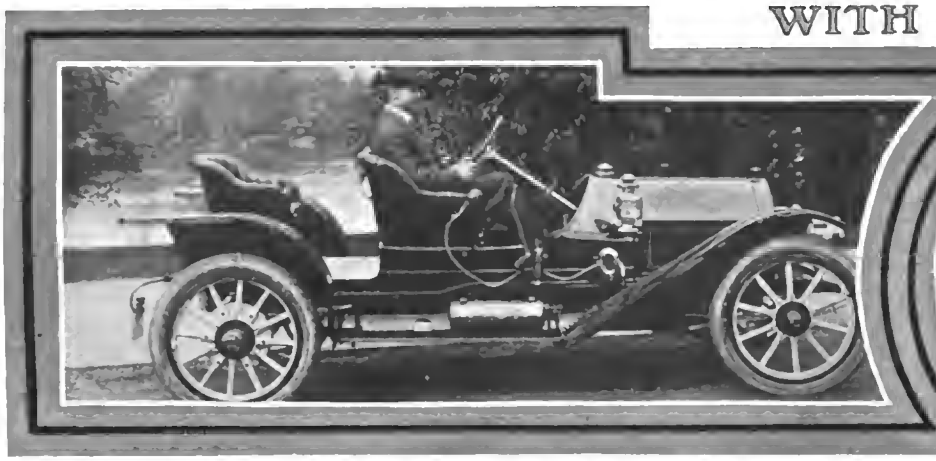
In applying even a corrected schedule, however, to a road project and trying to decide in advance what the maintenance cost will be for the completed dustless road, it will probably be safe to assume that any country thoroughfare, so situated that it requires to be made dustless, will attract one hundred per cent. of additional traffic from neighboring roads, as soon as the improvement is made; and at this point one discovers an advantage in the dustless thoroughfare which has been little noticed.

All the domestic data of maintenance fail to take account of one element in cost reduction which has been well demonstrated in Europe. Any system of regular and continuous maintenance, such as is made possible when financial provisions are made in advance for a period of twenty years or longer, results in a compacting and adaptation of the roadbed to its traffic, which gradually reduces the average cost of the maintenance below any estimate based on data from the first five or ten years of the road's existence.

Worcester Dealers Organize

WORCESTER, May 2—The Worcester Licensed Automobile Dealers Association has been organized with six firms as charter members. The members are: Lemont Motor Car Company, John S. Harrington, Worcester Motor Car Company, Macker-Tyler Company, Harry J. Murch, and Norcross Auto Company. Officers: President, B. A. Lemont; vice-president, Fred B. Williams; secretary-treasurer, Oliver P. Tyler; clerk, Jay Clark, Jr.

WITH THE AGENCIES



Joseph Tracy, of New York City, the well-known automobile engineer, at the wheel of his Chalmers Thirty runabout, in Central Park

Peter S. Steenstrup, of Hyatt Roller Bearing Co. and Nat. Association of Manufacturers

E. M. Long & Sons have assumed the Overland agency at Cadiz, Ohio, for Harrison county.

H. J. Smith, Cleveland, has been appointed Regal agent for Ravenna and surrounding territory.

E. L. Leinbach & Co. have moved the local Matheson car agency to 21 East North avenue, in the rear.

Will J. Friel has taken the agency for the Overland at Marietta, Ohio. He will cover several counties in Southeastern Ohio.

The C. N. Lippart Auto Company, of Lorain, Ohio, was incorporated with a capital of $5,000 to do an automobile business.

Another new agency in Pittsburg is that for the Pullman car, which will be at 6113 Centre avenue with J. E. Graham in charge.

Reis & Co. have assumed the agency for the Warren-Detroit Car in Baltimore. The salesrooms and garage are at 21 East North avenue.

The Only Car will be handled in Cleveland by J. H. Anderson. The car sells for $700 and, its makers claim, has a rating of 60 miles an hour.

J. A. Boyd has organized the Commercial Auto Sales Company for the sale of Chase delivery wagons and Gramm trucks in the Cleveland territory.

Harry E. Pence, of the Pence Automobile Company, recently purchased a 220-foot tract of land, where a temporary structure is to be built immediately for warehouse purposes.

Dr. Leon C. Long has secured the exclusive agency in Western Pennsylvania for the Babcock electric car of Buffalo, and will be located in the Rittenhouse Block on North Highland avenue, Pittsburg.

Kimmell Bros., Fourth and Spring streets, Columbus, O., have taken the Central Ohio agency for the Badger, manufactured at Columbus, Wis. The company has been handling the Speedwell and the Overland.

H. J. Schwartz, formerly a veterinary surgeon but more lately connected with the Atlanta branch of the White Co., has been engaged by C. H. Johnson, local agent for the Stevens-Duryea car, to manage the sales in this territory.

The Georgia Motor Car Company, of Atlanta, G. W. Hanson, president and manager, has absorbed the J. J. & J. L. McLendon Co., which sold the National car. Hereafter the Georgia Motor Car Company will sell the National car, in addition to the Benz, the Randolph truck, E-M-F, Flanders and Studebaker.

Coates-Goshen Company moved this week from 1619 Broadway to 1864 Broadway as was also the branch of the Dayton Airless Tire Company, which is jointly occupying the new store room.

The American Garage, of Indianapolis, has been chosen agent for the Royal Tourist in that city. Sales Manager H. M. Adams, of the Royal Tourist Car Company, Cleveland, announces that other agents will be chosen within a week.

Baron Van der Noot de Vrecken de Moorsal will represent the Krit Motor Car Company, of Detroit, at the Brussels Exposition. The Baron believes that there is a great future for low-priced American cars in Europe. He sails May 10.

David Davis, Jr., of Racine, Wis., has been appointed mechanical superintendent of the new gasoline and oil engine department of the J. I. Case Threshing Machine Company at Racine. Mr. Davis studied in German for three years after graduating from the University of Wisconsin.

Harry S. Moore has secured the agency for Northern Ohio for the Overland car. Mr. Moore has for some time past been distributor of the Stoddard-Dayton, National and Courier. The Overland has for two years been sold in Cleveland by the Overland Motor Car Company.

Harry J. Murch, Worcester, Mass., who has been agent of the Cadillac and Peerless automobiles, has purchased the interest of his partner, Charles E. Hidden, and will continue the business alone. Mr. Murch is to move his business June 1 from Central street to the new garage now being built on Main street, near Hermon.

The Morrison Motor Car Company, of Chicago, an Illinois corporation with $15,000 capital, has filed articles and a statement to do business in Wisconsin. The local interests are $2,500. The Morrison company handles the Pierce-Racine and has established Wisconsin sales headquarters in Milwaukee.

Among Pittsburg firms which have recently moved or enlarged their qnarters are the Pittsburg Automobile Company, which is now at 5909 Baum street, East End; the Pioneer Top Company, which has moved from Butler street to 5472 Penn avenue, and the Pittsburg Automobile Equipment Company, which has leased another big room on Baum street.

The New York Auto Supply Company, 1755 Broadway, New York City, have just secured the distributing agency for the Parry car, made by the Parry Automobile Company, Indianapolis, Ind. The territory comprises the Metropolitan district of New York below Albany, New Jersey and the lower half of Connecticut. The company will appoint agencies in all of the principal towns.

The Haynes Automobile Company, Minneapolis, has recently placed the Regal agency in Duluth and along the Iron Range with the Interstate Auto Company. P. J. McGuire, manager of the wholesale department for the Haynes company, made the arrangements.

AMONG THE GARAGES

President S. C. Tallman, of Auburn Automobile Club, Auburn, N. Y., and party in a Cadillac, returning from inspection of free bridge, erected for automobilists

R M. Owen, now vice-president Reo Motor Car Co., Lansing, Mich.

James P. Roodhouse, of Medora, Ill., is erecting a new garage.

Elyria Garage Company, of Elyria, O., is organizing an auto livery service for that city.

George Bettes will manage the new garage now being erected by C. D. Fenn at Antigo, Wis.

The Buckeye Garage & Sales Company has doubled its force of workmen as well as its floor space.

The Moyle garage building at 135-137 South State street, Salt Lake City, Utah, is nearing completion.

Metzger & Wells have a contract to build a $10,000 garage for Clarence A. Warden, in Haverford, Pa.

The Louisiana Motor Company has completed its garage near Baronne and Julia streets, New Orleans, La.

D. M. Huntington, of Grand Rapids, Wis., will open a garage. He has been conducting a repair shop for a year.

John W. Yule has opened a large garage and repair shop at 448 Broadway, Paterson, N. J., where he will handle the Pullman automobiles.

John Conway, T. W. Orbison and Dr. D. J. O'Connor, of Appleton, Wis., are the incorporators of the Appleton Garage Company. This company is building a large public garage in Appleton.

The Ohio Auto Sales Company has completed the work of remodeling the new garage and sales room on North Park street, near Goodale street, Columbus, O. The company handles the Ford in Central Ohio.

Stoll Brothers of Mt. Pulaski, Ill., are erecting a three-story brick building, the first floor of which will be used as an automobile garage, the second floor as a display and sales room and the third floor as a public dance and lodge hall.

J. Z. Wilklow, of Mishawaka, Ind., has commenced the erection of a one-story automobile garage on his property adjoining the new Mishawaka Hotel. The building will be 50 by 150 feet and will have conveniences for cars and repairs.

Schmidt & Herres, proprietors of the New London Iron Works, New London, Wis., are building a garage adjoining their shops. It will accommodate ten cars. The firm has taken the agency for the Overland and will make a feature of repairs.

The English Motor Car Company, of Massillon, O., was incorporated with a capital stock of $25,000 to engage in the general automobile and garage business by F. A. English, W. P. English, H. W. Loeffler, George W. Krotsch and Homer A. Hoftzer.

Dr. O. H. Thorpe and George A. Rauch, of Marysville, O., have sold their garage and repair business on Plum street to the Marysville Motor Car Co., recently organized by A. Earl Harvey and Walter M. Otte. Mr. Harvey will be general manager.

The Connellsville Garage Company has bought 65 by 165 feet on Apple avenue, Connellsville, Pa., and will build a $15,000 garage at once. The building will hold 40 cars and the company will start a repair and accessory business as well as a taxicab line in June.

The Fourth Street Auto Garage and salesroom, Barberton, O., was opened April 1 with Dr. G. E. Gardner, president, and E. G. Grady, secretary and general manager. They are agents for the Halladay and De Tamble cars in the counties of Summit, Medina and Wayne.

P. H. Haber, district agent for the Ford at Fond du Lac, Wis., has leased the Hass Garage, Macy street, between Forest avenue and Division street, and has taken possession at once. The name will be the Ford Garage and a general livery, repair and garage business will be carried on.

The Hoaglin Auto Company, of Oshkosh, Wis., is rushing work on a large new garage building in order that it may occupy the building by June 15. It is of fireproof construction, with brick walls and steel-trussed roof and will be ample to care for the immense transient garage trade developed by the Hoaglin interests during the last three or four years.

F. J. Briquelet, of Green Bay, Wis., has opened a garage at 215 Stuart street and will handle the Kline Kar. He is negotiating for several other lines. Mr. Briquelet was formerly associated with the Green Bay Motor Car Company, and is an expert mechanic. The present quarters are temporary and Mr. Briquelet plans to get a larger building before July 1.

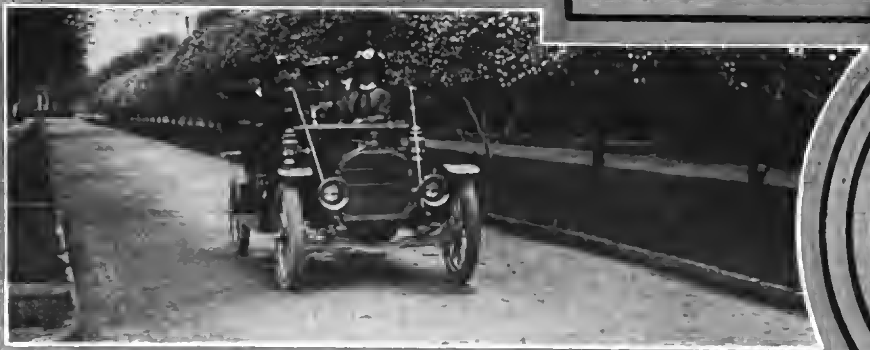
Personal Trade Mention

Herbert L. Shearer, for six years general manager of the plant of the Chicago Brass Works at Kenosha, Wis., has joined the central offices of the American Brass Company at Waterbury, Conn. George Allen, assistant manager at Kenosha, succeeds Mr. Shearer.

Peter S. Steenstrup, secretary and general manager of the Hyatt Roller Bearing Company, is enjoying a vacation. Mr. Steenstrup has been closely confined by business cares for several years and now he is going to spend several weeks resting. His rest will include mountain climbing and fishing in mountain streams of Oregon, the Columbia and the Pacific Ocean. Mrs. Steenstrup accompanies him.

J. B. Comstock, for six years with the Westinghouse Electric & Manufacturing Company at its East Pittsburg works, and for four years manager of its publication department and printing plant, severed his connections with that company in April to accept a similar position with the P. & F. Corbin Company, of New Britain, Conn. Prior to Mr. Comstock's connection with the Westinghouse Company, he filled the same position with the Corbin Company that he has recently been recalled to assume.

REALM OF THE MAKERS



View of one of Rochester's flower lined streets, the justly famous Oxford street, showing a Selden car among the magnolia trees

Geo. B. Selden, president of the Selden Motor Vehicle Company

The Ford Motor Company built and shipped out 1,035 cars between April 18 and 23, according to the records of that company.

The Fry Manufacturing Company, a concern organized to control the manufacture and sale of the Fry plug, is located at 1779 Broadway, New York City.

The Dayton Rubber Manufacturing Company has decided to increase its capital stock from $150,000 to $500,000 in order to provide for enlarged and augmented facilities for manufacture.

The Whitney Manufacturing Company plans for immediate construction of a five-story addition to the present big plant in Hartford, which is to be completed and ready for occupancy by October 1.

The Monitor Automobile Works have removed from Chicago to Janesville, Wis. The new plant has a floor space of 75,000 square feet, which is a material increase over what was formerly occupied.

The Billings & Spencer Company, of Hartford, has just completed a fully equipped emergency hospital in connection with the local plant, which is the outgrowth of a very modest beginning, a first aid cabinet.

The Rapid Motor Vehicle Company, of Pontiac, Mich., has purchased 16 acres of land adjacent to its present plant, and within two months, according to present plans, another big building will be completed and in running order.

The Castle Lamp Company of Amesbury, Mass., has purchased the assets of the Atwood-Castle Company and assumed its liabilities. The capitalization of the new concern is $300,000. F. E. Castle will have the management.

The Standard Specialty Company, of Cleveland, was incorporated with a capital of $10,000 to manufacture automobile accessories by Harry Dolitz, Cornelius Sheehan, Leo J. Kellosky, Charles M. Robertson and Louis M. Kleinhenz.

The Fal Motor Company of Chicago will be moved to Champaign, Ill. That city has agreed to give a site and erect the factory buildings to cover at least 100,000 square feet. The plant is expected to be in running order by Aug. 1.

The Pittsburg Motor Company, which manufactures the "Pittsburg Six" car at New Kensington, Pa., has bought from the Dawes Mfg. Co. of Braddock, Pa., a $25,000 site in Braddock, on which it will build a factory to employ 500 men.

The Warren Motor Car Company's new factory at Detroit will be completed by Jan. 1, 1911, if the plans of the construction, work out as expected. The first of the buildings 600 by 60 feet is approaching completion and the two others are progressing.

The Auto Motor Castings Company, of Cleveland, was incorporated with a capital of $50,000 to manufacture castings and other accessories for motor cars by Adelbert J. Miller, Charles H. Gunkleman, William Schofer, William Baisch and Elex L. Appleby.

With a factory 600 by 60 feet, three stories high, the Schacht Mfg. Co., of Cincinnati, is planning to enlarge its plant. The increased facilities will allow the company to treble its output in 1911. The capital stock of the company will be increased from $100,000 to $500,000.

The United Manufacturers will remove from their present quarters at Seventy-sixth street and Broadway to Motor Hall, 250 West Fifty-fourth street, where they will have offices covering 10,000 square feet of floor space. The change will be accomplished May 1.

The Auto Tire Re-enforcement Company of Auburn, Indiana, has reorganized and incorporated under the name of Double-Fabric Tire Company. A. L. Murray is president and W. H. Willenar is secretary and general manager. Tire re-enforcements and emergency tire repairs of various kinds will be manufactured in large quantities.

The Connecticut Shock Absorber Company, of Meriden, Conn., has purchased the tools, dies and stock of the Sager Shock Absorber Company. The former concern announces that the reason for the retirement of the Sager company is that its device was an infringement of the patents held by them.

Deliveries of the new 1910 type of six-cylinder, sixty-six horsepower cars of the Pierce Arrow Motor Car Company will begin in July. This will be in time for the latter part of the touring season and so that cars for fall touring in Europe may be available for those who intend to put them to such use.

Announcement is made by the E. R. Thomas Motor Company that the 1911 models of that company probably will be practically identical with those of the current year. While a definite decision has not yet been reached, the preliminary work indicates that any changes that may be made will be matters of detail rather than any radical departure in the construction.

The annual meeting and election of the Hartford Rubber Works Mutual Benefit Association resulted as follows: President, C. B. Whittlesey; vice-president, George Holloway; secretary, A. Elmer; treasurer, E. Fothergill. During the past three years there has been paid out in benefits to members $5,000 in cases of sickness and death. The association has a membership of 500.

A consolidation of the Standard Gauge Steel Company and the Standard Connecting Rod Company, of Beaver Falls, Pa., has been effected. The new corporation will be known as the Standard Gauge Steel Company. By the merger, facilities will be improved and capacity increased. The full lines made by each of the companies interested will be continued and others under consideration added. The management will be practically the same as it has been in both corporations.

NEWS IN GENERAL

Alexander Winton, president Winton Motor Carriage Co., Cleveland

Five ton load of orphans on a joy ride with Hal Sheridan at the wheel of White truck. A reminder of the Orphans' Day, which is soon to be celebrated

Paterson "30" cars will be sold in Brockton, Mass., by the Gay Automobile Company, 345 Warren avenue.

Hemery, Hanriot and Bruce-Brown will drive cars in the Grand Prize race on the Long Island Motor Parkway next fall.

Four Cleveland .factories have announced their intention of entering the Glidden tour. Two private entries are also promised.

The Miller Rubber Company, of Akron, Ohio, has increased its capital stock from $250,000 to $500,000. The company has doubled its capacity during the past year.

The Chicago Vulcanizing Company, of Chicago, has certified to a change of name to the Chicago Tire and Supply Company, and increase of directors from three to five.

The Ford Motor Company has beaten all records for shipments to Pittsburgh. Sixteen carloads of Model "T" Fords, including 48 autos, came in over the P. & L. E. Railway last Saturday.

The Locomobile Company of America, capitalized at $5,000,000 in New York, has been incorporated in the State of Illinois, with offices at Chicago. The capitalization in Illinois is $131,600.

The Selden car that will take part in the Brighton Beach 24-hour race has arrived at the track. The car is being given a special preparation under the guidance of George E. Mack, who will pilot it in the race.

The Washington Post Touring Test run from Washington to Richmond, Va., will be held May 27 to 31. Eleven entries to the event have been received so far and many more cars have been promised for the contest.

The New Jersey Automobile and Motor Club is seeking a location for its country branch. Officers and members have been engaged in seeking ideal sites, and it is reported that there have been found several that answer the requirements.

U-auto Varnish Company, of Cleveland, was incorporated with an authorized capital of $50,000, to manufacture an automobile varnish, by C. O. Perrin, A. B. Newland, H. L. Hullinger, H. W. Perrin and A. L. Talcott.

In the issue of THE AUTOMOBILE of April 7 reference is made to the "Apple Automobile Lighting Dynamo." While the system is made by the Apple Electric Company, of Dayton, Ohio, the trade name under which it is marketed is "Aplco."

The Cleveland Transmission Gear Company was incorporated with a capital stock of $5,000 to manufacture gear wheels for transmission of power in automobiles by R. H. Williams, Marion Kirkely, E. C. Kirkely, C. A. Myers and F. H. Hartman.

Cleveland Taxicab Company, of Cleveland, Ohio, was incorporated recently with a capital stock of $100,000 to operate a number of taxicabs. The incorporators were Charles S. Wachner, F. B. Williams, R. A. Wilbur, J. B. Graham and Benj. A. Gage.

More automobiles were sold in the United States during the thirty-one days of the month of March than in any corresponding period in the history of the automobile industry, according to reports received from many factories now working overtime.

W. R. Hines announces that he will locate a factory in or near Cleveland to manufacture a four-cylinder, two-cycle car designed by him. Mr. Hines has been experimenting with the Hines car for six years. He proposes to make 500 cars for 1911 delivery.

Rene M. Petard, manager of the European branch of the Mitchell-Lewis Motor Company at Paris, writes that the American idea in motor cars is making satisfactory progress abroad. M. Petard says that the success of the Mitchell car has been considerable.

The Goodrich Company, of Akron, O., recently started a road marker out from its factory. For the present, the roads around Cleveland, Akron and Canton will be marked. The marker will then start east from Chicago to Buffalo, thence through Albany to New York.

L. C. Alexander resigned from the Cleveland Warner Instrument office staff Saturday, to accept a position with the Willard Storage Battery Company. He will have charge of the automobile lighting department of the Chicago office. The Willard company is designing a miniature lighting system, the same as is used on trains, for automobiles. It will be on the market in a short time.

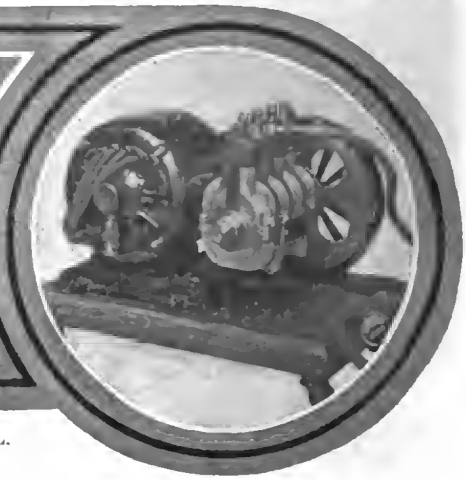
Spokane, Wash., is to have an agency for the Lozier, according to the announcement of the Metropolitan Motor Car Company, of that city. The territory includes Seattle and Portland. W. T. Sleddon, who formerly represented the Lozier in Seattle, has associated himself with the Metropolitan Company.

Sharp-Arrow cars are better known in racing than in trade circles, as this car, which is made in Trenton, N. J., has put up some fine performances over the Motor Parkway and the Riverhead courses. William Sharp, the builder, has completed plans for a special racing car which he intends to drive himself in the Grand Prize race on the Parkway next October.

Additional contracts have been placed by the Pierce-Arrow Motor Car Company, of Buffalo, with the Aberthaw Construction Company, of Boston, for the doubling of the size of the present office building of the former's Buffalo plant, for adding 200 feet to the motor testing building and the garage, and for building the truck assembly shop. The Aberthaw Company has just completed the large storage building and has partly completed the nickel-plating building of the plant.

PROMINENT ACCESSORIES

New tire and accessory store of the well-known Philadelphia tire makers, James L. Gibney & Bro., located at 248-252 West Fifty-fourth street, New York City



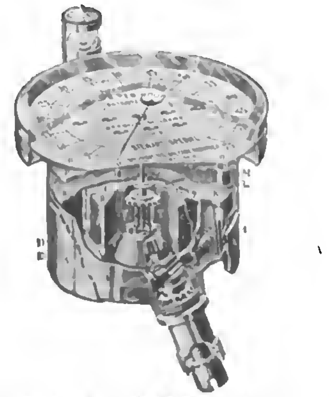
Kellogg electric motor-driven pump for use in private and public garages

STEWART OFFERS NEW SPEEDOMETER

The Stewart & Clark Mfg. Co., makers of the Stewart Speedometer, are now marketing a new type of speedometer, known as the "Stewart Special."

The illustration will make clear the design and function of the component parts. Multipolar induction is the actuating principle. AA is the containing cup or casing, one-piece drawn brass. U is the frame on which the parts are assembled. This frame is machined with integral sockets, bosses, shoulders, etc. B is the generator or rotor. It consists of a ring of nonferrous material, on which are mounted two permanent magnets CC, CC, of the closed-ring type, divided by an insulating plate. These magnets are accurately machined from imported tungsten steel, made to special analysis, the highest priced material obtainable from this purpose. They are hardened in a special furnace of our own design, are magnetized, aged and tested before assembling in the rotor. D is the spindle to which attaches the flexible shaft from the road-wheel connection. Formed integrally on the upper end of this shaft is the bevel pinion E, which revolves the rotor R through the medium of the internal bevel gear F. The central stud G on which the rotor B revolves is recessed to receive the cap and crown jewel bearing H. Stepped in this bearing is the tempered and highly polished pin I, secured to this pin is the disc JJ. This disc is made of an alloy metal, having a low resistance and is exceedingly light. The fixed plate KK serves as a support for the jewel guide L and one end of the restraining spring M, the other end of this spring being secured to the pin shaft I. To the upper end of the pin I is secured the indicating pointer N, which moves over the graduated scale OO. RR is the revolving field. TT is the rotor bearing of which F bevel gear is an integral part. Interposed between the plate KK and the dial scale OO is the odometer mechanism, of which PP is the lower plate. This odometer is driven from the spindle D by means of a hardened steel gear train, S being the drive connection.

Operation.—In operation, as the rotor is revolved, lines of force flowing from the magnets CC, CC through the disc JJ cause it to revolve in the same direction as the rotor. This tendency to revolve is resisted by the spring M and is exactly proportionate to the speed at which the rotor is revolved. By reason of this arrangement of the magnets a continuous torque or drag on the disc is maintained, insuring a steady, even movement to the indicating means. This feature is of the utmost importance and because of the exceedingly few inertia of the disc makes the indicator responsive to the minutest change in speed.



Stewart Special Speedometer

KELLOGG MOTOR-DRIVEN PUMP

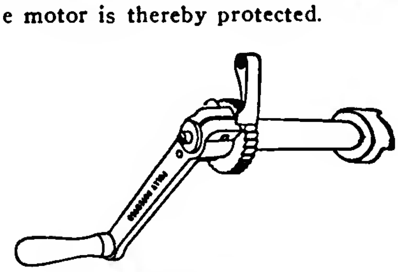
This pump is mounted on a heavy oak plank, which in turn is supported by substantial steel casters, so that it can be moved about. This pump entirely dispenses with the need of an air tank. The motor is of the Westinghouse make of 1/4 horsepower, for either direct or alternating current. It is attached to the pump by means of chain and sprocket. The pump is of four-cylinder 1-inch stroke, 1 1/2-inch bore, the engine base and crank case are of aluminum with the cylinder made of bronze, the pistons are leather and steel and are tested out for half a day at 500 r.p.m.

The company has tried in every way to burn down one of these leather washers, but has never been able to do so, and they fully guarantee them to stand up.

The cams are arranged on a quadrant in such a manner that one cylinder is always working. The pumps are all tested to 200 pounds and are guaranteed to deliver 120 pounds to the tire.

SIMPLE SAFETY STARTING CRANK

The illustration here presented of the Jones Safety Crank suggests simplicity, and the fact that there are but a few really sturdy parts in the makeup of this device should attract the notice of discriminating buyers. It will be observed that the safety crank is not keyed or fastened to the extension of the crankshaft as in ordinary cases. In this construction the end of the crank is split, and a clamping bolt, when it is fetched up, holds the jaws in tight relation with the bearing portion of the crank extension. The friction thus induced is sufficient to permit of cranking the motor. A steel pawl, which is fastened to the cross bar at the front end of the chassis frame, engages the teeth of a ratchet wheel, which is arranged to permit of cranking to the right in the process of starting the motor, but backward motion is snubbed by the pawl and ratchet and the autoist in the process of cranking the motor is thereby protected.



Jones Safety Starting Crank

THE AUTOMOBILE

Harrisburg Club Runs Fourth Annual Event

HARRISBURG, with its fourth annual roadability run, made a dashing start on the morning of May 10. It is for three days. The itinerary of the run, starting from Harrisburg, is Philadelphia, Atlantic City, Wildwood, and return to the place from whence they came. The run is under the auspices of the Motor Club of Harrisburg, is under the rules (for 1910), and is sanctioned by the "Contest Board," of which S. M. Butler is chairman. The officials of the Harrisburg club who are responsible for the run made every necessary preparation and the reward is just within their grasp; there is every indication that the end to-night will be fine.

Scene at the Start, Harrisburg Reliability Run

Right, W. R. Douglas, Referee Left, Gas Tank Wagon

Officers and Committees

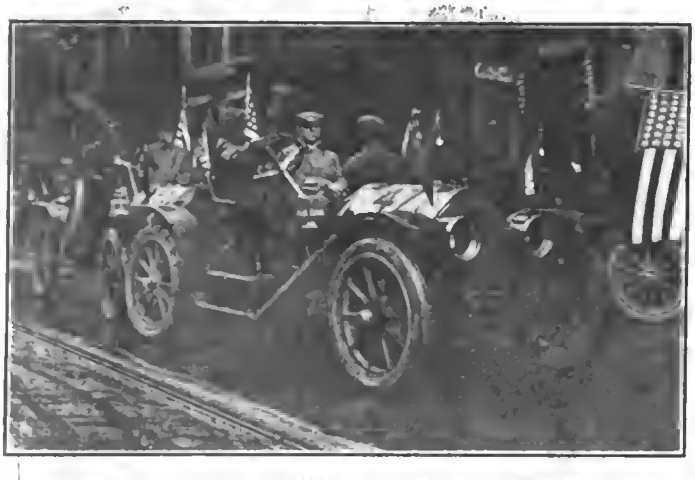
W. O. Hickok, 3d, president; F. H. Bomgardner, 1st vice-president; David G. Bowman, 2d vice-president; Dr. John Oenslager, 3d vice-president; John C. Nissley, treasurer; J. Clyde Myton, secretary.

Board of Governors

James McCormick, Jr., Dr. C. C. Cocklin, Frank A. Stees, C. C. Cumbler, O. C. Robertson, J. C. Aldrich, J. Sidney Sible,

Maxwell Entry, the First Car into Philadelphia

Checking in the Franklin Car at Philadelphia



Greenwood Driving the Marion Entry in Harrisburg Run

Enger Car, a Newcomer, in the Quaker City

Frank J. Brady and H. C. Wright.

Chairmen of Committees

W. G. Starry, membership; I. W. Dill, house; J. Clyde Myton, contests, tours, etc.; E. K. Frazer, law and ordinances; Robert McCormick, auditing; Vance C. McCormick, roads.

Official Cars

Pathfinder—The American, Stoyle-Vogel Co., Philadelphia, Pa.; Re-Survey Car—Buick, Sheriff E. Johnson, Atlantic Co., N. J.; Referee—Premier, The Motor Company, Philadelphia, Pa.; Tire Car—Meely, the Tire Man, Philadelphia, Pa.; Pilot—Kline Kar, C. C. Cumbler; Press Car—Chalmers, Harvey Ringler, Philadelphia, Packard Monument Motor Car Co.. Philadelphia, Pa.

Race Officials

Referee—W. R. Douglas, of Harrisburg; Technical Chairman—David Beecroft, President Chicago Motor Club; A. A. A. Representative—David Beecroft; Chief Observer—J. Clyde Myton of Harrisburg; Finish Judge—B. F. Blough of Harrisburg; Publicity Agent—Geo. Proud.

Contest Committee

J. Clyde Myton, chairman; W. R. Douglas, secretary; R. H. Johnston, E. G. Irvin, C. C. Cumbler, F. A. Stees, B. F. Blough, G. G. McFarland, W. F. Graupner, C. C. Crispin, Andrew Redmond, I. W. Dill, Robert Morton.

The distance from Harrisburg to Atlantic City is 168 miles, which represented the first day's work, and the arrival there was in due season, heralded by all the motorists of that popular seaside resort. It was a heavy day, from the weather point of view; rain fell for a considerable portion of the time, but despite this rather unpleasant phase of the situation, the run was hugely enjoyed, and it was to the credit of the contesting automobiles that there were no serious incidents to mar the day.

ATLANTIC CITY, May 9—Forty automobiles made the journey from Harrisburg, and while many of them were entered by maker's agencies, the fact remains that there was a goodly sprinkling of owners in the merry throng. There were a thousand incidents which happened along the way to upset the monotony of the weather, and citizens along the line were as much interested as the contestants themselves, if appearances count for anything.

In Pennsylvania the roads were extremely good, excepting for a stretch of bad going between Reading and Pottstown. This part of the way was in mighty contrast with the "pikes" in Pennsylvania and New Jersey; they were the wonder and the source of continual admiration on the part of such contestants as were strangers to this state. Despite the rain and the general inclemency of weather, the roads in New Jersey were hard and dry; the rain tumbled down and rolled off and away through provided channels as water from a duck's back; the automobiles passed along and on just as if the sun was shining all the time, and the autoists in their rain togs enjoyed every moment of it with an added interest for every foot.

The story of cars dropping out of the perfect score ranks in the first day was looked for, and in the maker's class four had to surrender this coveted honor for one day. On the second day's run six more were disabled in one manner or another, so that by the end of the second day only eleven of the original twenty-one remained with clean scores. On the opening day the cars made the pace as fast as possible, and some suffered because of this. The Mitchell was given fifteen points for having to take on gasoline and water outside of the noon and night controls. This car withdrew on the second day, but will complete the circuit as a non-contestant. One of the Kline Kars, driven by Sieg, ran out of gasoline a short distance out of Norristown and received 27 points. The driver, A. D. Rea, had to go some distance to secure gasoline, and was penalized for the filling and also for the time the car was late in reaching its controls.

On the second day more penalties were added. The Mitchell six which received some penalties on the opening day was withdrawn. The Regal received six points for carbureter adjustment. The Kline Kar, driven by McCulla, was penalized three points for adding oil between noon and night controls. Nine points were given the Enger car for tightening nuts that worked loose on the gear set. The Pullman, driven by Ickes, received fifteen points for putting on a new fan belt. Herb Bitner, driving a Pullman, was given one point for carbureter adjustment.

To date the penalties have been more for adjustments than for defects of construction, there being a big loss in points through dirty gasoline. It is expected that to-morrow's run of nearly two hundred miles will add to the number of cars that have been penalized, so that by the time all cars have taken the final outdoor test and technical inspection there will be few of the present eleven perfect scores remaining. Compared with past seasons, it is very remarkable how few of the cars have lost points through broken springs, frames or wheels, which is to an extent accounted for by the smooth roads.

The list of private owners competing is:

Maxwell, H. C. Wright; Mitchell, J. W. Shaffer; Maxwell, D. G. Bowman; Buick, E. K. Frazer; Ford six, W. G. Starry; Maxwell, F. H. Bomgarden; Cadillac, J. E. Dare; Buick, M. H. Baker; Kline Kar, M. E. Brightbill; Kline Kar, M. B. Cumbler; Buick, Donald McCaskey; Cadillac, W. H. Riggle; Maxwell, S. F. Metzer; Rambler, J. A. W. Brubaker; E. M. F., R. H. Forney; Pullman, T. O'Connor; Franklin, Geo. Karlavan; Pullman, J. L. L. Kuhn.

In this amateur party are passengers in most of the cars, and they all run on a 17-mile schedule in Pennsylvania and a 20-mile pace in New Jersey. They start each morning immediately after the makers' cars have been checked out, and are required to check in at all of the checking stations.

WILDWOOD, N. J., May 10—The second day of the three-day fourth annual tour of the Harrisburg Motor club ended here to-night, fine weather having followed the tourists except for a few hours after the start from Harrisburg Monday morning. It is rarely if ever there has been in America a tour by a local club which has created more interest throughout the territory traversed than the present one. This widespread interest is due primarily to the excellent publicity campaign throughout the territory covered by the run and also because of the local interest worked up in the different towns passed through by the promoter. In all twenty prizes are offered, two special prizes and eighteen trophies and of these eighteen trophies four were donated by the city of Bridgeton, three by the city of Millville, two by the town of Salem, six by Reading and one by Wildwood. These trophies, as well as the two given by Harrisburg have stirred up widespread interest. Another factor in stimulating interest in the run is the big list of private owners or amateurs as they might be called. There are 18 amateur or private owners in the run and 21 cars entered by manufacturers so that this field together with official cars makes a grand total of forty-nine cars or more than were in the Glidden tour of last year. This big entry list, which is representative of a goodly number of cars, taken in connection with the miles of roads that have been dragged and specially prepared for the tour, is conclusive proof that the Harrisburg club has the co-operation of the district.

Score for the First Two Days of Run.

		Monday.	Tuesday.
Kline Kar	J. A. Kline	0	0
Kline Kar	R. L. Morton	0	0
Kline Kar	C. V. Fairman	0	0
Kline Kar	S. Cole	0	0
Mitchell	C. F. Snyder	15	Withdrawn
Regal	F. Hosmer	0	6
Franklin	J. Burns	0	0
Pullman	H. Welker	0	0
Pullman	H. P. Hardesty	4	0
Pullman	N. Gallatin	0	0
Pullman	H. Bitner	0	1
Inter-state	W. W. Vandergrift	0	0
Warren-Detroit	Tom Berger	0	0
Columbia	E. Yeager	19	0
Enger	H. L. Brownback	0	9
Marion	E. Greenwood	0	0
Overland	C. Greenwood	0	12
Maxwell	A. D. Rea	0	0
Kline Kar	William McCulla	0	3
Kline Kar	W. P. Seig	27	0
Pullman	G. Ickes	0	15

Premier Car, Which Carried the Referee and Starter

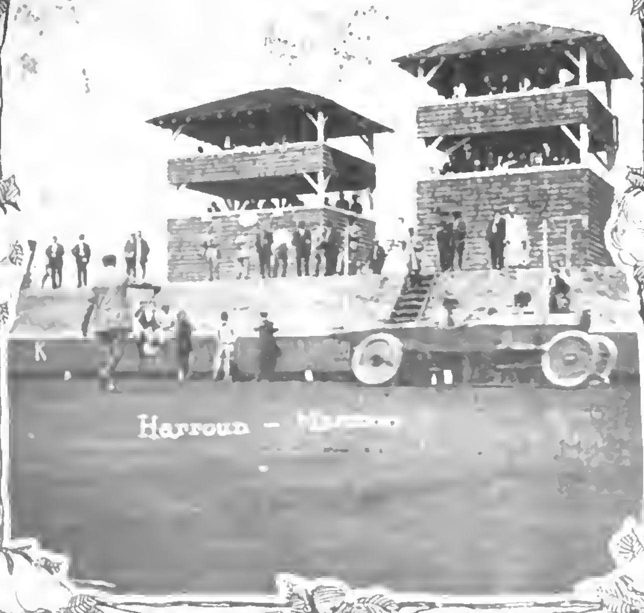
Entering States Garage, Atlantic City, After Checking In

Pullman Entry, Welker Driving, Reported Present

Regal Car Filling with Oil and Gas at Philadelphia


Marmon and Knox


Start of Trophy Race


Harroun - Marmon

Atlanta's Epochal

ATLANTA, May 7—The three-day race-meet which ended here to-night, although not a success from the view-point of number of entries or attendance, was, nevertheless, most interesting, as many of the races were closely contested and not any car had a certainty of winning everything in its class. The whole attendance on the three days did not total over 20,000, whereas the grand stand and bleachers will accommodate over double that number. In all fourteen cars of different makes competed in the program; the speed merchants being the Marmon six with cylinders 4½ by 5 inches, the Fiat 90 with cylinders 130 by 190 millimeters and with double-intake and exhaust valves, and the American roadster with cylinders 5¾ bore and 5½-inch stroke.

In the meet only one record was broken, namely, the 20-mile event stock chassis, in the 451-600 cubic inch class. De Palma driving a Fiat 60 with cylinders 140 by 130 millimeters, clipped nearly 2 seconds off the mark.

In many of the other races the times made were very close to the old records, but the rough condition of the track made it almost impossible to equal the old marks.

The cars entered in the various events were as follows:

	Bore	Stroke	No. Cyls.	Piston Dis.	Weight
American	5¾	5½	4	571.3	2,850
Buick	3¾	3¾	4	....	1,404
Cole	4	4	4	201.1	1,728
E-M-F	4	4½	4	226.2	1,565
Fiat	140	130	4	....	2,748
Fiat	130	190	4	....	....
Firestone	4	4	4	201.1	1,620
Knox	5	4¾	4	373.	2,398
Marmon	4½	4½	4	286.3	2,205
Marmon	4½	5	4	318.1	3,254
Marmon	4½	5	6	477.1	....
National	5	5 11-16	4	....	2,628
S. P. O.	110	140	4	....	2,000
Allen-Kingston	5½	6	4	....	....

SUMMARIES OF THE RESULTS

MAY 5.

Event 1—Twenty-mile stock chassis, 451-600 cubic inches:—

Miles	2	4	6	8	10	12	14	16	18	20
Fiat 60	1:42	3:11	4:47	6:22	7:56	9:30	11:07	12:43	14:20:00	15:57:41
Nat'l 40	1:49	3:26	5:04	6:40	8:16	9:53	11:28	13:04	14:40:09	16:16:08
American	1:42	3:11	4:47	6:29	8:10	9:42	11:14	12:46	out	
Nat'l 40	1:49	3:26	out							

Kincaid, Aitken – Nationals

pring Meet Ends

Endicott-Cole

Event 2—Ten-mile stock chassis, 161-230 cubic inches:—

	2-mile	4-mile	6-mile	8-mile	10-mile
Cole	2:12	4:11	6:08	8:05	10:04:89
Buick	2:13	4:13	6:13	8:13	10:15:15
E-M-F	2:20	4:25	6:29	8:31	10:31:76

Event 3—Matched amateur, 10 miles:—

	2-mile	4-mile	6-mile	8-mile	10-mile
Fiat 60 (Rutherford	1:57	3:42	5:29	8:12	8:53:03
National 40 (Stoddard)	2:00	3:46	5:31	7:16	9:04:35

Event 4—Ten-mile free-for-all:—

	2-mile	4-mile	6-mile	8-mile	10-mile
Fiat 60	1:40	3:12	4:45	6:20	7:55:71
Marmon Six	1:43	3:12	4:40	6:10	7:43:47
National	1:47	3:22	4:56	6:30	8:06:06

Event 5—Match race, 10 miles handicap:—

	2-mile	4-mile	6-mile	8-mile	10-mile
Fiat 60 (Asa Candler, Jr.)	1:32	1:33	1:33	1:32	1:44:76
National 40 (Stoddard), one min. handicap	2:02	1:47	1:47	1:47	1:46:12

MAY 6.

Event 1—One-mile time trials:—

Fiat 90 (De Palma)	40.33 seconds
Marmon Six (Harroun)	41.19 "
Christie (Christie)	42.79 "
American (Lytle)	43.19 "

Event 2—Twelve-mile free-for-all:—

	2-mile	4-mile	6-mile	8-mile	10-mile	12-mile
Marmon Six	1:41	3:08	4:30	6:07	7:33	8:59:15
American	1:42	3:09	4:37	6:06	7:34	9:02:48
Fiat 90	1:39	3:08	4:37	6:08	7:38	9:30:58

Event 3—Ten-mile stock chassis, 301-450 cubic inches:—

	2-mile	4-mile	6-mile	8-mile	10-mile
National (Aitken)	1:49	3:26	5:04	6:41	8:18:11
Marmon (Harroun)	1:55	3:37	5:20	7:03	8:44:83
S. P. O., Strang	2:11	4:08	6:05	8:02	9:58:81

Event 4—Ten-mile amateur handicap:—

		Actual running time
S. P. O. (1:30 handicap), Woodside (won)	9:56:32	(*8:26:32)
National, Stoddard	9:17:76	

*Woodside's official time.

Event 5—Sixty-mile stock chassis, 161-230 cubic inches:—

	10-mile	20-mile	30-mile	40-mile	50-mile	60-mile
Cole	10:10	20:43	30:49	40:49	50:37	60:28:46
E-M-F	10:45	21:04	31:37	42:10	52:36	62:58.91
Firestone	13:09	26:31	37:50	48:49	59:53	*running

*In 52nd mile at finish, 62:12:53.

(Continued on page 901)

Lytle-American

Good Start for Around New Jersey Run

UNDER weather conditions that could hardly have been improved upon, the Around New Jersey Reliability Run, under the auspices of the Motor Contest Association, started on schedule time Tuesday morning with thirty-one cars on the line. The route, which was to Atlantic City and return, 157.9 miles on the out-trip and 155.1 on the return, was arranged over a variety of roads to test the touring efficiency of the cars. The roads were in excellent shape and there was nothing to mar the comfort of the drivers.

The starters included:

Class 1A—$800 and under.

Car.	Entrant.	Driver.
Hupmobile	F. L. C. Martin Auto Co.	Elmer D. Cutting
Hupmobile	F. L. C. Martin Auto Co.	R. E. Gillam

Class 3A—$1,201 to $1,600.

Car.	Entrant.	Driver.
Cole "30"	Colt-Stratton Co.	F. Warmington
Regal	Regal-Detroit Auto Co.	W. H. Bowers
Overland	Essex Overland Co.	George L. Riess
Maxwell	L. M. Bradley	L. M. Bradley
Buick	Buick Motor Co.	W. C. Davenport
Maxwell	J. W. Mason	Charles Schaffer

Class 4A—$1,600 to $2,000.

Car.	Entrant.	Driver.
Pierce-Racine	G. M. Merrill	Lewis Strang
Auburn	LaDue & Carmer	Herbert F. Earle
Franklin	Franklin Auto Co.	Paul Harvey
Chalmers	C. H. Page & Co.	Joseph Bell
Koehler	Dr. Alex Dallas	J. J. Bryer
Buick	Buick Motor Co.	Paul Hines
Marion	Charles E. Riess	W. F. Bradley
Cadillac	Detroit-Cadillac Co.	N. L. Lichtenberg
Cadillac	Charles M. Welsh	L. R. Burne
Midland	Midland New York Co.	Leo Anderson

Class 5A—$2,001 to $3,000.

Car.	Entrant.	Driver.
Stoddard-Dayton	Atlantic Motor Car Co.	R. Newton
National	Poertner Motor Car Co.	W. C. Poertner
Croxton-Keeton	Croxton-Keeton M. C. Co.	O. P. Bernhard
Mitchell	Mitchell Motor Car Co.	O. R. Delamater
Mora	Mora Motor Car Co.	Charles Hinman
Mercer	Floy & Clark	H. S. Clark
Mercer	Added Starter	Joe Trehou

Class 6A—$3,001 to $4,000.

Car.	Entrant.	Driver.
Franklin	Franklin Auto Co.	Charles F. Fox
Welch-Detroit	Buick Motor Co.	Robert M. Flagg
Matheson	Matheson Auto Co.	Neil Whalen
Haynes	Walter Shuttleworth	W. Shuttleworth

Class 7A—$4,001 and over.

Car.	Entrant.	Driver.
Zust	T. J. Gerehart	Joseph Kingsland
Zust	American Zust Motor Co.	V. P. Pisani

The American and Stearns entries and one Maxwell car that was eligible, did not start and the Glide car was disqualified before the start owing to the lack of condition of the driver.

The start was from Fifty-seventh street and Broadway at 7.30 o'clock, thence to the Twenty-third Street Ferry and the public square in Jersey City, where the cars were sent away on their course.

The following is a list of the officials who had charge of the run: A. H. Whiting, referee; J. B. Ireland, pacemaker; Raymond Beck, pilot; J. M. Carples, chief observer; A. N. Jervis and E. F. Korbel, checkers, and A. L. McMurtry, Edward Johnson and C. H. Martin, technical committee. W. J. Morgan, president of the Motor Contest Association, was there.

Headed by the Franklin truck, which carried the baggage of the participants in the tour, the column reached Lakewood, N. J., Tuesday noon. In the afternoon the tourists proceeded to Atlantic City which was reached without extraordinary incident. Thirty out of the 31 starters arrived at the night control. Wednesday morning the return trip was started and shortly after 4:30 o'clock the contestants began to arrive in Jersey City.

The same excellent checking arrangements were in force at the finish as had obtained at the start, and with a minimum of confusion the wearied drivers shot their cars over the line.

The last leg of the run was over roads not quite up to the standard of Jersey highways and several of the contestants were covered with dust as the cars finished. The winners in each of the classes will be awarded gold medals; the seconds, silver, and those who finish third will get bronze decorations.

How the Cars Looked When Lined Up in Newark

New National Torpedo Body Attracted Much Attention

Matheson Silent Six, Niel Whalen at the Wheel

Mora Light Four-Cylinder, Driven by Hinman

—and not so long ago either—when au-
:w Jersey included a number of extra-
gles that should have no place in the
: was a notorious fact that the automo-
ıplated a tour always found it conven-
$2-bills, with which to smooth out the
'er-officiousness and over-zealousness on
y peace officers. "Jersey Justice" had a
ɔration was deserved.
Automobile and Motor Club never did
ct that unjust, annoying and almost in-

tolerable condition it performed a service that entitles it to a warm place in the hearts of motordom. It did a great work in this matter and it did it so thoroughly that the necessity for the roll of $2-bills has been obviated and a tourist can enjoy the magnificent roads and scenery of New Jersey without hindrance if he simply observes the law of the land.

This has been accomplished through the activity of the giant organization which has its headquarters in Newark. The club is said to be the largest and most powerful in the United States. It was founded June 1, 1903, with twenty-nine members. Two years ago it moved into its present quarters at East Park street and Park place, Newark, and to-day it has 2,087 members, including the leading citizens of the state.

The club takes a strong position in every line of automobile activity. In the first place it offers legal protection against persecution and unjust suits instituted against members. The club takes up the legal battles without charge and the records show that it has met with extraordinary success. While the casual reader might imagine that this feature of the work would seem to encourage reckless handling of automobiles under the protection of the organization, the very opposite is the truth.

The felicitous outcome of the club's campaign against "over-officiousness" on the part of certain country constables and justices, which rendered necessary the $2-bill bankroll as a condition precedent to any kind of an extended tour, was the result of a plan worked out by A. B. Le Massena, secretary of the organization. When the "over-officiousness" was at its height, the club organized a motor-cycle squad consisting of some ten or a dozen members and when an unwary tourist was about to trundle into a speed trap, at the end of which was a log chain and a group of "needy" officers, a motor-cycle emissary from the club would dart out of a crossroad and halt the automobile. Then the sentry would hand the occupants of the car a card that read like this:

> **Warning!**
>
> **Speed Trap Ahead**
>
> You are warned that a speed trap exists on this road just ahead. Go very slow until you pass the danger point.
>
> This Warning Is Issued by the
>
> **New Jersey Automobile and Motor Club**

On the back of the card is printed a blank application for membership and not a few of the enthusiastic members of the club were first introduced to it through this medium.

If the motorist happened to run foul of the "authorities" he was instructed to take complete data of the proceedings. This consisted of the name and address of the member; the date; the name of the justice and his location; names of witnesses, and the amount of the fine. He was also instructed to take a receipt for the fine, if one was levied.

This proved most disconcerting, as it gave a definite line upon the money paid in and afforded a basis for appeal that cut down revenues with a broad sweep. One illuminative fact has developed since the club commenced its campaign. The amount of fines turned into the state treasury has increased, while the club members say that prosecutions have been cut down over half.

The club gives from six to ten runs and tours during each year and at least one real contest. The runs are all strictly for the pleasure and benefit of the members, while the contest brings out manufacturers' cars in large numbers. This year the event will start early in the morning of June 11. Four classes of cars have been provided for and strict technical rules will be observed. Class A includes cars listed at $950 and less. Class B includes cars listed between $951 and $1,500. Class C includes cars listed between $1,501 and $2,500. Class D includes cars listed at $2,501 and over.

The course, which has been laid out to cover all kinds of roads and conditions from the steep hill and narrow path to the broad and smooth highways of the level plains, is 145.3 miles long. Twice around is the distance of the race and the small cars are required to complete the course in fifteen and a half hours, while the other cars must make it in an hour less. A liberal entry list is expected as soon as the blanks are distributed.

Silver cups for the best scores in each class have been provided. The entrance fee is $15.

The newest project of the club is the acquisition of a country branch. Much care was exercised in the making the choice of a location and the decision recently has been announced that the selection is a five-acre plot lying near Butler, N. J.

It is about twenty-five miles out from Newark on the old Pompton turnpike. The route is via a stone road all the way and leads along the scenic Pequanock river road. The way from the Newark headquarters to Butler is through Montclair. Singac, Mountain View, Pompton to Butler. The branch clubhouse site is in the foothills, 700 feet above sea level. The house stands on a bluff, fronting upon a private lake of sixty acres extent. This lake is stocked with game fish and is strictly preserved. It is called Apshawa Lake and is one of the most beautiful spots in that section of the country. A bungalow for the benefit of members who wish to enjoy the fishing is being built, and many improvements in the present plant are being made.

There is a spacious old mansion now upon the property, but the club intends to build an addition that will double its size.

The plans contemplate a clubhouse two and a half stories high with a basement. There will be a chauffeurs' dining-room and quarters and on the main floor a restaurant to seat 60 persons. The upper floors will contain a dozen bedrooms, equipped with every convenience. Between the addition and the present building the club will build a pergola and corridors connecting it with the old building and a wide veranda will surround the whole.

The townhouse of the club, at 64 Park place, is an impressive building. It is three stories and basement and when the club first occupied it it seemed as if it would be large enough for all time. But in two years the New Jersey Automobile and Motor Club has grown so swiftly that the big house is no longer adequate for its purposes. This year the club will stay in the present quarters, but next year a permanent location is to be purchased.

The club has a lot of attractions and conveniences. It has a restaurant and grill-room that rival the best in Newark in the matter of cuisine and service and is equipped with billiard and pool tables and rooms where bridge and other games may be enjoyed, beside a dozen other details of service to its members.

In a financial way the club is in excellent shape, owing nothing and possessing a comfortable bank balance. Its secretary, Mr. Le Massena, is a business man of high ability and he has the confidence of his officers and governors as well as the general club membership.

The annual meeting was held very recently and the following officers were chosen: President, Clarence H. Bissell; vice-president, H. D. Bowman; treasurer, George H. Simonds, and secretary, A. B. Le Massena. The board of trustees includes besides the above: W. C. Crosby, Guido O. Groebe, Dr. F. B. Meeker, J. B. Scarlett, Lewis Strauss, Paul E. Heller and J. L. Adams, Jr.

South Shows How Roadbuilding Is Done There

THE problem of the use of convict labor in building the good roads of our nation is fast assuming an aspect of particular importance, and is being given the serious consideration of the chief executives and other thinking men in the several States interested in this movement. At the present time there are a number of the commonwealths in the Southern sections of this country which have shown a commendable spirit in having their prisoners do a work which benefits the entire State rather than spend their time in idleness or in a series of prison occupations which simply pay for their own expenses and do not benefit any one outside.

The importance of the good-roads movement, with its lessened cost of transportation, and its increase of automobile touring with the accompanying influx of money, is fast being realized by many of the States and the developments in this line are of particular interest. Louisiana, sometimes supposed to be a State which was not making any special efforts in the direction of progress, is now showing itself to be wide-awake and the movement which has been started there for good roads, with the support of some of its most influential men, will probably do more to open up that section of the South than anything that has happened in recent years.

The history of this movement for good roads is an interesting one inasmuch as it has taken two and a half years to bring these plans to a culmination and to show actual progress in the work. New Orleans as a city is a great surprise to Northerners, for its reputation of quaintness, of old style, and appearance of a past age, are certainly misnomers.

In the matter of its fine streets, large substantial buildings, and beautiful residences, it is not surpassed by any Northern municipality, and it is, perhaps, this prevailing spirit of progress which has influenced the promotion of the Motor League of Louisiana, a body which is composed of well-known and influential citizens, with a steadily growing membership. The necessity for good roads in the State was at once appreciated upon the formation of this organization and just two and a half years ago the campaign for improved highways was begun by P. M. Milner, the president, and Victor Aschaffenberg, secretary, both of them enthusiastic automobilists.

It was figured that $30,000 would be necessary to complete the first road in order to show the advantage of the improved service if extended throughout the State, and it was decided to select a certain old trail, built eighty years ago, leading to Chef Menteur, which would give a distance of twenty-three miles and would open up a country renowned for its fishing and hunting, allowing the trip to be made in a couple of hours by motor, to grounds which could only be reached by train or boat at certain times of day and in several hours. When this route was announced, the failure of the plan was at once predicted because the road was at that time absolutely impassable and it lay through a country of luxurious Southern foliage, where splendid live oak trees and hanging Spanish moss formed an archway overhead. Chef Menteur has a splendid natural harbor and it was formerly open to the Gulf of Mexico, but the Louisville and Nashville Railroad fifty years ago built tracks across the outlet compelling all vessels to go to Rigolets. Recently the United States Government Engineers have pointedly recommended that this railroad build a drawbridge, thereby giving a coast outlet to Chef Menteur for yachts and lumber and oyster schooners, and making a road thirty miles shorter through Lake Borne, from the Gulf into the Mississippi at New Orleans.

It was soon found that $30,000 could not be raised among the motorists whose interest could be enlisted, but this did not deter the ideas of the moving spirits of the new club, and seven of the men contributed $100 each for a survey of this road to be made through the City Engineer, W. J. Hardee. The survey was reported most favorably and the scheme was pronounced thoroughly practicable so that the movement was started in earnest. The first assistance was received from Mayor Martin Behrmann and the City Council, who at one night meeting introduced an ordinance, passed it unanimously, and appropriated $2,000 for experimentation, as to the best type of road surface. The Mayor gave his personal assurance that if the road was constructed it would be maintained by the city, being within the city limits. It might be stated here that New Orleans has the largest area of any city in the country, having 265 square miles within its boundaries, although only seventy square miles are populated. Of the twenty-three miles to Chef Menteur, only eighteen had to be constructed by the League inasmuch as the remainder was composed of city asphalt streets and a series of splendid shell highways in the suburbs.

About this time Governor Sanders, himself a good-roads enthusiast, devised a new scheme of using the convict labor in the open country rather than in the closed prisons or on the state farms. The failure of other cities in this particular was assigned to the fact that they farmed the criminals out and there were many serious complaints against the treatment of the latter, who were entitled to at least human consideration, so this up-to-date chief executive arranged a new plan. In Louisiana, the Governor has the right to furnish convicts for other work than on the cotton and sugar plantations of the State, as long as they are not leased. On these farms they have paid their own expenses, but at times there are more convicts than necessary, so in conjunction with the automobilists it was arranged by the State authorities late last Fall to organize camps of twenty-four negro convicts each for work on the roads. The white prisoners are used in the commissary department, and all of the men are watched constantly.

The Motor League of Louisiana agreed to take the first camps upon the following basis: To pay for all food, the salary of the armed guards, one-half the cost of the resident engineer, and the fee of the visiting physician who inspects the negroes three times a week, and the state agreed to furnish the camp equipment, consisting of a commissary wagon, one or two berth wagons, a portable screened jail, tents, etc.

On the twenty-first of February of this year the actual work on this roadway was started and the first formal inspection took place on April 17. In just about two months, working six days a week, the convicts have dug ditches, and graded and crowned roads for a distance of about four miles, from Gentilly road to Michaud station, and they have given positive assurance of the success of this great undertaking. It is estimated that it will take eight months longer before the preliminary, or comparatively rough work, is completed, and perhaps, within this time they may have an opportunity of putting on the top coat of heavy gravel covered with a dressing of asphaltum oil.

Upon this pleasant Sunday in April there congregated at a prominent point in New Orleans, a party of particularly distinguished persons, who arranged to look over the ground thoroughly, and to give especial attention to the conditions of the convict camp at Lee Station. A number of local motorists volunteered their services to carry the State and City officials to the scene of action, and the factory representatives of the Premier Motor Mfg. Co., who were at that time in the city, placed the big six-cylinder Wistaria Premier touring car, which has been used by the Imperial Potentate of the Shriners during the convention, at the disposal of Governor J. Y. Sanders, ex-Governor W. W. Heard, president of the Penitentiary Board of Control, and Mayor Behrmann. E. B. Williams in a Premier carried E. E. Sykes and the newspaper men; A. J. Stallings in a Locomobile carried J. J. Frawley, president of the City Council, and James Reynolds, Chief of Detectives; C. H. Ellis, president of the United Fruit Company in his Peerless was accompanied by Henry Krohn and Captain John Deibert, a wealthy lumberman; and Palmer Abbott in his Packard carried Mr. Milner, Mr. Aschaffenberg, Joseph Schwartz and G. F. Boudereaux. Others in the party were E. B. Williams, E. J. Roderigue, M. B. Fletcher of the Premier Co., and the writer.

This party was driven through the beautiful suburbs of the city and out into the bracing morning air, through groups of picturesque negro shanties, and bits of woods and fig orchards, to the country of the live oak and the real Southern scenery. It was interesting to the Northerners in the party to travel over several miles of shell roadway which are as hard and well kept as anything in Jersey, before coming to the new operations. They were then taken over four miles of recently constructed surface at a lively clip, and the new road appeared to be particularly solid and well drained. But beyond the point to which the improvements have at present reached there are miles where an automobile would be useless, and indeed one of the cars sank so deeply as to necessitate taking it out. This was just an apt illustration of the "before and after treatment" and showed the necessity of the enthusiasm now abounding. The Motor League has paid for the plows, scrapers, and other machinery, and a large number of the members have contributed between $100 and $200 each to assure the furtherance of the operations. Their success is leading other parishes to inquire about the movement and Governor Sanders has assured them that any one in the State may receive organized camps of convict laborers.

The plans for the future call for a belt road around the entire city, with a number of well-prepared feeders into the interior. As yet no definite ideas have been formulated as to a series of roads which would lead from New Orleans, the principal city of the State, to the large cities in the neighboring commonwealths, such as Atlanta, Mobile, Memphis, and Texas points. It is very probable that this will be taken up as soon as the present situation is shown to be a phenomenal success and one which bids fair to give more life and wealth to New Orleans than any single factor in recent years.

Start of Governor and Party to Inspect Roads in a Premier

Beyond the Road Improvement, Even the Edges are Dangerous

Standard Process of Finishing Automobiles

By M. C. Hillick

FIRST let us consider the oil and lead system which, since the early days, has been the premier system in all departments of painting where quality is a factor of importance, referring to wood bodies only.

Sand and clean up the surface. Into pure raw linseed oil stir enough keg white lead, ground in oil, to stain the oil somewhat and check the excessive penetrating property of the oil. Whip the lead into a batter before adding it to the oil. Lay coat on thin and smooth.

Use a purchased ready-mixed roughstuff, or, if preferred, a shop-mixed one, adding to either, for this first coat, a small quantity of keg lead to give the material greater density and compactness of texture. If shop mixed take equal parts, by weight, of keg lead, oil ground, and any good American filler, beating the two thoroughly together to a stiff paste, in equal quantities of coach japan and rubbing varnish, then thinning to a proper brushing consistency with turpentine. With a good chisel-pointed brush apply a coat of this filler.

The Fourth Day Brings Work to Do

Go over the surface carefully and putty up all defects with a hard-drying automobile putty made as follows: Dry white lead, three parts; finely bolted whiting, one part. Mix in equal parts of coach japan and quick-rubbing varnish to the proper working consistency.

Apply second coat of roughstuff, laying material off at right angles to the first coat. If the ready-mixed roughstuff is used omit the extra allowance of white lead mentioned in connection with the first coat.

Sixth, Seventh and Eighth Day's Demands

Apply one coat of roughstuff each day, changing the color of the last coat by adding either a little dry Indian red. or yellow ochre, thus serving to give the workman a guide coat to rub by.

Using plenty of water, with blocks of artificial rubbing stone, which in composition run from coarse to fine, using the coarse stone first and the fine to finish with, block down the surface to a smooth level condition. Wash the surface thoroughly.

Sandpaper with No. 0 paper to loosen up possible accumulated substances. Dust off and apply one coat of color. P. M.—Apply a coat of color-and-varnish.

With a thin piece of perforated felt, wet, and dipped in pumice-stone flour, go lightly over the surface, "killing" the gloss uniformly. Wash off and apply a coat of elastic rubbing varnish containing just a pinch of the body color to preserve the original purity of it. In case any of the lakes or the transparent colors used, as a rule, in the form of glaze colors, are employed, it will be necessary to change the system to the extent of introducing a preparation coat of color and using the glaze coats over this. Rub the surface with water and pumice-stone flour, applying a firm, uniform surfacing, wash up, and stripe, and apply other ornamental work desired.

Apply Varnish on the Sixteenth Day

Wash up and apply a second coat of elastic rubbing varnish.

With water and pumice-stone flour rub the varnish all over thoroughly and uniformly wash up perfectly clean and flow the surface with a pale elastic finishing varnish of the best grade.

During this time the chassis should be painted in a manner to correspond to the body and brought to a finish.

There are a number of patent surfacing systems being marketed by paint and varnish manufacturers which may, without disadvantage, be substituted for the lead-and-oil system above outlined, the first or priming coat of these systems being a transparent medium, and in some cases to be wiped off with soft pieces of cloth after being brushed on. The time limit does not, however, vary greatly from that above described for the lead and oil, when first-class work is in order.

By applying roughstuff, one coat in the morning and one in the afternoon, making two coats per day take the place of one, and omitting one coat of rubbing varnish about three days in the schedule may be saved, thus getting the finish within 16 days.

Rapid System of Finishing Is Cheaper

The demand for rapid systems of painting both metal and wood bodies has developed to such an extent of late that there have been evolved methods with which to meet this demand.

For metal.—Clean surface thoroughly. Apply either a patent metal primer of which there are plenty, or one made of one part raw linseed oil and three parts turpentine with a stain of lead in it.

Mix dry white lead, three parts, and best bolted whiting, one part, in equal parts of coach japan and rubbing varnish, (elastic) adding a teaspoonful of raw linseed oil to each pound of the mixture. Work this down to a condition to smooth out under the blade of a broad, half-elastic putty knife, and apply to the surface with the knife, drawing the pigment out thin, smooth, and in shape to sandpaper to a good surface with a minimum amount of work. Color this surface to meet any shade desired for the final body color.

Sandpaper on the Third Day in the Morning

Sandpaper surface thoroughly, first with No. 1 sandpaper, second and finally with No. 0 to fetch out the fineness. Same day, P. M.—Dust off and apply one coat of the regular body color to be used, if such color is known as an opaque color. Lay on a coat of ground work color, if a transparent or glazing color is called for. In mixing this first coat of color use one part raw linseed oil to five parts turpentine.

Apply coat color-and-varnish or coat of glaze.

Rub lightly with a roll of broadcloth dipped in water and in No. 00 pulverized pumice stone to deaden the gloss and knock down any dirt atoms. Same day, P. M.—Apply coat of elastic-rubbing varnish into which a bit of the flat color has been thoroughly stirred. Again, with pads of felt dipped in water and No. 00 pulverized pumice stone rub the varnish carefully, clean up, and apply any necessary striping.

Color Is Again Applied on Eighth Day

Apply coat of clear elastic rubbing varnish.

Again rub as above with water and pulverized pumice stone, wash up, and finish with a rich, full body-finishing varnish.

During this course of painting and finishing the body, the chassis should be cleaned, painted and finished to match the body.

For wood-body surfaces this same rapid system may be employed, except that in the priming six parts raw linseed oil and two parts turpentine be used. All other operations to be carried out as in case of metal surfaces. By substituting quick-rubbing varnish for the elastic the system may be abbreviated to the extent of at least two days.

The chassis should in painting always be brought along with the body and given every necessary attention. It should have the same primer, and above this should be laid at least two good coats of lead, or, as the case may be, patent surfacer, each coat being perfectly sandpapered and made fairly glass-smooth, and puttied wherever needed. Then in order come the color or ground-work coat, color-and-varnish or glaze coat, then a light rubbing with water and pumice-stone flour, striping, and one coat clear rubbing varnish. In due season surface this coat down with water and pumice-stone flour, wash clean, and finish.

Thus is the automobile painted and finished with due regard for harmony and a proper balance of all the parts.

1910 Touring Information for Autoists

PERHAPS, in time, the type of dictionary which will be accepted as autboritative will give a comprehensive definition of the word "touring." It is not so long ago that the idea of touring was confined to the process of racing around the country, violating speed laws and ruffling the temper of the natives, besides tearing up the roadbed and doing all the other things which made it utterly impossible to know anything about the locality througb which such swaths were cut, and of pleasure it was frequently confined to a restful sojourn in the ward of convenient hospitals.

Familiarity is said to breed contempt, and the time arrived in the career of the sensible autoist when his contempt for mere speeding is best expressed by the leisurely fashion in which he prefers to tour when the spirit moves, and this leisure idea is quite independent of the ability of the car, which in nine cases out of ten will do better than a mile-a-minute pace. Touring for pleasure, under the circumstances, must take into account a certain familiarity with the scenery and the surroundings, and the problem which will confront the autoist of acumen in the near future will be solved when he finds an accurate source of information, historical, geographical and topographical, beyond the dream of the autoist of yesterday who merely wanted to know how far it was from this place to that, and if he could get through without having to hire a horse.

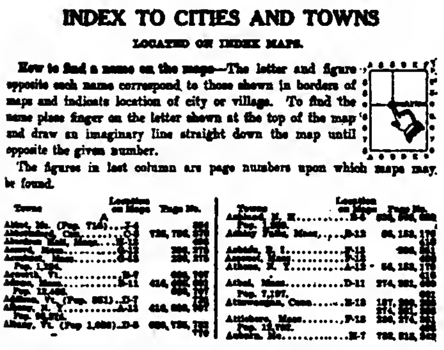


Fig. 1—Facsimile of beginning of index to cities and towns with means for locating any given place on the guide map

It would seem that the Official Automobile Blue Book for 1910 is designated to meet the needs of the autoist who prefers to tour; in fact, it gives, as a primary consideration, an index, which is reproduced in facsimile (just a small portion to illustrate tbe idea) in Fig. 1, and a diagram is there presented, by means of whicb, if the directions are followed, names of towns along the respective routes may be located on the "key map," a portion of which is given in facsimile in Fig. 3. This map shows all the routes which were definitely surveyed by the topographical engineers employed in the building of the Blue Book, and each route is numbered.

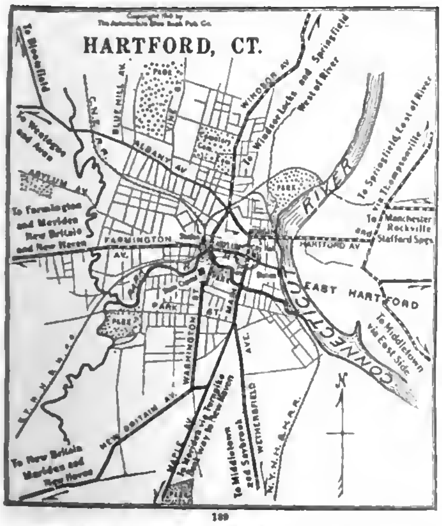


Fig. 2—Map of surveyed routes out of Hartford, Conn., which is one of a series of maps shown in Volume II of the New England Section of the Blue Book

With a view to a better understanding of the makeup of this comprehensive work, an illustration of its workings will be given as follows: Turning to page 189, the route map, as shown in Fig. 2, will be found, which map is of routes 161 to 180 inclusive. In order to make further progress in the explanation of the workings of this plan, one route will have to be selected, and for this purpose route 162 is given in facsimile one-half size, as shown in Fig. 4. The key map (Fig. 3) then, in conjunction with the index (Fig. 1), enables the autoist to find any desired route which has been mapped out in the book. With the key map, after having picked out the route number, it is only necessary to turn to the route map, which will be known by the number taken from the key map, and then to the route text, which also carries the same number.

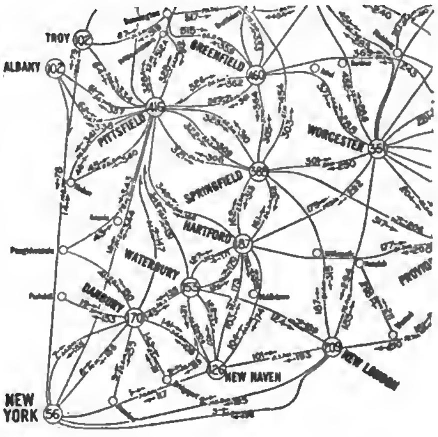


Fig. 3—A portion of the guide map from the front of the Blue Book by means of which routes, which are given numbers, may be located, preliminary to turning to the route map

The facsimile of route 162 (Fig. 4) is representative of the method employed throughout the book, and one of the important innovations is that of the "Baedeker feature," which gives a descriptive outline of the route, naming the historical points of interest, and affording to the autoist a clear insight into the things which will make touring pleasureable, if during his travels an attempt is actually made to appreciate the points of merit along the roadside. In addition to the descriptive outline, a brief statement of the condition of the road is put, and then comes the mileage, both total and intermediate, and instructions which will enable the tourist to identify the landmarks by means of which he will be enabled to traverse the route with a feeling of confidence, backed up by the assurance that every foot of the way was surveyed under the skillful eye of a topographical engineer of recognized capabilities.

Volume II of the Official Automobile Blue Book for 1910 covers New England most completely; it contains 30,000 miles of routes which were actually surveyed, as against 20,000 miles of surveyed routes as set forth in Volume I, as previously issued. There are many other differences worthy of comment.

(Continued, Page 901)

Route 162 **Hartford, Conn., Section**

Route 162—Hartford, Conn., to Springfield, Mass.—25.6 m.

Route map, page 187. Reverse route, No. 813

Descriptive Outline—Leaving Hartford via Windsor Ave., we pass at the right of Keney Park and follow the first highway laid out in Connecticut (1636) to Windsor, where "Plymouth Meadow" was the site of the first house erected in Connecticut, the materials, all fitted, having been brought from Plymouth, England. Crossing the Tunxis or Farmington River, we pass through "Palisade Green," which was Windsor's center of trade in the early days. On the right, 2 miles beyond, is the old Ellsworth mansion, restored by the D. A. R. Windsor Locks, located on the bank of the canal, connects with Warehouse Point by a suspension bridge (see Route 161). An interesting variant to our trip may be made through Suffield, which escaped the ravages of the Indian wars on account of the fact that the settlers paid the Indians £30 for the town site. Originally called Stony River, it became Southfield, then Suffield in 1674. Tobacco raising is the most important industry, and here the first cigars in New England were made in 1810. A pleasant trip along the bank of the Connecticut River, crossing on South End bridge, we turn left into South Main St., Springfield (see page [illegible].)

West side all the way, with connection across the Connecticut River to east side route at Windsor Locks; about half macadam.

Mileage Total	Intermediate	(For this and optional exits, see Hartford city map, page 189.)
0.0	0.0	**HARTFORD**, City Hall, Main & Asylum Sts. North on Main St., curving left with trolley (0.2 m).
0.5	0.5	Stone watering trough at irregular 4-corners; bear right with branch of trolley on Windsor Ave.—asphalt; becoming macadam. Direct along Connecticut River.
6.5	6.0	**WINDSOR.** Fork at end of green on right; turn right with branch trolley. Caution for sharp right turn under RR. with blind left turn beyond (6.6 m). Go through covered bridge over Farmington River (6.9 m) on stretch of fair dirt road.
9.3	2.8	Fork; bear right with trolley on dirt road, coming on macadam (10.4 m); cross RR. (11.1 m).
12.1	2.8	**WINDSOR LOCKS.** Straight on with trolley (Right across river at large electric sign connects with Route 161, at Warehouse Point—0.6 m beyond.)
12.5	0.4	Fork; bear right with trolley; (left is variant through Suffield, see note a). Macadam ends (13.2 m); Cross RR. (13.5 m)
13.6	1.1	Fork; trolley station on left; keep right, leaving trolley, on good dirt and gravel road. Join tracks (from left—18.7 m).
20.5	6.9	Fork in small settlement; bear right—leaving trolley—short stretch of sandy road, coming on macadam (21.3 m).
23.4	2.9	4-corners; turn square right, immediately cross long iron bridge over Connecticut River, and over RR. bridge just beyond.
23.8	0.4	End of road; turn square left into Pecousic Ave.

Fig. 4—Facsimile of a part of a page from The Automobile Blue Book showing the method of giving exact information

In the Building of a Private Garage

NECESSITY demands that the fuel problem be discussed at the same time as the garage construction, partly on account of the importance of the fuel in automobile work, and then in view of the hazard which will be run if the fuel is not properly handled. Referring again to the question of a "pit" in the floor of the garage, even allowing that it has a certain utility, the fact remains that it will serve as a pocket for vapor of gasoline and air. This mixture will reside in the pocket until it is borne away with a current of air, or it will be there when the motor is cranked, ready to respond to the touch of flame, as from the timer of the motor ignition system.

In a pocket such as this there is small chance of realizing a current of air, unless a means is provided, and even assuming that an artificial means is afforded, it must be of a character such as will require no attention at all, as a natural draught, which involves the use of a chimney of some height. Fig. 5 depicts a section through a garage showing the pit in the concrete floor. G is a drip of gasoline from the carbureter of the motor, and V represents the vapor which is formed; this vapor should be highly explosive; the proportions will naturally be rich at the bottom of the strata and will taper off as the top of the formation is approached.

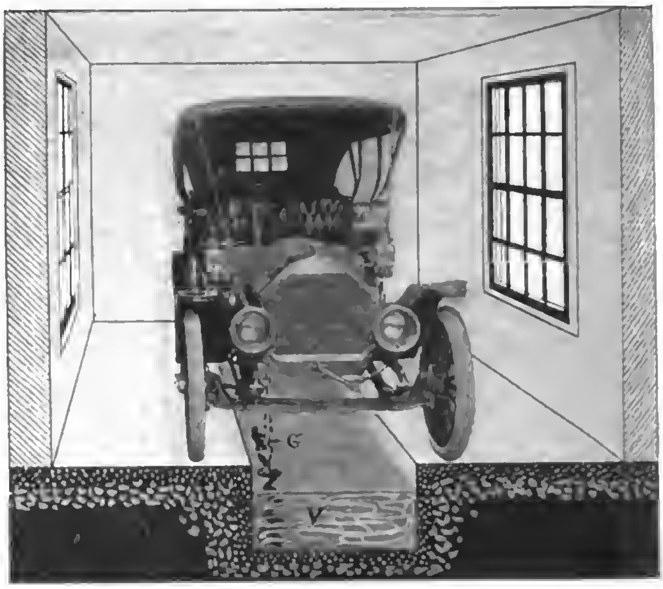


Fig. 5—Section of a garage showing a pit under the automobile to accommodate the workman and to trap in accumulations of explosive mixture

Some Features of the Gasoline Problem Exposed

In order to better appreciate the characteristics of gasoline, an attempt will be made to illustrate the points to be enlarged upon. Fig. 6 is intended to represent the landscape on a foggy day, showing the fog in somewhat dense formation, lying close to the surface of the earth. Referring to Fig. 7, the fog is clearing up from the ground surface under the action of a mixture of gasoline and air. The gasoline is obtained for the purpose from the barrel B; it will mix with the air as it boils out of the barrel (assuming there is an opening in the barrel for the escape of the gasoline) and the mixture of gasoline and air will be heavier than the air in its normal state, with the result that the mixture will form and displace the air (in the fog state) and fresh air will rush in so that the fog will be lifted. In this way, the use of gasoline will serve the purpose of lifting fog, but the plan has no practical significance beyond the illustration of the moment in the attempt to show that a pit under a garage is a dangerous device.

Taking the illustration Fig. 7 as proof of the fact that gasoline will hug the lower stratum, it is but a step to the conclusion that gasoline, if it dribbles out of a carbureter, or is turned out of any other source in a garage, will fall to the lower level and form an explosive mixture in proportion as it is diluted with air. If the low level happens to be a pit the gasoline mixture will be entrapped and it will rest in the trap until it is ignited. Fig. 8 shows the right principle to utilize. The floor of the garage is without any depression at all, and a means is afforded by which the mixture of air and gasoline, as it is formed, is driven out through openings at the floor line; there may be any number of these openings, but just a few, perhaps four, properly located will do the work as efficaciously as the occasion requires.

Sewer Connection Should Have a Trap

In a small private garage the best way to avoid complication is to do without a sewer connection, but if one is desired for any reason, the best way will be to provide a suitable trap, having in mind the fact that gasoline vapor will form in the sewer opening, and after it accumulates sufficiently, it will serve as a source of danger. Fig. 9 shows a rather pretentious "well" which is especially designed to overcome all sewer trouble, due to the accu-


Fig. 6—Landscape on a foggy day, used to illustrate the point to be made in relation to the displacing ability of mixtures of gasoline and air

Fig. 7—Barrel of gasoline sunk in the ground, leaking gasoline to the surrounding, as the liquid evaporates and mixes with the air surrounding it lifts the fog by displacement

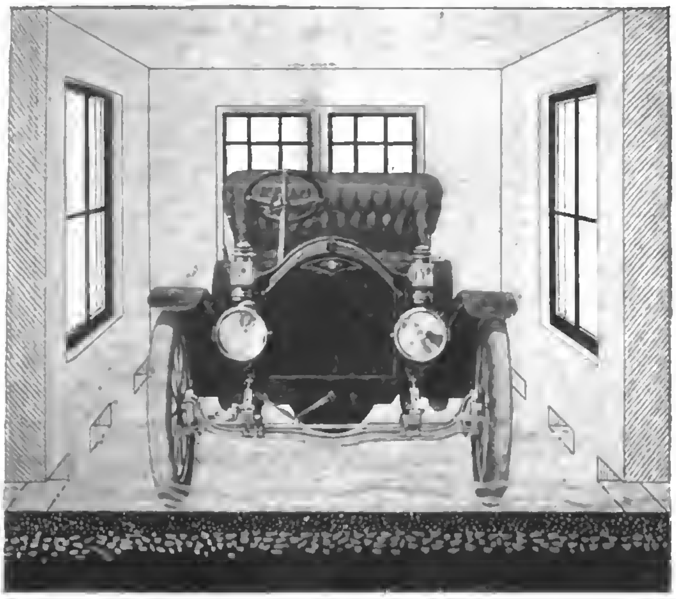


Fig. 8—Garage floor without a pit: openings in the walls near the floor, mixture of air and gasoline being swept away by air currents which are formed by draughts set up

mulation of gas; this plan is available for use in public garages, but since it is designed on the right principle the same idea will have to permeate any such application, be it for a public or a private garage.

In this example the cover of the "well" is perforated, the floor is supposed to slope toward the well, and when water drains into the well from the surrounding floor, it passes down and forms a seal; excess water will then pass out through the sewer connection. By connecting the lead from the air vent to a stand pipe, which should lead to the roof of the structure, a current of air will be set up and the gasoline vapor will be conducted up to the roof, will be well diluted with air en route, and will be borne away on a passing breeze to safety.

In a private establishment, especially if it is in the wooden district, with little room to spare, all the precautions as here intimated and many more as set forth in the various insurance rules, as promulgated by the Board of Fire Underwriters for the respective districts, should be observed, and it is something of a question as to the expediency of using a wooden garage under such circumstances. Modern concrete construction lends itself with facility to the purpose, and it might even be in the path of wisdom to make the doors and windows substantially fireproof, so that if a fire after starting cannot be smothered, it may be permitted to exhaust itself furnace fashion.

Prize for a Safety Automobile Crank

A French association for the prevention of accidents in industrial work has offered $300 in prizes for a crank or safety device for hoists, cranes, and all forms of lifting apparatus, and also for explosion motors, which shall, in the first case automatically stop the descent of the load, or in the second case, throw out of gear the driving action when not required. The invention remains the property of the competitor, who must himself be responsible for its due protection by patents. Drawings of competitive devices should be sent to the office of the Association des Industriels de France contre les Accidents du Travail, 4, Boulevard Saint-André, Paris, France. A non-return starting crank for gas engines, of simple design, was illustrated in the January, 1910, issue of *Machinery*, which may be of interest to prospective competitors in order to get informed of the most important recent developments along these lines. The above-named publication, from whose pages this note is quoted, will eventually render any further information in this matter.

Champlain Transportation Improved

THROUGH the courtesy of the Champlain Transportation Company, and the Lake George Steamboat Company, of which D. A. Loomis is manager, with headquarters at Burlington, Vt., THE AUTOMOBILE is enabled to state that the conditions at Baldwin are much improved; the highway is in far better shape than last year, and the former steep grades and deep sand may now be avoided. It is stated by the Transportation Company that after June 1 automobiles can be discharged at Baldwin as well as at Roger's Rock. The conditions on Lake Champlain are such that automobiles may be handled at Bluff Point. The Transportation Company can handle practically every kind of automobile, excepting the limousine type, provided they exceed 7 feet in height. The rates for transportation are given in the following tables, and it will be noted that the rates on machines include one person, and column C gives the fare for extra passengers:

RATES OF FARE COVERING AUTOMOBILES, INCLUDING ONE PERSON IN CHARGE OF MACHINE, BETWEEN STATIONS ON LAKE CHAMPLAIN AND LAKE GEORGE

LAKE CHAMPLAIN

Between	And	"A"	"B"	"C"
Fort Ticonderoga	Larrabees	$1.25	$2.00	$ .25
" "	Westport	4.00	5.25	.90
" "	Burlington	5.50	8.50	1.65
" "	Port Kent	5.50	8.50	1.65
" "	Plattsburg or Bluff Pt.	6.70	9.00	2.05
Westport	Burlington	3.75	5.00	.75
"	Port Kent	4.25	5.75	.80
"	Plattsburg or Bluff Pt.	5.50	8.50	1.20
Burlington	Port Kent	2.00	3.00	.40
"	Plattsburg or Bluff Pt.	3.00	4.00	.75
"	Port Henry	4.25	5.75	1.10
St. Albans Bay	Plattsburg	3.50	4.50	.75
Gordons	"	1.25	2.00	.25

LAKE GEORGE

Between	And	"A"	"B"	"C"
Lake George	Sabbath Day Point	$3.00	$4.00	$1.05
" "	Hague	4.50	6.50	1.25
" "	Baldwin	4.50	6.50	1.50
Bolton	Sabbath Day Point	2.50	3.50	.75
"	Hague	3.00	4.00	.90
Sagamore	Baldwin	3.00	4.00	1.25
"	Lake George	1.50	2.00	.50
"	Sabbath Day Point	2.50	3.50	.75

"A"—Automobiles seating two persons, one person in charge free.
"B"—Automobiles seating more than two persons, one person in charge free.
"C"—Fare for extra passengers, each person.

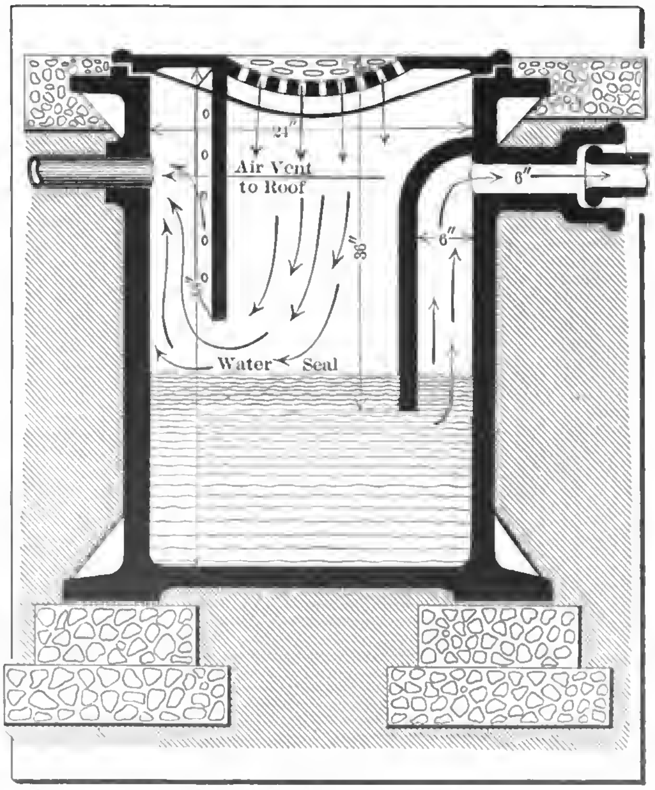


Fig. 9—Well hole so shaped as to serve as a safety trap at the sewer opening in a garage, with means for preventing gas from entering the sewer, and a draught pipe to dispose of the gas

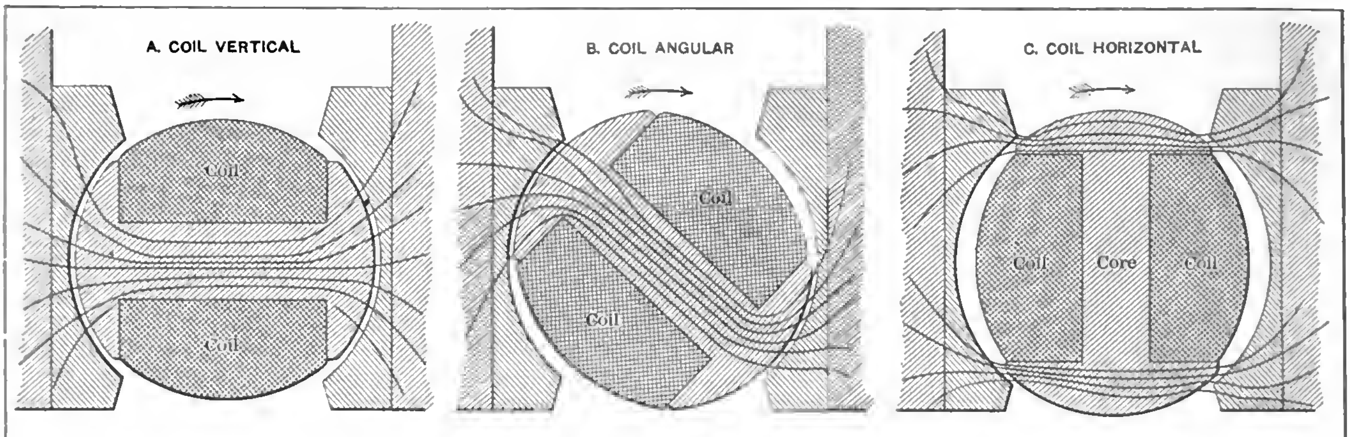


Fig.11

Fig. 11—Direction of lines of force with H armature in three positions. At the left, with coil vertical and H armature horizontal. In the center, both coil and armature set at an angle. At the right, coil horizontal and armature vertical

Magnetos—The Leading Types Analyzed and Explained

By HERBERT L. TOWLE

LAST week it was explained that the flow of current in a rotating-armature coil reverses direction when the coil is vertical. It was also explained that no reversal of flow takes place when the coil becomes horizontal because the change of the included lines of force from decrease to increase is offset by the reversal of the coil itself. Owing to the reversal of current when the coil becomes vertical the ordinary magneto gives an alternating current with two maximums per revolution.

In order to give the lines of force a ready path from pole to pole and also to modify their direction in certain respects presently explained, the actual coil is wound over an iron core of the form shown in Fig. 10 last week. The winding is very heavy and fills approximately the space shown by the dotted lines. From the form of this core it is known as the H armature.

Fig. 11 this week shows in the three views *A B C* the influence of the core on the lines of force. In these views both core and coil are shown in section, and the reader is asked to remember that when the armature assumes the position *A* the several windings of the coil are *vertical*—the position of zero current. When the armature is in position *C* the current is a maximum.

As the drawings show, the effect of the core is to concentrate the lines of force into the iron. Consequently when the armature has made an eighth of a turn, the magneto field is distorted somewhat as shown in *B*. When the core approaches the *C* position the lines of force abruptly change direction and pass from one pole-piece to the other through the curved ends of the core, leaving the coils destitute of magnetic field. When further rotation of the armature has carried the core past the *C* position the lines of force rearrange themselves as abruptly as before, passing now from the lower left end of the core diagonally upward to the right-hand pole-piece. The effective work of the armature is thus concentrated into a narrow range or arc of rotation, and during the remainder of the half rotation little or no current is induced. Fig. 12 indicates roughly the character of the resulting curve of potential.

It is evident from Fig. 12 that an effective spark can be produced only within a certain range of armature positions. Precisely what this range will be depends on the actual potential, which varies with the speed. If the curve *A B C D*, Fig. 12, represents the varying potentials at 500 r.p.m., the curve *A B' C' D* will be approximately the curve at 1000 r.p.m. At very low speed, e.g., when cranking, only the peak of the curve will produce an effective spark. It is customary to set the armature in relation to the crankshaft so that when the spark occurs the core will have approximately the *C* position, Fig. 11, with maximum advance, in order to get the strongest spark when the most rapid flame propagation is desired.

From the character of this type of magneto it is evident that its rotation must keep step with the engine. As a 4-cylinder, 4-cycle engine delivers one impulse per half revolution, it follows

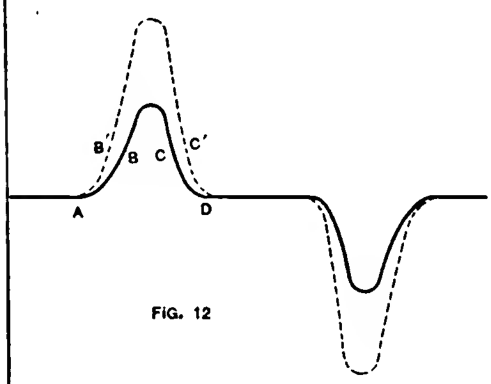


FIG. 12

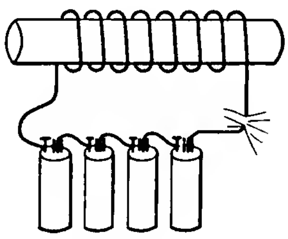


FIG. 13

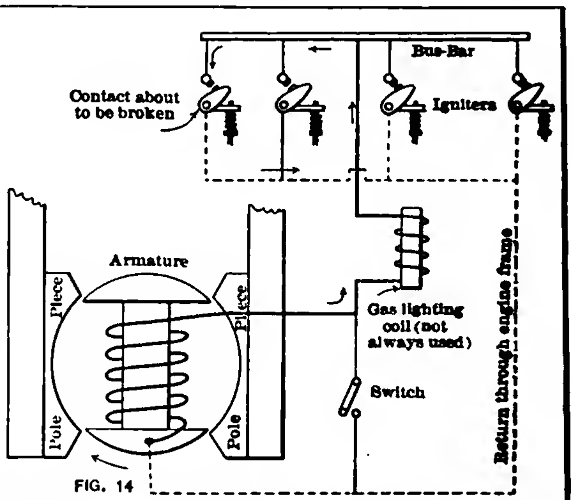


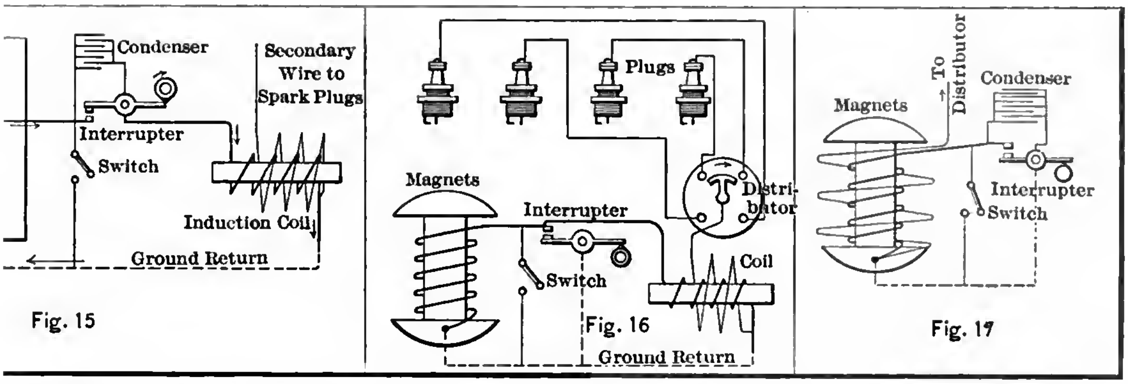
FIG. 14

Fig. 12—Effect of H armature on induced current. Fig. 13—Diagram of gas lighting coil. Fig. 14—Diagram of low-tension magneto circuit for 4-cylinder engine (path of current through engine frame shown in dotted lines)

the magneto should be geared to run at
ıe engine has two cylinders the magneto
speed, since if it ran only half as fast
:rong enough sparks when cranking. Of
'olution, one is wasted, but as it comes
ıaust stroke it does no harm.
ne six sparks are required in two turns
: magneto must make three rotations to
This is accomplished by gearing. Owing
ıaller magneto can be used on a 6-cylinder
nder engine.
onsidered simply how the rotation of a
ıces current. We are next to consider
ected to produce sparks. To understand
familiar gas-lighting coil, Fig. 13, which
rse insulated wire surrounding a bundle
ıen a current flows through the coil and
nomentary spark occurs at the point of
due to the "extra current" referred to
icle. The cause of this extra current is
of the induced current in the secondary
coil, namely, the sudden dying out of the
e passing through the coil. The extra
gh to make a momentary bright spark,
ed in all simple make-and-break systems.
ke-and-break system is simply a device

by an electromagnet instead of by mechanical means. The electromagnet is energized by the magneto current itself, and is timed merely by the strength of the current wave. In other words, the magnet in the plug attracts its "armature" and thereby breaks contact at the igniter when the current strength is sufficient to cause the magnet to overcome the very light spring which normally maintains contact between the points.

Fig. 15 shows an early and now obsolete arrangement for this purpose. A magneto is wired up to an induction coil exactly as if it were a battery, with the single exception that the switch is arranged to short-circuit it instead of to open the circuit. The interrupter is arranged to make and break contact mechanically, and is mounted on the armature shaft, though shown separately for clearness. When the magneto is used in this way a condenser is necessary, see Fig. 15. The condenser consists of a number of sheets of tinfoil, of which alternate ones are electrically connected. The leaves are thus connected, "half and half," to the circuit on each side of the break at the interrupter. If there were no condenser, a heavy spark would appear at the interrupter contact points, and, by delaying the dying out of the current in the coil, would weaken and prolong the flow of secondary current. In order to have the primary current die out as quickly as possible in the coil, and thereby deliver its maximum inductive effect, the condenser is provided to absorb the momentary extra current. The manner in which it does this need not here be explained; suffice it to say that the size of the



ırly magneto circuit using separate induction coil. Fig. 16—Diagram of circuit of modern types of magneto ıowing also course of secondary current through distributor to spark plugs. Fig. 17—Diagram of circuit of gneto. Distributor and spark plugs not shown

g contact inside the cylinder. A frequent
13. It comprises a stationary insulated
pped with platinum or iridium for dur-
ontract finger attached to a rocking stem
ıing in the wall of the cylinder. Suitable
ıvided to make and break contact within.
k ignition is employed, the magneto is
rmature has but one coil and induces a
y. One end of the coil is grounded on
he other is insulated and led out through
rubbing-current collector outside. The
:ed by the armature is led either directly
g coil (usually the former) to a bus bar
; connection in multiple with all the
in turn makes contact for a short arc
then breaks contact, producing a spark.
ot make contact till the first has broken.
he armature is simply short-circuited by
h button. It is a peculiarity of all mag-
short-circuited indefinitely without detri-
ı of the current is self-limited by local
oil and core.
ent modification of the low-tension mag-
: mechanical igniters of Fig. 14 are re-
s. These plugs contain the same moving
Fig. 14, but the rocking stem is actuated

condenser must be proportioned to the quantity of extra current which it is to absorb. Too small a condenser would fail to suppress the spark, and the contact points would therefore burn away with injurious rapidity.

The arrangement shown in Fig. 15 does not utilize more than a minute fraction of the energy of the magneto. A much more efficient arrangement, though less easy to understand, is shown in Fig. 16. This is now the standard arrangement for magnetos having separate coils. It will be seen that here the coil is not in series with the interrupter; the latter, in fact, simply short-circuits the armature. The induction coil, which is outside the magneto, has a primary winding of somewhat long and fine wire, so that without the action of the interrupter this coil would take very little current. However, when the interrupter breaks contact, the momentary extra armature current due to the break is strong enough to make itself felt in the induction coil as a sudden rush of current, and this momentary rush induces a high-tension current in the surrounding secondary coil. In this diagram is shown the distributor as arranged for a 4-cylinder engine. The secondary current from the coil is led to a revolving arm which delivers current successively to the four different spark-plug cables. The distributor is necessarily geared to run at half the speed of the armature and interrupter, since it supplies the four cylinders only once in two revolutions. To shut off the current the armature is short-circuited as before.

(To be continued.)

Aeronautic Progress Along Constructive Lines

By MARIUS C. KRARUP

(Continued from last week.)

SINCE the machine cannot turn about its axis, the canting is therefore in reality effected by raising the outer end, and consequently also raising the center of gravity. And the preliminary increase of tilt of the outer wing helps to make this effect of centrifugality decisive, or, in other words, helps to steady the balance and avoid fluttering. In a machine differently balanced, it would not be essential to steering, however. The main point is, that in some manner the centrifugality must be spent without interference with equilibrium. It cannot be permitted to drive the machine away from its intended course, as it does in the case of a racing car at a sharp turn in spite of ground friction. So, it must be harnessed to do other work.

While so many factors and forces are simultaneously involved in the balanced turning of an aeroplane, that it becomes difficult to speak clearly and at the same time correctly about the requirements, it is clear that design and control must in some manner permit the center of gravity to obey the centrifugal impulse, by taking it farther outward in the curved movement than withstanding possible adverse influences of the wind, becomes an important item in the studies of the aeronautic designer. A glance at Fig. 2B will suggest how complicated the factors entering in equilibrium may become at a turn, with a biplane, when the lower plane may get partly in the way of the upper one, so far as resistance to lateral motion or wind action is concerned, thereby causing the center of resistances to such lateral motion or wind action to shift downward and outward, while the center of gravity will tend to swing around the new center, unless kept steady by the action of the vertical rudder and suitable changes in the tilts of the main planes.

Fig. 2C, representing a monoplane with dihedral angle and low center of gravity, indicates a method for resisting centrifugal action, mainly by the resistance of the horizontal wing at r2 against downward vertical displacement and an increased resistance from the upturned wing at r1 against lateral displacement.

The question of equilibrium at turns and the closely related

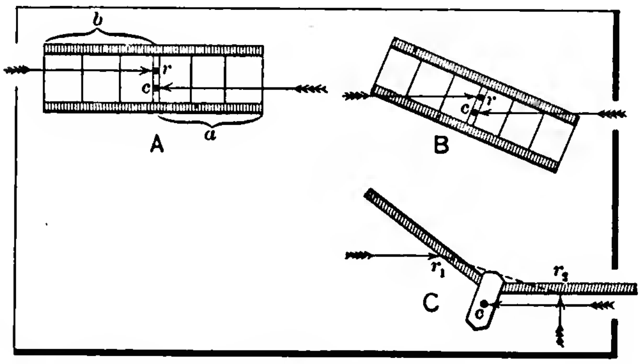


Fig. 1—A, B and C, Action of Centrifugal Force in Aeroplane Flight

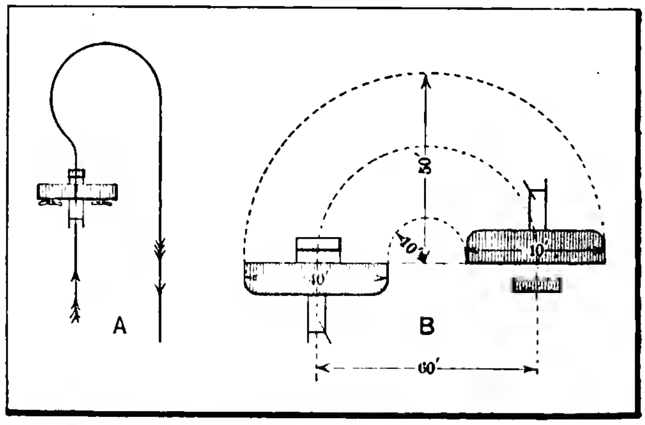


Fig. 2—A and B, Illustrating Requirements in Turning with Biplane

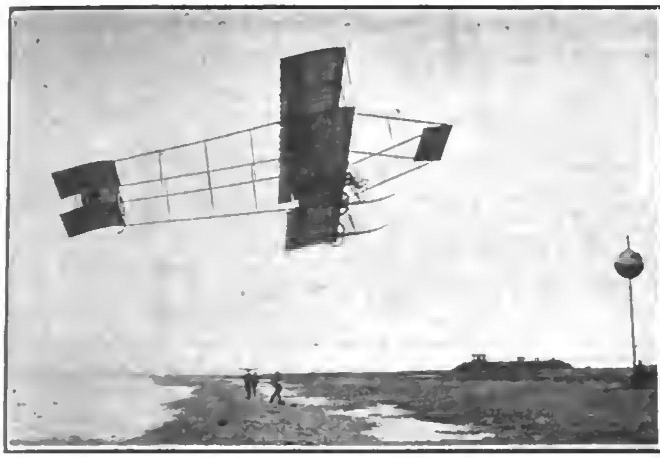
it was before the movement was begun, and also that the action wbich produces this result must at the same time be made to produce increased air resistance against lateral movement of the machine, since the resistance to lateral movement is ordinarily very small and quite insufficient for offsetting centrifugality, especially in a biplane with straight front edges.

The canting of the machine serves both these purposes and therefore also serves to maintain equilibrium. It is not an inconvenient incidental effect of the vertical rudder action required for steering, like the listing of a boat, but a necessity. And the means for producing this camber and for controlling it, not-

question of equilibrium in a side wind, can probably not be discussed to advantage in a general way, but only in detail and with reference to the different types of fliers separately. All flying creatures possess the faculty of lowering or raising the center of gravity with relation to the centers of air resistance, both in the direction of motion and laterally, and it does not seem quite settled, as yet, whether this element of mobility can be dispensed with in aeroplanes intended for flight in all kinds of weather, but it is a physical and mathematical certainty that engine power would be required for quickly raising the center of gravity of a machine during flight, once it had been lowered.

Some Effects of Curved Planes

IT is stated that the French builders of monoplanes are abandoning the deeply curved surfaces which were at first adopted with a view to getting a maximum of sustentation from the relatively small areas inseparable from monoplane design. They are at the same time providing the tails of these machines with larger "feathered" appendages, both vertical and horizontal, as in the latest Antoinette type, but opinions are divided with regard to what may be expected from these changes. Decisive performances are still missing, and a minority of the engineers whose ideas find vent in public take an opposite position. It is charged against the deeply curved planes that they make it difficult to maintain the equilibrium of the machine. One well-known engineer, René Arnoux, believes that this is most important, and that sustentation should be freely sacrificed in order to improve the balance, and to this end be proposes that the hollow of the planes should be turned skyward instead of earthward, since this is what the wind does to the planes now used, in too many cases. He contends that the balance would thereby become automatic, the stability perfect, while the sustentation would not be sacrificed to the extent of requiring areas three to four times greater than with present design or much bigher speed, since sustentation may also be obtained by higher tilts. It is generally admitted that nothing short of experiment and practice can fully decide these questions, by determining just what the resistances to propulsion and the sustentation are at various tilts and with various shapes of the planes, and the scientific world in France has gone into this subject with much energy. Rateau and Brillouin, both authorities in physical science, were the first to experiment carefully.



Rawlinson Making Turn at Nice Meet with Farman Biplane

Paulhan's Farman Biplane as Shown on His Tour in the U. S.

but the results obtained by them have been superseded for practical purposes, through the installation of an elaborate aerodynamic test station by Gustave Eiffel, the designer of the Eiffel Tower. Here the experiments embrace flat planes and planes of many different curvatures, and designers are watching the results with anxiety. They have shown, among other things, that flat planes give a maximum sustentation at a tilt of 30 degrees, and that the suction produced at the top of the plane is equally important with the thrust of the pressure surface; also that the rise in sustentation from 10 deg. tilt to 30 deg. is very slow.

At the aerodynamic institute at Koutchino in Russia, experiments have been made by Riabouchinski giving the sustentation and also the horizontal resistance obtained from planes of different curvatures at different tilts. At a tilt of 7 degrees, which is very practical, the proportions are found to be as follows: For a flat plane, 215 sustentation to 24 resistance; for a plane with a hollow 1-30 as deep as the fore-and-aft extension of the plane, 283 sustentation to 22 resistance; similarly, for a hollow 1-20, the figures are 310 to 32; for 1-16 they are 386 to 44; for 1-12, 390 to 45, and for a 1-8 curvature the sustentation rises to 440, but resistance at the same time rises to the very high figure of 81.

The net result is therefore that resistance to propulsion rises considerably faster than sustentation, when the curvature exceeds 1-30, but that, nevertheless, the weight-supporting qualities of a given area can be multiplied almost by 4 by increasing the curvature to 1-8. And, as the designer has the choice between reducing the resistance against propulsion by reducing his area and curvatures, the chances for capable engineers are immense.

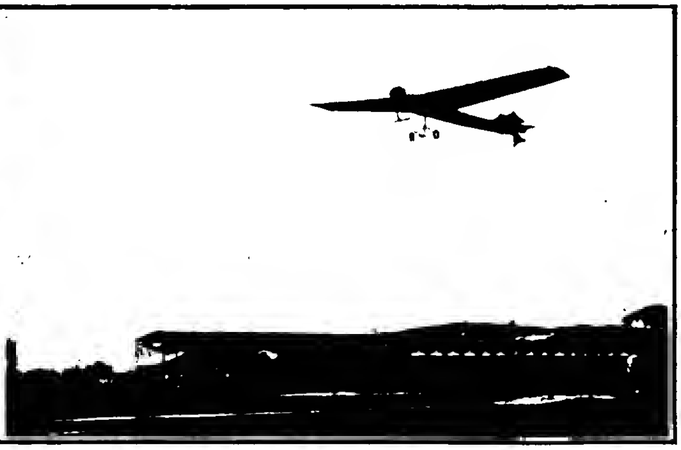
Two biplanes whose dimensions are known, having been stated authoritatively by the owners, illustrate how wide the variations are which are consistent with successful flight. One belonging to Maurice Farman has 1-50 curvature, 45 square meters area (484.37 square feet), carries 600 kilos (1322.77 pounds) all up, or 13.833 kilos per square meter (2.73 pounds per square foot), and it reaches a speed of 85 kilometers (50 miles) per hour. The other, belonging to R. Esnault Pelterie, has 1-12 curvature, 23 square meters area (247.57 square feet), while it also carries 600 kilos (1322.77 pounds) all up, or 26.100 kilos per square meter (5.34 pounds per square foot), but despite of its smaller area it cannot make a speed in excess of 70 kilometers per hour.

Aviation Machines at the Meets

NO new construction feature enabling aeroplanes to brave unfavorable weather or permitting substantial design, with a minimum of guy wires and struts, has been brought to public attention at the aviation meets during the past two years, but by lengthening, lightening and reducing the wind-catch of tails, the types shown at the 1908 meet at Rheims have been made steadier fliers in fair weather.

Disciples of Henry Farman carried off the honors at the recent meet at Nice on the Mediterranean Sea, as well as in the London-Manchester flight by Paulhan. In both cases, the winner as well as most of the non-winners flew Farman biplanes. The characteristics of these are the single-plane "tilter"—as the elevating or tilting rudder might perhaps be called, for short—the tiller, either single or double, placed with the trailing planes far in the rear of the main planes, the single rear propeller, and the adjustable rear-edge flops attached to the end sections of the main planes. One of Farman's latest models has the upper plane extending beyond the lower plane at both ends.

Effimoff, Winner at Nice Meet, Began Flying in December



Latham in His Monoplane at the Nice Meet

Engineering Digest

A carefully abstracted digest of accounts of engineering activities as they are reported in society transactions and technical papers throughout the world.

The Society for Smokeless Automobile Traffic at 21 Bülowstrasse, Berlin, recently exhibited an apparatus guaranteed to accomplish the complete combustion of the smoke and gases arising from an over-supply of lubricating oil in the operation of internal-combustion engines. The apparatus is attached to the exhaust pipe, and the combustion is obtained by means of a suitable device for admitting fresh air and mixing it with the exhaust, while ignition of this mixture is secured by means of the flame accompanying the exhaust. The utility of the apparatus is demonstrated by the company in Berlin on an automobile, and it is found that both the odor and the blue smoke resulting from bad oil or bad regulation of the oil feed are obviated.—*Allgemeine Automobil Zeitung.*

Complete statistics have been collected in the German Empire showing just how many automobiles and motorcycles are in use in each of the provinces, what their power is, and for what purposes they are employed. But comparison with similar data for 1909, 1908 and 1907, it is shown that the increase from year to year has been at the rate of about 35 per cent each year for automobiles, but much less pronounced for motorcycles. The latest figures are in brief as follows, for the whole Empire: 22,283 motorcycles and 24,639 automobiles, and of the latter 12,595 have less than or not over 8-horsepower, 7,341 up to 16-horsepower, 4,695 up to 40-horsepower and 98 more than 40-horsepower. Industry and commerce employ 7,152 automobiles and 11.997 motorcycles; sport and pleasure claim 10,562 automobiles and 7,569 cycles; the professions and special avocations make use of 3,175 vehicles and 2,255 cycles; 3,285 vehicles are in public service for hire, but no motorcycles; 131 cycles and 328 automobiles are used in government service by postal, police and railway employees, while agriculture and forestry make use of 331 cycles and 137 automobiles.—*Allgemeine Automobil Zeitung.*

The two or four-cylinder Cote motor is of the two-cycle type. It was brought out two years ago, and has lately attracted attention in France, where a vogue for valveless motors is bestirring the designers. In the Côte motor the lower enlarged portion of one cylinder, in which works the enlarged lower portion of the corresponding piston, is utilized for the preparation of the explosive charge for the next explosion in the adjacent cylinder, and vice versa. The charge is driven from each auxiliary cylinder chamber into a transverse sleeve divided concentrically into two transfer posts, and from there into the cylinder which is to be fired. Thus, neither is the crankcase used for compression of the charge, nor is there employed an auxiliary cylinder with separate piston from which the charge is taken. In brief, each cylinder in the Côte motor is composed of a high portion which works and exhausts when the piston descends and which compresses its own charge, when the piston rises, and of a low portion which draws in a charge from the carbureter on the downstroke and feeds this charge to the adjacent cylinder on the upstroke. The construction details indicate the possibility of economical manufacture, while tests conducted by the A. C. of France show fuel economy and power efficiency.—*Omnia,* April 16.

Every time some new manifestation of human insight buds forth, the people get busy swaddling the new life with regulations, says Mortimer-Mégret in *La Pratique,* referring to the enforcement of antiquated automobile traffic rules and projected restrictions upon aviators.

It is usually assumed that the valve spring for a four-cylinder motor should be calculated so as to produce a certain pressure per square inch or square centimeter in the valve seats, such as, for example, 40 pounds per square inch, and also that it is advisable to shape the cams so abruptly that the spring in action passes quickly from its maximum to its seating tension. With a view to obtaining a minimum of noise and wear of the valve mechanism, and the valve seats as well, K. Praetorius, of Charlottenburg, Germany, calculates graphically the minimum strength required of a valve spring for given dimensions of a motor and arrives at a shape for cams by which the expansion of the spring is made more gradual without interfering with the proper opening and closing time for the valves.—*Der Motorwagen,* April 10.

Usually automobile fire engines are fitted with pressure pumps of the reciprocating type. *Le Génie Civil* for April 2 describes one in which the motor, when not used for driving the vehicle, is connected by a multiplying gear with a centrifugal pump, giving the latter a speed of 2000 revolutions per minute. The designer, Karl Metz, of Karlsruhe, Germany, places a large water reservoir behind the driver's seat on a truck chassis, and the centrifugal pump, which is located in the rear, is thrown into mesh with the first pinion of the transmission, as soon as the vehicle arrives at the place of fire. By means of two pipes, the pump may draw its stream of water either from the reservoir or from a suction pipe to be connected with another source of supply, and the reservoir may be filled either by the pump through a third pipe or from a street hydrant with pressure, by attachment on either side of the vehicle to a crosswise feed conduit on top of the reservoir. The pump uses 15 to 30-horsepower to discharge 600 to 800 liters per minute, at a pressure of 6 to 10 kilograms per square centimeter and can throw a stream of 19 millimeters diameter a distance of 50 meters, or else, by different attachments of discharge hose, three streams of 12 millimeters diameter a distance of 40 meters. The motor gives 35 to 40-horsepower at 900 to 1,200 revolutions per minute and a vehicle speed of 25 to 30 kilometers per hour. With ladder, pipes and hose reel the vehicle weighs about three tons.

By means of a series of experiments with one cellular radiator and two tubular radiators, the engineer Walther Freiherr von Doblhoff has reached confirmation for a number of theoretically deduced formulas by which the automobile designer may determine the dimensions required of a radiator to be used with a motor of a given power and under any ordinary given set of conditions. Every step in the author's reasoning, is accounted for in text, illustrations, plotted curves and interim formulas, the whole forming a lengthy document running through several issues of the *Zeitschrift des Vereines Deutscher Ingenieure,* concluding in the issue of April 2. Fine distribution of air and air cooling surfaces, with considerable resistance to the passage of the air, is found of greater importance than fine distribution of cooling water. It is concluded to be a false principle to let as h the radiator as possible. The two main

$$\frac{\theta_1 - r_1}{\frac{1}{\text{st}}\left(\frac{1}{\phi\kappa} + \frac{1}{500\lambda\rho V_F}\right) + \frac{1}{2W}}$$

$$\text{st} = \frac{\frac{1}{\phi\kappa} + \frac{1}{500\lambda\rho V_F}}{\frac{\theta_1 - r_1}{1000\,N} = \frac{1}{2W}}$$

the symbols denote as follows:
ırs disposed of.
cted area of radiator.
e vehicle in kilometer-hours.
e chosen type of radiator between entire
ınd the front projected area Fst.
: chosen type of radiator of the coefficient
ıal.
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d area of radiator Fst.
speed coefficient for the air current in the
is, the ratio between speed of air current
radiator and the speed of vehicle. This
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ıissible temperature centigrade of the

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the author calls the normal (*ideelle*)
ıeed at which the radiator, other things
ıame number of calories with fan as

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gress has introduced in the steel-cast-
'yman from New York State confides
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hare technical insight with the en-
and terms.—*Allgemeine Ingenieure*

:he machine and metal industries of
oo addresses and the working capi-
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ıal of Austrian Mining and Smelt-
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enna. Price 7.50 Kronen ($1.50);

ng Göschen," Leipsic, Prof. Her-
volume of a work dealing with
ı adapted for machines, machine
ɔoses. Special attention is given
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, giving the equivalent terms of
uages. The price in Germany is

transmissions and brakes acting
:ures predicted for the automobile
editor of *La Vie Automobile.*
ars been seen in France, says this

authority, as since this company adopted the Knight-Minerva motor. It is a fact against which nothing will prevail. The public likes them, and what the public wants it gets. The Panhard company, slow to move, has adopted this type, and the other great houses have quickly comprehended the necessity for getting up a valveless motor of their own. The Mercedes people, after working on the problem for three years, will spring a valveless sensation in 1911. The Delaunay-Belleville, the Renault, the Delahaye, the Bayard-Clément, the Hotchkiss will not remain behind. Ten of the great automobile companies of the world are contemplating and working on hydraulic transmissions. Louis Renault has for several years filed patent after patent in this line of construction, and automobile history shows that Louis Renault has never been mistaken about the trend of developments.

Air Resistance to Racing Cars

Public interest in aviation and propellers for aeroplanes has brought to the surface in France, the land of mathematical deductions as the means for guiding practical work, many questions relating to the air resistances against automobiles. A spirited controversy has arisen with regard to the possibility of reducing the atmospheric resistance against racing cars by placing a suitable traction-helix in front of the car, to act presumably not only by direct traction effect but also by scattering the atmosphere, so that the latter will strike the body of the car with diminished force. The arguments pro and contra bid fair to continue until proven or disproven by practical demonstration. The editor of *La Vie Automobile* in a recent issue offers a calculation of the air resistance overcome by the Benz racer of 250 horsepower in the performance when this vehicle made one mile in 27 33/100 seconds. "This car," he writes, "at first had an ordinary hood and a straight-front radiator. Then a wind-splitting front was substituted, but it was especially the subsequent modifications of its rear forms which produced extraordinary results. The tapering of the rear to the shape of an armor-piercing projectile made the vehicle with one bound gain 12 kilometers per hour. But the power absorbed by the atmosphere remains considerable, as may be seen from a simple yet sufficiently exact calculation.

"In running order the vehicle weighs 1350 kilograms. Its speed on the occasion referred to was 59 meters per second, and the air resistance at this speed comprises two elements. One is independent of the speed, being the product of the car's weight with the coefficient of rolling friction, which is about equal to 12 kilos per thousand kilos of car weight. The other is proportionate to the square of the speed, multiplied by a certain coefficient, which the special shape of the Benz car permits one to place at 0.07.

"With these figures, the unit of resistance becomes, thus:

Resistance $= (1.35 \times 12) + (0.07 \times 59 \times 59) = 259.87$ kilograms.

"The product of this unit with the speed in meters per second will then equal the work performed at the wheel rims in kilogram-meters.

$$259.87 \text{ kilos} \times 59 \text{ meters} = 15{,}333 \text{ kilogram-meters.}$$

which is the equivalent of about 204 horsepower."

According to the editor of *La Vie Automobile,* the power consumed in air resistance at a speed of 212 kilometers per hour, with a car shaped as favorably as possible, therefore amounts to 191 horsepower out of a total of 250, and this, by the way, gives an efficiency in the power economy of the car of about 80 per cent. But it is evident that the accuracy of the calculation depends largely upon the more or less arbitrary factor, 0.07, chosen to represent the special shape of the vehicle.

A new horsepower-rating formula has been brought out by Louis Lacoin and is presented in the current number of *Omnia.* This is figured from the cubical capacity of the cylinders, which of course varies with the stroke, so that the final form of the formula takes into account the stroke as well as the bore, also the speed. This formula, which will be given in next week's issue of THE AUTOMOBILE, carries the bore with an exponent less than 2, in which it differs from all previous rating formulas.

Construction Ideas From Designers Abroad

New Longuemare Carbureter

IN the latest product of the famous carbureter builders, the brothers Longuemare, of Paris, a number of distinctly different features are to be found. These include a bypass for heated gases, a novel needle adjusting means, a new idea of gasoline strainers, and some more. The carbureter is shown below in the drawing, a cross section, and in the photograph of the assembled device. In the drawing, it will be noted that there is a separate float chamber, communicating with the bottom of the vaporizing chamber. Inset into the bottom part of the latter is an adjustable nozzle, and the air inlet, which takes the form of a series of round holes through a circular band, the number and size of the openings through which are governed by a sleeve around the exterior, which may be rotated at will.

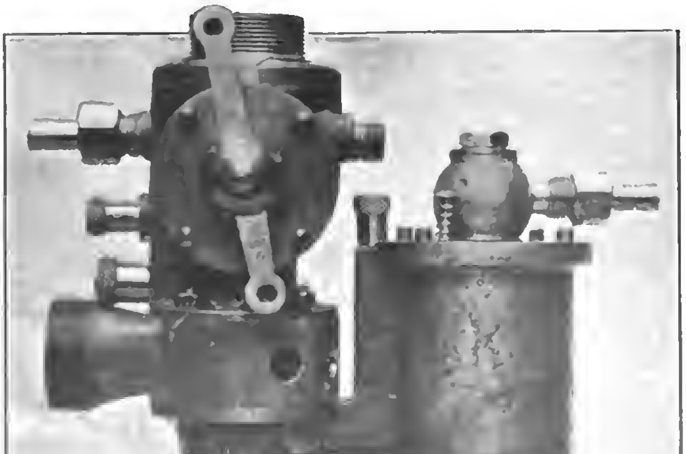
In the drawing, A is the hollow metal float, into the chamber for which the gasoline flows from above, the movement of the float up and down governing the amount of fuel permitted to enter in the regular way. Before reaching the float chamber, however, the gasoline must pass into a spherical chamber, within which is placed a circular gauze strainer. This strainer is placed around a hollow vertical post, through openings in which the gasoline flows inward and thence downward. The different form of the strainer has an influence upon the cleaning of the same, and its ready removal and insertion for that purpose and after the cleaning is over.

B is the housing for the needle valve G, which projects up through the nozzle F into the vaporizing chamber, which consists of a perfectly vertical, concentric tube with a sort of double cone insert, to give the venturi tube effect. This tube, lettered C, is but a force fit in place, and were it not for the pipe O, could be slid up or down to improve the carburetion effect. The needle G is movable up and down, the adjustment being made from an outside point, namely, the regulating nut K. The latter moves the regulating rod or stem J up and down, with a corresponding motion of the needle down and up; that is, for a downward motion of the rod, the needle moves up and vice versa. In this sliding action, the needle is guided within the housing B, and its quick action is opposed by the spring H. The lever I, pivoted off center, gives the proper motion to the needle. The lower part of the needle is not only widened out, or enlarged in diameter to fit the sides of the chamber, but it serves a double purpose also in being perforated with small holes through which the gasoline may flow.

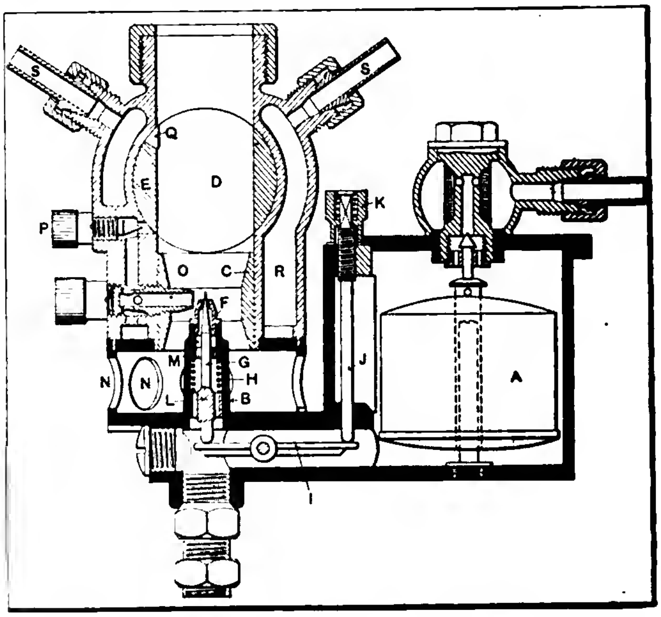
Around the outside of this part of the carbureter is a large annular chamber, through which holes N N give access to the air, while a thin member around the outside of this slides around to partially close or open these holes, thus regulating the amount of air. The outer sleeve is shifted by hand. In passing into the vaporizing chamber, the fuel carries the air, or rather the air carries the fuel up into the passage, which connects to a longitudinal passage at right angles to the former, the latter passage leading to the cylinders. Just at the level of the top of the nozzle is placed the hollow tube O, which communicates with the chamber on that side of the carbureter, this chamber being connected at the top to the inlet pipe, but beyond the throttle valve. This pipe then acts as a bypass around the throttle, and the taper pointed screw P is used to regulate the amount of gas which may thus be shunted. Although the present carbureter comprises but one of these bypasses, the idea is capable of infinite enlargement. By this means, a larger carbureter could be pressed into service, for with proper regulation of the bypasses, as to number and amount of gas allowed to flow, the large size of the vaporizer could be practically nullified. However, the present use is to develop very slow speeds, the bypass permitting some fuel to reach the engine, when the throttle is completely shut off, the speed thus developed being very, very small, according as the adjustment at P is made very small. It will be noted that provision is made for hot water jackets around the entire vaporizing chamber, with the exception only of the side on which the bypass is located.

Dennis Worm-Driven Rear Axle

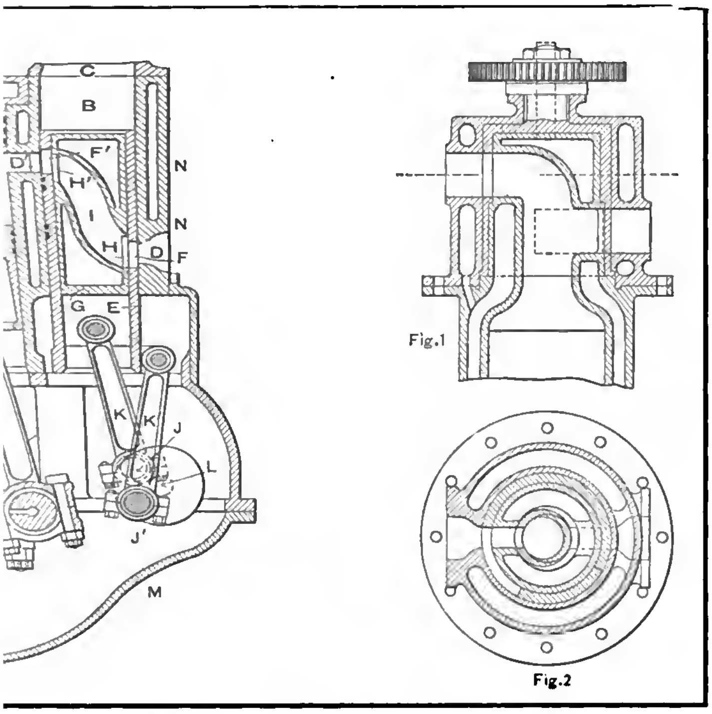
While worm driving has not made a great deal of progress in this country, on the other side, where for commercial vehicle work it received its first and best tryout, it has achieved a fair degree of success, and each month develops a new adherent for this quiet and efficient drive. In the Dennis cars, the drive has it staunchest and most consistent adherent, so it is not strange that the latest product of Dennis Bros., Ltd., of Guilford, Eng., a light 20-horsepower touring car, embodies a worm-driven rear axle.



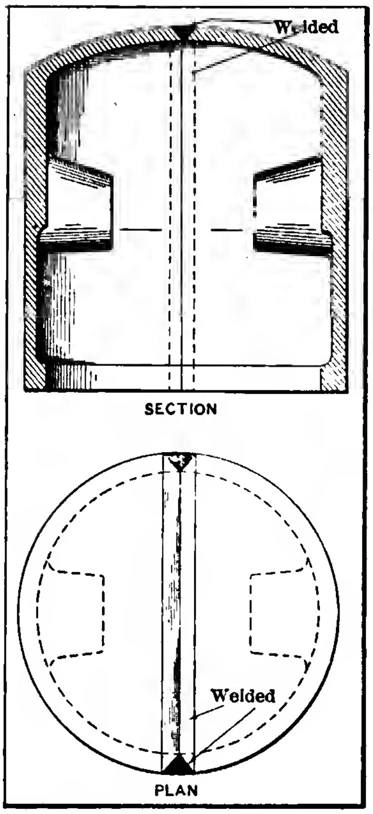
View of Longuemare Carbureter Showing Air Valve



Section Through New Type of Longuemare (French) Carbureter



tion Through English Engine with New Form of Valves



Steel Piston from France

ɔw in section, this being a reproduction of ȝ. At the extreme right is to be seen the latter very apparently being made in two ɔgether. This step is taken from the point of manufacturing costs. Within the bolted-ar is found the spur-type of differential, the forming a housing for the latter.

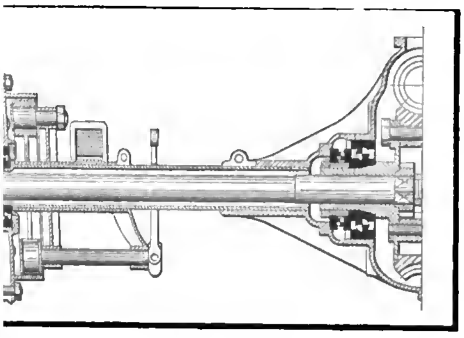
he semi-floating type, and the bearings be-ɔer and its housing are of special interest, in e of the single type, so placed that one comes ıoad. The brakes are of the internal expand- brake drum is made a part of the hub, the ɔiece of designing. From the engine, the drive s through a four-speed gear box, with direct n or top speed. In this gear box, ball-bearings ly, these, where need is for two, being spaced ı the case of the axle shown.

ıer English Slide Valve

marked success of the Knight engine in Eng- have been prolific producers of engines with from the ordinary poppet type. These have in-eeves, piston valves, disc valves, valves of the the reciprocating type, and many more. The nis very interesting line is that shown herewith, ıng being reproduced. In this, a form of trunk ithin a sliding sleeve, both the piston and sleeve being actuated by means of eccentrics off of a secondary shaft, a la Knight. The two valves, for such they are despite their form, are placed in an offset portion of the cylinder casting, conforming to the L type of cylinder casting offset.

As the drawing shows, there are two slots in the opposite walls of the sleeve, which is, in addition, open top and bottom. The open bottom is not used, but the open top is, the opening C being the free exhaust, or the place where the exhaust pipe is attached. The inlet operates through the registering of the diagonal slot through the inlet piston with the two slots in the sleeve, the latter at this moment—according to the correct timing—being just opposite the combustion chamber passage, thus giving the inlet gases a free, though slightly inclined, passage from the pipe upward to the combustion chamber.

At the right of the drawing, in the smaller figures, is shown a modification of this same idea, this being in the form of a pair of concentric rotating discs or shells. The action is the same and so is the shape of the two discs, the motion of rotation of these, located in the head, being substituted for the more complicated one of reciprocation in a separate chamber.



Worm-Driven Rear Axle for Touring Car Use

Welded Steel Pistons, Now

Steel pistons have long been a dream of the successful designer, but, for various reasons, those which have been tried have not been a howling success. In racing cars, these have found a somewhat limited use, being cut, in that case, from a solid steel bar, and not made from a casting. This process is too expensive for use on ordinary touring cars, so that form is not useful. Nevertheless, the idea that steel pistons were good has persisted. The very latest development in this line is that shown above, being a pair of pressed steel, half-round shells, electrically or otherwise welded together to form a whole-circular piston.

This makes the steel piston not only light in weight, an advantage always claimed, but also cheap to produce, of a very homogeneous metal, which has a very uniform thickness. With so many advantages, and few, if any, apparent disadvantages, the steel piston may soon come into its rights. If this means longer life, as engineers claim, it will be a good move.

Irreversible Steering Explained

Editor THE AUTOMOBILE:

[2,256]—What is an irreversible steering gear? Will you please explain this in an early issue of your excellent paper, "The Automobile"? A SUBSCRIBER.

Fitzgerald, Ga.

When any combination of gears, or train of gears, or gearing is of such a nature or so arranged that motion in one direction is properly transmitted through the whole train or throughout the gearing, while motion in the opposite direction is not or will not be transmitted through the train, the whole is said to be irreversible. In the simple case of two spur gears in mesh, if one (A) be moved, the other (B) will also move just as freely. So, too, if the other (B) be moved, the one (A) will respond and move just as freely as did the last gear in the first case (B). This form of gear is then strictly reversible, since motion given to any part of it, is properly and easily transmitted by all other parts. If now a worm and gear be used as an example, motion of the worm will turn the gear, but the opposite of this is not so, that is, turning the wheel will not turn the worm. To be exact, it will turn it a little according to the shape, size, and character of the threads of the worm and the teeth of the gear, but all of the motion given to the gear will not be transmitted through the worm, in fact, but a very small fraction.

Now, most steering gears are composed of an internal and external worm, a worm and gear, worm and nut, or worm and wheel, all including the nearly irreversible worm, so that the statement that a steering gear is irreversible only means that it includes a worm in its make-up. The word irreversible, as applied to steering gears, is somewhat of a misnomer, for as explained above, all such steering gears are reversible, but to a very limited extent. A more correct word for use in this connection would be semi-irreversible or the phrase, partly irreversible. or even, nearly irreversible.

Gears and Gear Cutting Methods

Editor THE AUTOMOBILE:

[2,257]—What kind of a gear would mesh with the "wide, strong gear" shown on page 327 of the February 10, 1910, issue of "The Automobile," in the article relating to gear and pinion failures? MURRY FAHNESTOCK.

Allegheny, Pa.

While the sketch alluded to by this writer is a little bit vague, the appearance seems to identify it as one of the new gears with stub teeth. This is a new form of gear which has been brought out by the makers of a gear-cutting machine, and is especially adapted to that machine's work. The gear has a different angle of obliquity, or angle which the common tangent to the teeth, when they are in contact at the pitch point makes with a line joining the centers of the wheels. This angle, which, in the ordinary involute form of tooth, is 15 deg. or close to it, is in the stub tooth made nearly 21, 20 1-2 to be exact. The result is that the teeth, whose proportions are determined somewhat closely by this angle are materially altered. In the stub tooth, the result is a short, fat, and, consequently, strong tooth. Any stub tooth of the same pitch will mesh with this one. Thus, if it were of 6-8 pitch—all stub-tooth gears have hyphenated pitches on that order—any gear of 6-8 pitch would mesh with it properly.

This form of gear tooth is meeting with great success, and is being used to an increasing extent in the automobile business.

Ways of Altering Compression of Motors

Editor THE AUTOMOBILE:

[2,258]—I wish to know how I may be able to alter the compression in my motor. It is not high enough to suit me and I am of the opinion that I will realize more power if I increase the compression quite a little. JOS. F. O'DAY.

Brooklyn, N. Y.

This matter was very well handled in *Omnia*, Paris, April 23. The gist of the discussion was as follows:

When it is desired to increase the compression the most general method, declares the author, is to attach a plate to the bead of the piston. This, however, has the distinct disadvantage, especially for a single-cylinder motor, of upsetting the equilibrium. To overcome this it is necessary to touch up the flywheels, which generally carry counterweights. For a four-cylinder motor the inconvenience is less, except in cases where the motor is balanced cylinder by cylinder. There is still the disadvantage of an increase in the weight of the reciprocating parts which is likely to reduce the number of revolutions per minute. A more mechanical method is to machine a special piston with a dome-shaped head. This, however, is costly. A cheaper method is to make a new and longer connecting rod. If the compression bas only to be slightly increased a clever smith can lengthen the connecting rod by heat treatment. This, however, is a delicate operation. Compression can be slightly increased by machining the valve plugs until they penetrate further into the cylinder. The angles should be rounded off in order to prevent preignition, and naturally enough space should be left to allow of the normal lift of the valves. A method often employed is to plane the lower face of the cylinders, or the upper face of the crankcase, thus bringing the head of the piston nearer the top of the cylinder.

Comparison may be decreased by the use of dome-shaped valve plugs; by changing the piston for one with an incurved head, or by putting a plate between the bottom of the cylinder and the crankcase. Although compression can be increased by placing a metal plate on the top of the piston, the contrary cannot be done to decrease compression, the piston generally being so thin that any planing of its surface would rob it of necessary strength. It is not advisable to change the connecting rod, for there will be danger of the lower part of the piston touching the top of the crankcase. If the metal is taken off the piston to overcome this the balance of the motor will be destroyed.—*Omnia*, Paris. April 23.

Oiling Practice with Disc Clutches

Editor THE AUTOMOBILE:

[2,259]—My automobile has a friction clutch of metal, made one steel disc, then one brass, then steel, then brass, and finally steel. All these are about a foot in diameter. I wore out one brass ring last year, and had to get a new one. The brass rings carry cork inserts. Should I oil the clutch or not? Please answer through the columns of "The Automobile." R.

Montgomery, Pa.

Doubtless reference is had to disc clutches, as the one described in the letter above would be a five-disc clutch. As to lubrication of these clutches, opinions differ, some experts saying that no oil is preferable, while others think that wearing or rubbing parts should be oiled whether in a clutch or somewhere else. The clutch described sounds like that of the Stevens-Duryea car, the makers of which advocate the use of a dry clutch, that is, no oil. If it were not for this fact, the advice would doubtless be to use a light oil, with which practice the majority of makers seem to agree.

The argument against the use of oil is that it makes the clutch slip more than it should, while being of no use whatever when the car is running and the clutch is engaged. It is also said that oil in a disc clutch makes the discs cling, in other words, the clutch does not disengage as quickly as it should. In the presence of cork inserts there really is less necessity for the oil than without them, for the corks furnish the wearing and contact surfaces of the clutch, and not the metal to metal faces.

Very Puzzling Case of Misfiring

Editor THE AUTOMOBILE:

[2,260]—We recently received in trade a Buick Model "10." The motor was not acting at all well and we overhauled it completely, cleaning cylinders, grinding valves, cleaning carbureter, timing valves by marks on flywheel and setting all the distributing and contact points in Remy magneto according to Remy instructions. After car was completely assembled we tried it out on the road. The motor ran beautifully at high rates of speed, but lurched and ran on two rear cylinders only when throttled down. This seemed to indicate magneto or carbureter trouble. First we tried all adjustments of carbureter with no better results (the carbureter is a Model "D" Schebler). Then, following Remy instructions, which read: "If motor misses with spark retarded at slow speed adjust the contact screw, by loosening about one-quarter turn," we adjusted the magneto with no better results. The timing is right, the valves all seat, there are no obstructions or leak in manifold, the magneto gives equal spark to all four cylinders, but still when the engine is throttled down, cylinders one and two do not fire steadily. We changed plugs, putting plugs from 3 and 4 into 1 and 2, but cylinders 1 and 2 still refuse at low speeds while running fine when engine is on full throttle. There is not too much oil in crankcase. In your opinion, what is the trouble?

Chippewa Falls, Wis. BARKER AUTO COMPANY.

Granting that the valves are right, that the cylinders and combustion chamber are clean, bright, and free from carbon deposits, carbureter clean, timing correct, and spark plugs in good condition, the only thing which can cause the misfiring in the two front cylinders is either a defect in the wires leading to those two cylinders, or a defect in the fuel supply to the same two. Since the trouble has been proven not to lie in the valves, timing, spark plugs, or carbureter, and has been isolated in the two front cylinders, and that too, only at slow speed, it is a fair assumption that the wires to the two cylinders in question may have defective insulation so as to cause a short circuit, which would deprive the cylinders of a spark; may be broken but with the ends held together at smooth speeds, but jarred apart at slow speed; may be worn somewhere and jarred against metal at slow speeds, etc. Or the inlet pipe to those two cylinders may be clogged with waste or something of that sort. It is even a possibility that the timing points in the magneto, which connect with the two bad cylinders, may be somewhat worn. In any case, to fix this trouble, confine your attention strictly to the wiring, fuel supply, and exhaust system of the two cylinders which have gone wrong.

Handling Liquid Carbonic Gas

Editor THE AUTOMOBILE:

[2,261]—Will you please advise me as to the best method of handling carbonic acid gas to recharge little drums with it for tire inflation? In my business I handle 20 and 50-pound drums of this liquid carbonic gas, and considering the time and expense of handling it, it is out of the question for tire purposes, unless I can recharge them myself. Will you kindly tell me of some way in which to do this at small expense? F. WEHNER.

Frostsburg, Md.

Granting that the gas in the large tanks is at a high pressure, the only caution necessary in transferring it to the smaller drums is that any increase in the temperature will increase the volume of the gas, that is with a constant pressure, while any reduction in the pressure will also increase the volume. The variation in the volume with changes in the temperature is exact and measurable, the variation being .002061 per degree Fahr. above 32 deg. Fahr., the volume at 32 being considered as 1.0. That is, taking the whole volume, each degree rise above the basic temperature will increase the volume by 2-10 of 1 per cent.

Now, if the connection be made from the outlet of the large drum to the outlet (inlet) of the smaller one which is to be filled, through a metal hose, with a valve at each end, the work may be done very rapidly and economically, simply connecting the hose, opening one valve so as to fill the hose, then opening the other and letting the gas expand into the small tank. In case it is desired to fill the smaller tank at a reduced pressure, one of the valves should be a pressure-reducing valve, or both of them may be, the reduction being made in two operations.

Answered and Discussed

Permanent Black Lacquer for Brass

Editor THE AUTOMOBILE:

[2,262]—Recently in the columns of "The Automobile" there was given a formula for making a lacquer for brass work. Now, I would like to know if this lacquer will make a permanent and lasting finish for the bright brass work? I have a Model 10 B Buick with a toy tonneau and would like to have you advise me as to applying this formula to my car, as I get tired of constantly polishing the brass work. In the article in which this lacquer was given, you failed to state how to apply it. LOYD H. JORDAN.

Gordon, Neb.

The lacquer in question is just as permanent as a coat of paint, or of varnish, or any similar coating, which weather, water, acids, and similar substances may wear off, or which will wear off in time, even when protected from these things, that is, in say three years.

To apply the lacquer, the body of the metal to be darkened is cleaned to a dull but very clean surface. Then, the lacquer is applied in a thin even coat with any form of fine brush. In short, it is applied just as varnish would be, except that the unusually quiet conditions and unusual care necessary with varnish is not necessary with this. The greater the care used, however, the better and more satisfactory will be the result.

Since this receipt seems to have aroused quite a little interest, it will be repeated for the benefit of those who missed the issue in which it occurred, namely, March 17, 1910. The two receipts are as follows: Dissolve one-half pound of best pale shellac in one gallon cold spirits of wine (so-called). When the shellac is dissolving, agitate it very thoroughly. After mixing, allow it to stand, then filter and bottle. It must be kept from the light as that would make it darker, this being a light lacquer. Now to make a dead black lacquer or finish for similar work, this may be colored black, or the following receipt may be mixed instead: Fuse three pounds of Egyptian asphaltum. When liquid, add one-half pound of shellac and one gallon of turpentine. The latter formula will give the dead black finish now so popular. The quantity, of course, may be regulated to meet the necessities of the case.

Cleaning Out Troublesome Carbon

Editor THE AUTOMOBILE:

[2,263]—I am a constant reader of "The Automobile" and write to ask that you tell me how I can take the carbon out of my cylinders without tearing them down. They are not so very bad, but I would like to keep them as clean as possible, if there is some way of doing this easily. A READER.

Ellinwood, Kan.

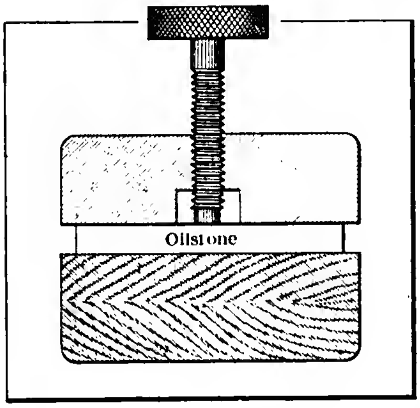
If the cylinders are not very bad, and this is just a matter of having them in the best possible shape, a liquid or powder decarbonizer should do the work very nicely. These are many in number, but the action of all of them is to loosen up the carbon, so that it is blown out by the exhaust the next time the engine is run. Either that or the stuff is dissolved in a liquid which may be drained off from the engine; then when the cylinders have been dried out, the engine is ready to run, and also free from carbon. You will find a number of these decarbonizers mentioned in the advertising columns of THE AUTOMOBILE, and should have no trouble in selecting a suitable one from among them.

Helpful Hints for the Man Who Drives

EVERY amateur should learn to grind in his own valves, for this little job is one that should not be entrusted to every Tom, Dick and Harry who claims to know how to do it. Doing the work oneself, a person is sure that it is done right. This is a job which does not require a great deal of mechanical skill, but on the other hand, it does call for a lot of patience.

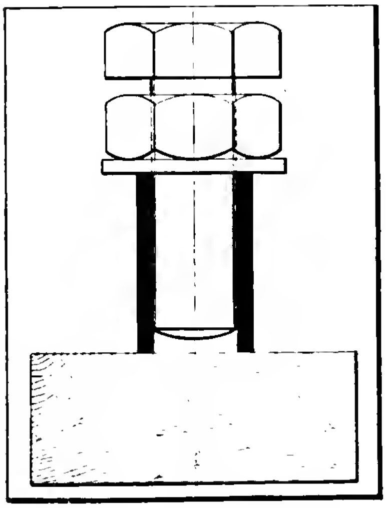
Before grinding the valve must be relieved from the pressure of its spring. In many engines the valve seat and spring are contained in a cage that is easily removed, and the detaching of the spring from the stem is an easy matter. When the valve seat is integral with the cylinder, the spring may be compressed by means of a special tool, or by a flat metal bar used as a lever. The valve may be taken out through the valve opening.

Finely powdered emery mixed with machine oil is a satisfactory abrasive for grinding, but whatever is used, great care must be taken to keep it out of the cylinder and away from the bearing surfaces. The passage between the valve pocket and cylinder should be tightly plugged with cotton waste, a string tied to it facilitating its removal when the work is completed.



Grinding Vibrator Screws Correctly

For a badly worn valve, the first grinding is done with coarse emery, which is later replaced by a finer grade to give the requisite smoothness. To apply the abrasive, dip the finger tip in machine oil and then in dry emery, the small quantity that adheres being applied to the valve surface. The valve is then replaced on its seat and rotated by means of a screw driver. A bit brace or breast drill may be used, but excellent results may be obtained by means of an 8-inch or 12-inch screw driver with a round grooved handle, which is held between the extended palms. A continuous rotary motion in one direction will tend to wear the valve oval, and it is necessary to turn it first in one direction and then equally in the other. A slight back and forth motion of the hands will give this result, and as only a light pressure is necessary, it should not prove tiresome.



Making a Jack on the Road from a Bolt

In order to preserve the true circular form of the valve and seat, the valve should be lifted after twenty or thirty turns, and replaced on its seat in a new position. To facilitate this, a few turns of a helical spring may be placed in the valve pocket under the disc, its size and strength being such that the valve will be slightly lifted from its seat when pressure is taken off.

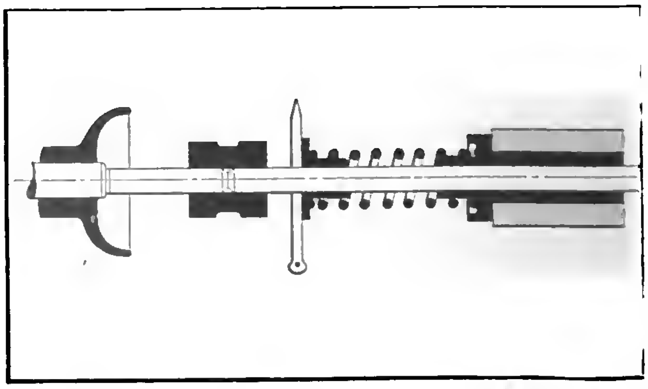
When the valve surfaces appear smooth, all traces of the emery should be washed away with gasoline, care being taken that it does not lodge in the cylinder, valve stem and push rod guides, or other bearing parts. To test the fit, make pencil marks on the valve seat, and give the valve a turn or two with the screwdriver; if the fit is correct the marks will be erased.

The replacing of the valve spring is simplified if it is compressed in a vise and bound in the compressed state by light iron or copper wires passed through it lengthways. The spring may then be placed on the valve stem and the holding device attached, after which the wires are cut.

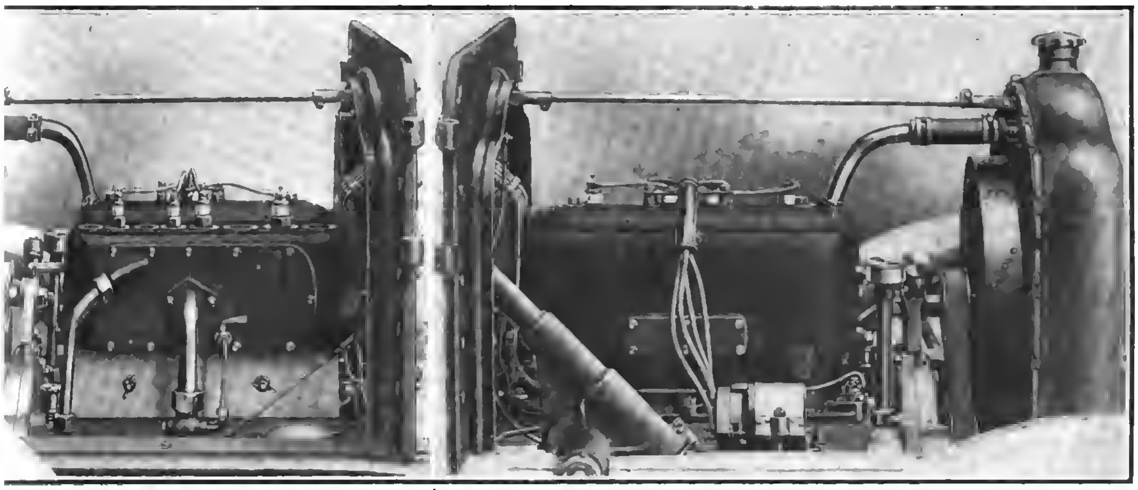
Grinding valves is quite a nice little trick, but another of equal importance, and requiring even more deftness of band, is the grinding of new points on pitted or worn coil tremblers. A sketch is given herewith showing how this may be done and done right. Take a block of wood with a finished top and set onto or into it a new small oilstone. This should be one of very fine texture. The setting of it into the block is to insure its being perfectly true and level. Then another block should be rigged up so as to set above this, and absolutely parallel to it. In the latter a hole should be tapped the size of the vibrators of the coil. Then to point a vibrator, screw it into the upper block, rub back and forth, or in a circular direction, until the desired result is obtained. The block holding it being square with the oilstone will insure the face being square with the axis.

Very often a motorist gets caught out on the road by some minor accident, some little part breaking, the lack of a repair or supply part for which will prevent the running of the car. Amateurs should carry a good stock of replacements to save themselves the humiliation which comes with this, unless they are possessed of an unusual amount of ingenuity. An example of this is shown in the sketch below. A driver broke the pin in his valve motion which retains the valve spring in place. Not having a spare for this, it was impossible to run the engine without it. With a four or six-cylinder engine, this cylinder could have been cut out, thus reaching home, but in this case the motor has but two cylinders, making the cutting out process practically impossible. Being rather ingenious, the driver hunted through his tool box for something to use in this place, as it was far to the next town. He found he had nothing, not even a wire nail which might have been used, or a cotter pin. Walking along to the next farmhouse, he tried to get something which would answer. After nearly failing, he finally secured a metal meat skewer, which was inserted as the sketch shows, and the engine limped home.

Another stunt was making a jack from an old bolt and nut of large diameter and a piece of scrap tubing. The figure shows how this was done. The tube was set into a block of wood to serve as a base, then the bolt was set on top of that with the nut in place and a washer below it. By screwing the nut down, the bolt-head was raised, carrying with it the load above. This was a bolt of unusually large diameter.



Useful Though Unique Substitute for Valve Stem Key



e of motor showing water connections, spark plugs, and freedom from complication. Fig. 2—Right side of motor magneto, simple and secure method of holding the high-tension wiring system, and how the steering post is fastened ıe with the shaft passing out above the line of the frame.

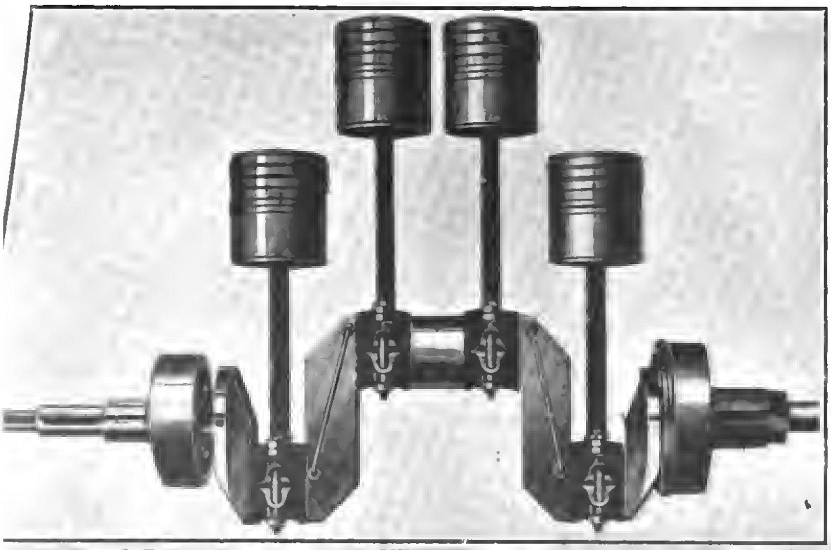
te Gasoline Car Brought Up To 1911

nufacturers to make public the details of the coming year, the White Company has ine of steam and gasoline cars for 1911. will include an unusually wide range of touring cars at $2,000 to trucks at $3,850 at $5,000. As is indicated by the fact that ion has been disposed of, the 1910 models, m, proved eminently satisfactory in every the new models do not show any radical built during the last season. No changes in the prices or in the designation of

all, the engine with which the several es are equipped—no noteworthy change The engine retains those characteristic :e Company introduced a year ago, but ade to bring about a state of refinement the ideals of the company.

e cast en bloc, with the intake and ' within the engine casting. As a re- there are no external manifolds; the their way to the cylinders and, owing st passages within the engine casting may be readily removed without disturbing any other part. In Fig. 1 may be seen a side-plate held in place by two thumb-screws. By removing this side-plate, the valve springs and valve stems are completely accessible. The valves may readily be removed from above, simply by unscrewing plugs located in the upper part of the valve chambers. The Bosch magneto and the centrifugal water-pump are placed on opposite sides of the engine and are driven independently, so that either may be reached for adjustment without disturbing the other. In Fig. 2 it will be noted that the magneto is located on the opposite side of the engine from the carbureter, so that there is no danger of gasoline igniting by dripping on to the magneto, as might happen where both the magneto and the carbureter are placed on the same side of the engine.

The crankshaft is forged of nickel steel and is of unusually heavy construction. As shown in Fig. 3, there are but two main bearings, which are ball bearings of large diameter. A distinctive feature of the crankshaft construction is the arrangement whereby the connecting-rod bearings are positively lubricated. Oil is pumped from the reservoir by way of a sight-feed placed on the dash to oil pipes which are so located that they drip into grooves on each crank-disc, immediately adjacent to the main bearing. These grooves are cut eccentrically with respect to the crankshaft center, with the result that the oil is driven by centrifugal force to that portion of the groove which is farthest from the center of rotation. The oil then passes by means of oil-ways cut through the crankshaft and oil pipes mounted upon it to the connecting-rod bearings. As will be seen in Fig. 3, these oil pipes are mounted eccentrically on the crankshaft, so that from the time when the oil drips into the grooves on the crank-disc until it reaches the crankshaft bearings it is propelled by centrifugal force. By this scheme, the connecting-



ig. 3—Crankshaft of substantial section with a very liberal annular type ball earing at the transmission end, also piping system through which lubricating il is passed to the crankpin journals.

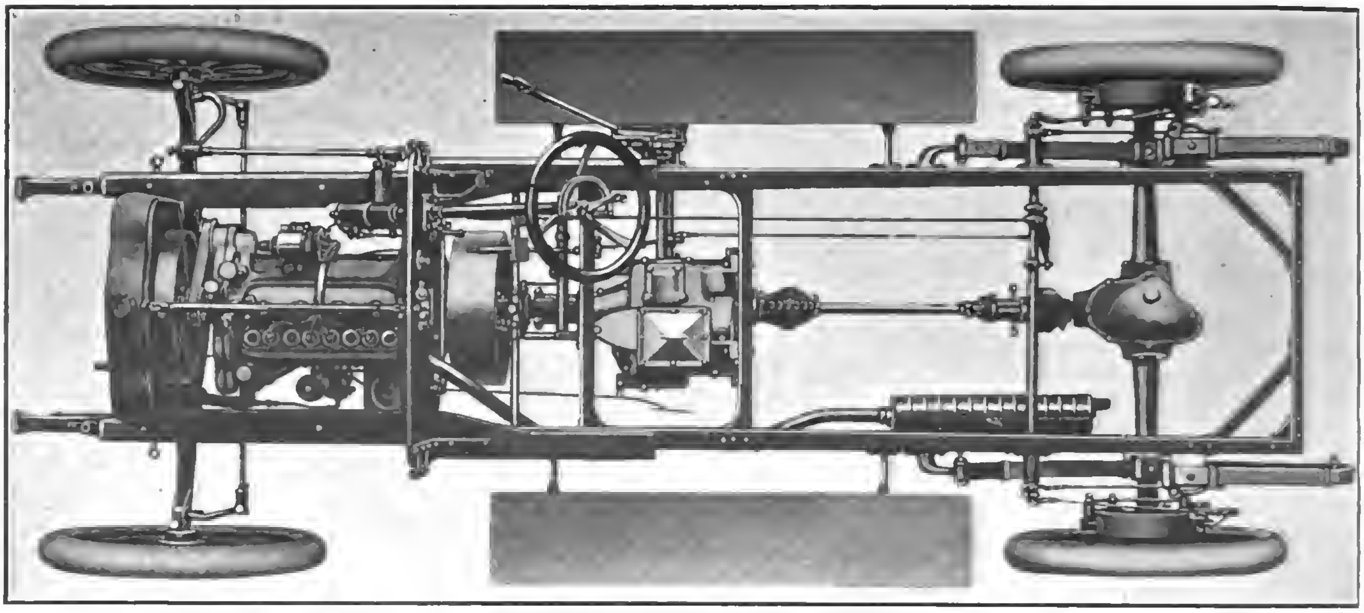


Fig. 4—Looking down on the chassis of Model G-A White Gasoline Car showing the arrangement of power plant, transmission and relating parts, together with size, shape, and bracing of the chrome nickel steel frame of large section.

rod bearings are perfectly lubricated and thus is solved a phase of the lubrication problem, which has caused great trouble to motor-car designers and users.

The crankcase is made in two sections of a special aluminum alloy. The upper section carries all the working parts of the engine. It is hung by three-point suspension on the main frame. The lower section is simply an oil well and is easily removable for inspection of connecting-rods, camshaft, etc., without in any way disturbing the crankshaft bearings. The oil reservoir forms an integral part of the upper section of the crankcase.

Another observed feature of the White construction is the arrangement for relieving the compression in order that the engine may be cranked with a minimum of effort. By means of a small lever located on the dash, the camshaft is shifted endwise, and the exhaust valves are thus held open during the greater part of the compression stroke. As soon as the engine is started, the camshaft is shifted back to its normal position.

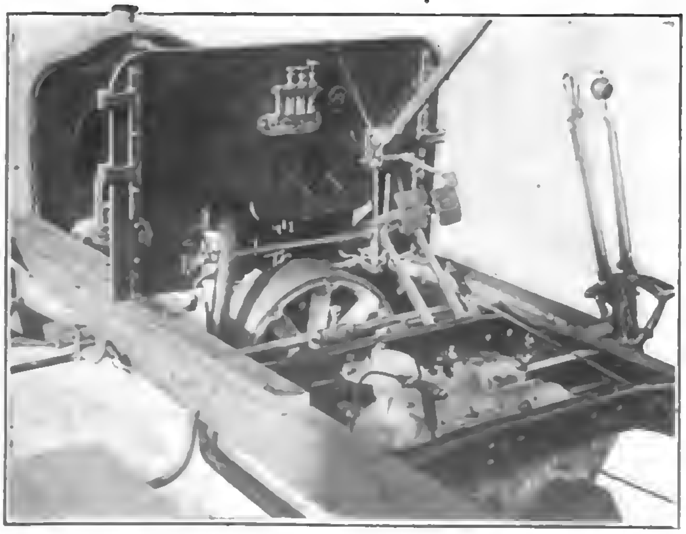


Fig. 5—Showing the dash, control levers and pedals, also cone clutch which is leather faced, employing a special means of holding the leather in the absence of rivets.

The clutch is of the leather-faced cone type, and is of unusually liberal dimensions, giving a working surface as large as is found to be of value. No rivets are used in attaching the leather facing to the clutch spider, the leather being held in place by T-bolts which are countersunk in grooves on the rim of the spider, as shown in Fig. 5.

The transmission is of the selective type and has four forward speeds with direct drive on the third. The gear-shifting mechanism is enclosed within the gearcase and is thus kept well lubricated and free from dirt and grit. A cover-plate, held in place by thumb-screws, may be easily removed, giving access to all parts of the gearcase. The gears are made of chrome-nickel steel and are of unusually liberal dimensions, as regards both width and diameter. The gearcase is located immediately behind the clutch and is supported on cross-members of the frame by three-point suspension. The connection between the clutch and the gearcase is such as to allow for any slight variation in alignment which may occur when the car is traveling over very rough roads.

The drive from the gearcase to the rear axle is by means of a shaft. The rear-axle housing is made in three parts, the central part containing the bevel-gear drive and the differential. This part is fitted with a cover, by removing which ready access is obtained to the gears within. The "live" axle is of chrome-nickel steel. The axle is of the semi-floating type and is fitted throughout with annular ball bearings.

The frame is of heat-treated crucible chrome-nickel steel. In the manufacture of these frames the requisite heat treatment is given by immersing them in baths of molten lead. By this process every part of the frame is raised to the same temperature and, furthermore, the degree of temperature can be absolutely controlled. The frame is narrowed in front of the dash, giving plenty of room to turn the car in the narrowest streets.

The above description applies to each of the two models of the White gasoline car. These two models are known as "G-A" and "G-B," respectively. Model "G-A" has a 110-inch wheelbase, three-quarter elliptic rear springs and 32-by-4 quick-de-

Fig. 6—1911 torpedo type of body with a wide side entrance, unobstructed straight lines, elegant upholstery, and fine finish of all parts of the car

tachable tires. It is fitted either with a 5-passenger touring body with wide rear seat, or with a 4-passenger detachable toy-tonneau body (which may be used in connection with the "domestic-express" body recently described in these columns). It is also fitted with a torpedo body, shown in Fig. 6. With the toy tonneau and torpedo types of body, the steering gear is tuted at a sharper angle than in the touring car and the control levers are in a slightly different position. The model "G-A" touring car and toy tonneau each sell at $2,000 and the model "G-A" torpedo sells at $2,250.

Model "G-B" has a wheelbase of 120 inches, is fitted with three-quarter elliptic rear springs, 34 by 4 tires and, in general, it has a somewhat heavier running gear than the model "G-A." Model "G-B" is fitted with an unusually roomy 5-passenger touring body, selling at $2,500; with limousine body, selling at $3,600; or with landaulet body, selling at $3,800.

The White commercial vehicle line for 1911 will consist of a 3-5-ton gasoline truck, a 1½-ton gasoline truck and a 1,500-pound delivery wagon. Both the 3-5-ton and the 1½-ton trucks were described in these columns several months ago. While the running gears of these three types of commercial vehicles vary widely corresponding with the varying loads for which they were designed, much study was devoted to securing the interchangeability of as many as possible of the parts of the three power plants.

The chassis of the 3-5-ton truck sells at $3,700, the 1½-ton chassis sells at $3,000, and the chassis of the 1,500-pound delivery wagon at $2,100. Bodies for these trucks will be furnished to meet the special requirements of any business.

Moon Pathfinder Takes Trail

St. Louis, May 9—Scouting for the route of the first reliability run of the St. Louis Manufacturers and Dealers' Association, E. Percy Noel, of the Automobile Club of St. Louis, started from St. Louis to-night in a Moon car. He will probably be on the road four or five days in an endeavor to map out the best route for the contestants to follow over the three-day itinerary in Missouri and Illinois. The roads in Missouri and Illinois are in extremely bad condition.

The three-day reliability run is the first real touring event ever planned in St. Louis and it is significant of the tremendous awakening of motor interest in St. Louis that already nearly 100 entries are assured the Contest Committee of the Manufacturers and Dealers' Association in charge.

Stevens-Duryea Changes

Chicopee Falls, Mass., May 9—As a result of a meeting of the directors of the Stevens-Duryea Company, Wednesday, several changes are announced, the most important of which was the resignation of Charles C. Hildebrand, who was general sales manager. Mr. Hildebrand has accepted a position as assistant general manager of the Chalmers Company at Detroit. He has been with the Stevens-Duryea Company eight years.

George S. DeLaney has been made general manager of the company, a new office. He was formerly general superintendent. George Baithwait, factory manager, will continue in his old position and will fill the position of general superintendent also.

Coming Events in the Automobiling World

June 20-July 6...Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Feb. 13-25, 1911..Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

May 9-11.........Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.

May 10-11........New York City, Reliability Run, Trade Association, New York to Atlantic City and Return.

May 12...........Cheyenne, Wyo., Motordrome, Cheyenne Motor Club.

May 13-14........Denver, Colo., Race Meet, Overland Park. Denver Press Club.

May 14...........Kansas City, Mo., Hill-Climb, Automobile Club of Kansas City.

May 18-19........Norristown, Pa., Third Annual Endurance Run, Norristown to Scranton and Return.

May 19-21........Hartford, Conn., All-Connecticut Reliability Contest.

May 21-22........Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.

May 21-22........Track Race Meet, Memphis, Tenn., Homer C. George, Manager.

May 27, 28-30.....Indianapolis, Ind., Automobile Races, Including Championship Events on Motor Speedway.

May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill; Automobile Club of Bridgeport.

June 2...........New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.

June 4...........Worcester, Mass., Fourth Annual Hill-Climb, Dead Horse Hill.

June 6-14........Atlanta, Ga., Reliability Run to New York City, New York Herald and Atlanta Journal.

June 7...........New Haven, Conn., Hill-Climb up Shingle Hill, Yale University Automobile Club.

June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.

June 15..........Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, Through the Southwest.

June 16-22.......Albany Automobile Club, Albany, N. Y., Sixth Annual Tour to Atlantic City and Return.

June 25..........Port Jefferson, Long Island, N. Y., Hill Climbing Contest. Automobile Club of Port Jefferson.

July 4...........Indianapolis, Ind., Cobe Trophy Race. Held on Speedway Track, Chicago Automobile Club.

July 4...........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.

July 18-22.......Milwaukee, Reliability Run, Wisconsin State Automobile Association.

July 30..........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.

Aug. 3-5.........Galveston, Tex., Beach Races, Galveston Automobile Club.

Sept. 5..........Wildwood, Pa., Speedway, Labor Day Race Meet of North Wildwood A. C.

Sept.............Chicago Commercial Car Reliability Contest of Chicago Automobile Club.

Oct. 1...........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.

Oct. 8...........Philadelphia, Fairmount Park Race. Quaker City Motor Club.

Oct. 15..........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.

May 25...........“The American Cup,” Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.

May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.

May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.

June 2-8.........Prince Henry (German) Touring Competition.

June 13-18.......Scotland, Scottish Reliability Trials.

June 20..........French Voiturette Race.

June 21..........French Stock-Car Race.

June 22-July 5...Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.

June 27..........Speed Trials at Kiev, Russia.

THE AUTOMOBILE

Vol. XXII — Thursday, May 12, 1910 — No. 19

THE CLASS JOURNAL COMPANY

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A. B. SWETLAND, General Manager

231-241 West 39th Street, New York City

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ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

SOMETIMES the feeling is acute as it bears upon the question of the dissemination of engineering information as it comes in from the haunts of designers in many lands. That there is a good deal of duplication is true, but, as a rule, a somewhat different angle obtains, so that light is given, even though it may be in relation to the same subject, but from points of view of the several sets of eyes. It would be impossible to report verbatim the doings from abroad as they are set forth in the several very excellent technical papers there printed, without devoting a whole form to the undertaking. To do this would be to encumber the ideas set forth by the "atmosphere" in which they are placed, which atmosphere, while it is very satisfactory to the readers for whom the papers are primarily produced, is scarcely in keeping with the requirements here and, so it seems, an accurate engineering digest will have the virtue of giving in compressed and comprehensive form, it is hoped, all that can be of any service to American engineers, but it does appear as if the busy engineer should have at his disposal a summary of the ideas which are utilized in other lands, in order that he may be able to determine, by comparison, how much better he is doing than his cousin from afar.

* * *

ACTIVITY as it is found in the several walks devoted to the automobile is nowhere of greater potential value than that which is measured by the automobile clubs which represent the autoist in the many States of the Union. These clubs, while they have a certain social undertone, are therefore for business; they represent the autoist before the legislative bodies; they are the voice which is loud enough to be heard, and they conduct a systematic campaign which is equally to the point. If a lone autoist is landed in a speed trap, it makes very little difference as to whether or not he is fair prey; his voice has too much of the characteristic of a pigmy to penetrate into the soul of the legislator, who is never moved, excepting by a force sufficient in magnitude to overcome legislative inertia. This same lone autoist becomes as forceful as a whole automobile club the very minute he places himself in the ranks thereof and raises his voice in unison with the rest for the good of all. Betimes the lone autoist overlooks the main contention, wants to become the whole thing, but instead becomes a nuisance. There can only be one president to any club, and he serves, if he serves well, as the trumpet which sounds the battle cry of the corps as a whole. The rank and file of the club is just as much a recognized necessity as the official who occupies the apex of the cone, and it is extremely important that he take the brunt of a real fight backed by the strong arm of real fighters, rather than to be the leader of a flock of geese. Fortunately, there are mighty few flocks of geese with the crest of an automobile club to mark their abiding place, and due to the wise action which is taken by the conservative automobile clubs in the several States, legislation, as it relates to the automobile, is taming down.

* * *

ADMITTING that the tire problem has its many important phases along lines which include the questions of quality and cost, assuming that these phases must be dealt with by serious-minded captains of the industry, even so, there are other angles from which the problem must be viewed, and in relation to which something must be done. It is well understood that every tire turned out of even the best equipped establishment devoted to the purpose cannot be up to the high standard set by tire makers for their product, and the part of the tires which fall below this standard are labeled as "seconds." The culls of the plants may be very good, indeed, but if the makers are unable to conscientiously imprint their name upon the seconds, and if they are sold through roundabout channels, ultimately reaching the users of automobiles, will it not be fair to all concerned if these same tires are sold as seconds? If so, why should the dealers in seconds be permitted to obscure the fact in any way whatsoever, in or out of advertising, to the end that owners of automobiles will go away after having purchased such tires with the understanding that a bargain fell their way, and that they were so fortunate as to be able to get more for the money than could be had through normal channels? Would it not be quite right were the tire makers to insist upon it that seconds should be sold as seconds, and as seconds only?

* * *

SPRING time comes along bringing better weather and with it better roads, the impression begins to take hold that now is the time for touring the country. So, it is that an increased number of tours and endurance runs are scheduled for the coming month. These partake of all different methods of testing out the new cars, and as such, have, each and every one of them, a direct and favorable influence upon the automobile business as a whole.

New Stock Car Rule Jeopardizes Prizes

CONSIDERABLE comment has been aroused in motordom over the new rule of the A. A. A. which requires that a "stock-car" certificate shall be filed with that body by the manufacturer before stock-cars made by the concern can compete in any event under sanction of the A. A. A.

All the necessary blanks were sent out to the various manufacturers last March, but the returns have been less than half so far.

Some little uncertainty has arisen as to the possibility of enforcing the rule and the intention of the A. A. A. to require its rigid enforcement, but these ideas are without solid foundation.

Chairman S. M. Butler of the Contest Board in commenting upon the situation said: "The conditions are simply these: The greatest line of progress in motoring this year is the proper classification of the stock-car. It is manifestly unfair to the public and to manufacturers who enter bona-fide stock cars in racing and touring events, to have specially made and prepared cars, masquerading as real stock cars, contesting against the legitimate entries.

"For that reason, the present rule was framed and, under it, every manufacturer is obliged to file a detailed certificate showing the standard of the stock cars turned out by him. In case such certificate is not filed, not only is the manufacturer barred from entering his cars under A. A. A. sanction, but agents and private owners are similarly barred.

"Supposing that the maker does not care nor intend to race or tour in competition, and fails to file his certificate, he probably will find that his action has worked a hardship upon agents and representatives who do wish to take part in competitive events.

"In the Around New Jersey Reliability Run which started Tuesday there were thirty-one cars to start and twenty-two of them were made by manufacturers who have not yet filed their certificates. As it would have ruined the run if these cars had been barred from starting, the rule has been modified to a slight degree. The cars mentioned were allowed to start only under the condition that the entrants would notify their factories by wire immediately, requesting that the certificate rule be complied with at once and upon the express agreement that no matter where they finished in the run, there would be no participation in the prizes or awards unless the necessary certificate was so filed.

"While this slight modification was made for this event, in future unless the certificates are on file before the start of the run, the cars will not be allowed to take part under any condition, even though it means the abandonment of the event."

Mr. Butler said that he believed the twenty-two manufacturers interested in the Around Jersey tour would file their certificates at once.

The rules in relation to stock cars as promulgated by the "Contest Board," were published in THE AUTOMOBILE in the issue of March 3, but for the benefit of those who may not have followed the plan closely, that part of the rules which relates particularly to stock car conditions is repeated briefly as follows:

Stock Car—"A motor car, the complete description of which, upon the official blank provided for the purpose, has been filed with the main office of the Technical Committee of the Contest Board at least 30 days prior to the date of the contest entered, the quantity production of which bears to the total yearly production of its manufacturer the ratio set forth in the following table, and which is on sale through the regular selling representatives of the manufacturer."

Official blanks for stock car description may be obtained from the chairman of the Contest Board, 437 Fifth avenue, New York City.

Computation in connection with the following table shall be based upon a period of time from July 1 to June 30 the following year.

In computing the annual output of a manufacturer, no account shall be taken of his production of taxicabs, delivery wagons or other vehicles designed for commercial use.

At the discretion of the Contest Board any competitor may be required to file a bond of $5,000 that the entry made by him is a bona fide stock car within the meaning of this definition:

Total Output.	Percentage.		Number of Same Model.
10,000 or more	4.5%	equaling	450 minimum
8,000 to 9,999	5.0%	equaling	400 minimum
6,000 to 7,999	6.0%	equaling	360 minimum
4,000 to 5,999	7.0%	equaling	280 minimum
2,000 to 3,999	8.0%	equaling	160 minimum
1,000 to 1,999	9.0%	equaling	90 minimum
500 to 999	10.0%	equaling	50 minimum
250 to 499	16.0%	equaling	40 minimum
100 to 249	30.0%	equaling	30 minimum
50 to 99	50.0%	equaling	25 minimum

Explanation—Percentages are calculated on actual total output For example: If the total annual output of a manufacturer is 2,500 cars, at least 8 per cent. of said output, or 200 cars, must be of the same model in order to constitute such model a stock car under this definition. The required percentage of output shall in every case be in accordance with the above table and in no event shall it be fewer than 25 cars.

National Association of Manufacturers Meet

The fifteenth annual convention of the association will be held May 16, 17 and 18, inclusive, at the Waldorf Astoria, New York City, and among the extremely important matters which will be discussed will be the prevention of accidents and employers' liability insurance. This important matter has been before the association on former occasions, and despite the struggle which is ever going on to arrive at a satisfactory basis, it is still an open question, and this year the association will undertake to establish a working basis for the future. The question of appliances for preventing accidents to working men and accident indemnity is regarded by the association as its most vital question, both from an economical as well as a humanitarian standpoint. The committee in charge expresses the hope that the convention will be fully attended, and it points out that those who fail to put in an appearance will miss an opportunity to participate in one of the greatest, if not the most interesting, discussion that has come before any of the conventions of the association. The keen interest shown by the association is best evidenced not only by the personnel, but by the vast amount of work done.

John Kirby, Jr., president of the N. Ass. of Mfgrs., Dayton, O.: James W. Van Cleave, president of the Bucks Stove & Range Co., St. Louis; D. A. Tompkins, president of D. A. Tompkins Co., Charlotte, N. C.; H. E. Miles, president of Racine-Sattley Co., Racine, Wis.; Henry B. Joy, president of the Packard Motor Car Co., Detroit, and F. C. Schwedtman, of St. Louis, chairman.

Hopes for Federal Registration

At the regular monthly meeting of the Executive Committee of the A. A. A., presided over by President L. R. Speare, and held Tuesday morning, at National headquarters, 437 Fifth avenue, it was made clear through the report of Chairman Charles Thaddeus Terry that the Legislative Board hopes to have its Federal Registration bill emerge from committee at Washington, D. C.

To-day Chairman Terry will go to the Capital where he will meet the delegates from the Chicago Motor Club, which has in charge the petition containing over 5,000 names, secured in the district from which Congressman Mann hails, he being the chairman of the Interstate and Foreign Commerce Committee, which has had the measure in charge. With the petition will be presented the consensus of opinion of the Chicago legal talent to the effect that the proposed law is constitutional.

From Governor T. M. Campbell, of Texas; Mayor S. J. Hay, of Dallas, and the Board of Trade of the latter city, came an invitation to Chairman S. M. Butler, of the Contest Board, that the Glidden tour visit Texas, and in particular the city of Dallas. Pathfinder Lewis has included the Lone Star State in the route, and he is now touring through Kansas. The entry list, at regular fees, will close May 15, with present indications that this year's contest will exceed all predecessors in point of entries, because much of the country traversed is virgin soil for automobile manufacturers.

Ground Broken for Lozier Factory in Detroit

DETROIT, May 9—Contracts have been let and ground is being broken for the Lozier Motor Co.'s $2,000,000 plant in St. Clair Heights, an eastern suburb of Detroit, and the Hudson Motor Car Co.'s new $500,000 factory in the Fairview district. These are but two of the large plants for the manufacture of motor cars and auto parts now in the course of construction in this city, all of which will be in operation before the end of the year.

Considerable speculation is going on as to why work has not started on the General Motors plant, for which a site was purchased several months ago and which, it was announced, would mean an expenditure of $2,500,000. It is understood, however, that plans are being prepared and that bids will be asked soon.

In the vicinity of the future Hudson plant, 400 men started work this morning, breaking ground for the Anderson Forge & Machine Co.'s new drop-forging plant, which will cost $750,000 and will be the largest plant of its kind in the world, it is claimed. Automobile crankshafts form a large part of the company's output.

The Modern Machine & Engineering Co. has removed from Cleveland to Detroit, with offices in the Ford Building. This company handles the Potter & Johnson line of automobile machinery, which is used extensively in local car factories. Thomas F. Ahern, general manager of the company, has found it necessary to spend the greater part of his time in Detroit for the past two years and for this reason it was decided to remove the headquarters here permanently.

The plans for the new Hudson plant, the contract for which was let to the Andrew J. Smith Construction Co., call for a main building, an office building, a testing building, a power house, shipping sheds and a dining hall. The plant will cover 2.8 acres and will have 223,500 square feet of floor space. The main building will be 580 feet long and will have two wings, each about 300 feet long.

In acordance with the action taken by the new directorate of the E-M-F. Co., immediately following its recent purchase by the J. P. Morgan interests, work is about to start on extensive additions to the company's main plant on Piquette avenue. Negotiations for the purchase of the necessary land adjoining the present buildings, which have been in progress for several weeks, were closed last Friday.

It is reported that the Simplex Motor Car Co., of Mishawaka, Ind., makers of the Amplex car, have purchased a factory site along the proposed extension of the Detroit Terminal Railway in Greenfield Township, immediately north of Detroit.

The Beyster-Detroit Motor Car Company, capitalized at $50,000, has filed notice with the County Clerk of Wayne County, Mich., to increase the capital stock to $250,000.

Chicago Floral Parade Included 120 Automobiles

CHICAGO, May 10—Forced by the rain to postpone its first annual floral parade from Saturday to Monday, the Chicago Automobile Trade Association succeeded in pulling off a most creditable affair in which 120 motor vehicles ranging from big 5-ton trucks down to motorcycles and including a fair representation of owners competed. Undoubtedly the postponement had its effect upon the parade, for more than 100 cars which had been entered were scratched principally because their owners were unable to participate because of business reasons. However, so far as the general public is concerned these defections did not hurt the parade in the least. All the cars were handsomely decorated with natural and artificial flowers, and all along the route which took in 30 miles of Chicago's boulevards there were crowds of people all of whom evinced a lively interest in the affair. The city of Chicago did its best to help matters along by sending a detail of motorcycle policemen as an escort while the Chicago Association of Commerce showed its power in the commercial section, which was fairly representative of Chicago's business strength in the commercial motor world. The judges of the affair were prominent cartoonists and artists including T. M. Wilder of *Motor Age*, L. D. Bradley of the *Daily News*, C. A. Briggs of the *Tribune*, Ralph Wilder of the *Record-Herald*, and J. G. DeLong of the *Cherry Circle*.

These judges lined the cars up on the midway and made a critical examination of the decoration from their artistic viewpoint. They decided that the best decorated car was an Oldsmobile entered by the local branch which was decorated in Clemantis. The car best decorated in natural flowers was an Alco belonging to a private owner, D. J. Joice, who spent nearly $500 for American Beauty roses. The best float was declared to be a Maxwell, which carried the Scottish bag pipers and was decorated in Scotch colors. In the private owner's class Mrs. Harry McKeller carried off the cup with her Winton car which was decorated in poinsettias, the deep red flower from California. The best electric was the Detroit driven by Miss Yetter which appeared to be propelled by the silent energy of two huge butterflies.

It is the intention of the Chicago Automobile Trade Association to make this event an annual affair and next year it is anticipated that it will be easy work to get more than 500 cars out for the demonstration. This year's parade was ably handled by a committee consisting of John H. Kelly. Henry Paulman and O. G. Temme which went about the organization, as a demonstration, in a business-like manner sending out more than 10,000 letters in its attempt to arouse the motorists of Chicago to the benefits to be derived from participation in the event.

J. D. Maxwell Is Now President

J. D. Maxwell, who has been vice-president and general superintendent of the Maxwell-Briscoe Motor Company, has been chosen president of that company, following the resignation of President Benjamin Briscoe, who assumed the presidency of the United States Motor Company.

For seven years the name of Maxwell has been familiar to those interested in automobiling and J. D. Maxwell has been looked upon as a pioneer and designer of exceptional ability.

All in Readiness for 24-Hour Race

With automobile racing a little slower in the East than elsewhere this Spring, interest in the big twenty-four hour contest which will be decided at Brighton Beach Friday and Saturday, is centered upon the event. Special preparations have been made to accommodate vast crowds and numerous improvements in the course itself and its conveniences have been installed.

Those who have been closest to the project say that the record this year will probably exceed 1,200 miles.

News of the Philadelphia Automobile Trade

PHILADELPHIA, May 9—At a meeting held in the Odd Fellows' Temple last Wednesday afternoon the Philadelphia Licensed Automobile Dealers' Association effected a permanent organization, electing the following officers to serve during the ensuing year: President, J. A. Wister, of the firm of Gawthrop & Wister, Elmore agents; vice-presdent, E. B. Jackson, of the local Packard company; secretary-treasurer, W. J. Foss, of the Foss-Hughes Motor Car Company, Pierce-Arrow agents. These gentlemen, with A. E. Maltby, manager of the Winton branch, and W. C. Longstreth, of the Pullman agency, constitute the Board of Governors. A constitution and by-laws were adopted and a committee composed of Messrs. Hipple (Chalmers), Jackson (Packard), Smith (Maxwell), Shelden (Premier) and Longstreth (Pullman) was appointed to secure at once a charter for the organization.

The Haynes Auto Company, now located at 211 North Broad street will move to "Marble Row," 326 North Broad street about May 15. The new building is double the size of the present quarters.

Walter S. Shawvan, of Chicago, has signed to manage the sales department of the Stoyle-Vogel Auto Company, distributors of the American for Eastern Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia. Mr. Shawvan comes here direct from the Boston Packard branch.

H. Leslie Walker has joined the sales force of the Hills Motor Car Company, which handles the Royal Tourist in this city.

Some idea of the phenomenal growth of the automobile in Pennsylvania may be had from the figures issued by the Automobile Bureau of the State Highway Department for the first four months of the present year. Last year the total number of licenses issued was 34,351. Up-to-date the number of 1910 credentials passed out has been 38,970, made up of 22,909 owners, 11,185 chauffeurs, 2,150 dealers, 374 special and 2,352 motorcycles.

George B. Blind, who has been connected with the automobile business in Philadelphia since 1900, has just taken the local agency for the Black Crow car, with headquarters at 2117 North Broad street.

The Regent Garage, one of West Philadelphia's largest automobile storage plants, Fred K. Mears, proprietor, has just installed a charging plant for electric vehicles. It was formerly necessary to run his electrics into the center of the city.

While the treasuries of the various boroughs and townships involved are suffering not a little as a result of this disinterested labor on the part of the Delaware Countians, and the rake-offs of the bucolic Vidocqs have been reduced almost to the vanishing point, motorists hereabouts, attached and unattached, are in high feather, and are showing their appreciation by helping along the work all they can. A notable increase in the membership of the A. C. of D. C. may be ascribed in large part to systematic warning work now carried on by the club.

Swann Law Is in Effect

BALTIMORE, May 9—The new Swann Motor Vehicle Law is now in force, Commissioner of Motor Vehicles John E. George having assumed office last Monday. He has given a contract to the Auto Supply Company for 5,000 sets of automobile tags, there being two tags to each set, and 500 motor bicycle tags. The automobile tags have blue letters on a white background. According to the new law all cars in the State must have tags before July 1.

Pioneer Manufacturer Is Dead

. V. Becker, one of the pioneers of the automobile industry, May 3 at his home in Clyde, O. He was 84 years old, until recently took an active part in business with the El- company. Mr. Becker was the father of B. A. and J. Becker who were associated with him.

Mosler Company Enjoys Show

R. Mosler and Company, makers of the Spitfire spark plug, tained the employes of that concern with a theatre party Thursday night. The play was the "Spitfire" and was given e New Lyceum Theatre. About 250 constituted the party occupied the balcony of the show house.

Boston Branch for Remy Magneto

Remy Electric Company of Anderson, Ind., manufac- of the well-known Remy magneto, have opened a branch outing office at 214 Pleasant street in the Motor Mart, . The office will be in charge of M. H. Pearson.

Touring Club Entertains

Touring Club of America entertained representatives of etropolitan press at luncheon Monday. The function was tended. Many prominent speakers were heard.

S. A. E. Gets Coker F. Clarkson

At a meeting of the board of the Society of Automobile Engineers which was held in New York City, on Tuesday, all the formalities leading up to the engagement of Coker F. Clarkson were completed, and he is now in charge of the work of the society. That Mr. Clarkson will have a busy time of it for some months to come, is assured, and it is the aim of President H. E. Coffin to advance the work at a rapid rate. There are many obstacles to be encountered and overcome, and it was the purpose of the society to obtain the services of a secretary who would be able to make headway which is the reason why Mr. Clarkson was approached. The society is to be congratulated in having succeeded in its endeavor to procure the services of so capable a man.

H. A. Bonnell, who has been treasurer of the A. A. A., has been elected assistant general manager of the A. L. A. M. to succeed Coker F. Clarkson. Mr. Bonnell was for several years secretary of the New Jersey Automobile and Motor Club of Newark.

Trade Association Shows Growth

Four new members have been elected to the New York Automobile Trade Association. They are: Rothschild and Company, Fisk Rubber Company, Thedford Auto Garage, and the Correja Motor Car Company. The roster of the association now includes 75 concerns. The addition of numerous garage concerns to the association has led to the abandonment of the idea of the formation of an organization composed of garages exclusively. New quarters have been secured at 1777 Broadway.

Will Entertain Little Cripples

Wyckoff, Church & Partridge, New York representatives for Stearns cars, have planned to give an outing for the pupils of the Free Industrial School for Crippled Children, located in West Fifty-seventh street, Tuesday, May 17.

The trip will be to Coney Island, where the little ones will be given the privileges of the various attractions at Dreamland.

Pathfinder Crossing Madison Creek at Ford City, Okla.

Sometimes Railroad Tracks Furnish Better Going Than the Highways

Iowa Farmers Royally Greet Pathfinder

THE 1910 Glidden Tour will be about 2,800 miles long, according to the latest estimates. The change in the route to include Omaha has added the extra mileage to the original plans. In another respect it will be an unusual event. The route of the fourteenth day of the run, which will be from Kansas City to Omaha, will be 242 miles long, the biggest ever essayed in a single day by the Glidden itinerants.

This day's run will be over Iowa roads, as the former intention of traversing the route to Omaha on the west side of the Missouri River has been found impracticable. In one way, the change has proved surprisingly favorable, for reports received from the pathfinding party show that three clubs have been formed in the rich Iowa bottom lands to be traversed by the tour. As a matter of fact the pathfinding has been very effective in stirring up interest in automobiling all along the way and at least a dozen automobile organizations have sprung into life while the scout and his party have been passing.

The territory included in the route of the tour this year amounts to about 1,000,000 square miles, in which over one-third of the population of the United States dwells. Nearly 200 incorporated cities having a population of upward of 5,000,000 are touched by the map of the tour. The official map of the event as far as it has been determined up to Tuesday is as follows:

	Miles
1st Day—Cincinnati to Louisville	162
2nd Day—Louisville to Nashville	193
3rd Day—Nashville to Sheffield	119
4th Day—Sheffield to Memphis	161.7
5th Day—Sunday in Memphis	...
6th Day—Memphis to Little Rock	207.7
7th Day—Little Rock to Texarkana	191.6
8th Day—Texarkana to Dallas	217.1
9th Day—Dallas to Lawton, Okla	200
10th Day—Lawton to Oklahoma City, Okla	145
11th Day—Oklahoma City to Wichita	216
12th Day—Sunday in Wichita	...
13th Day—Wichita to Kansas City	234
14th Day—Kansas City to Omaha	242
15th Day—Omaha to Des Moines, Iowa	160
16th Day—Des Moines to Davenport, Iowa	190
17th Day—Davenport to Chicago	200

DES MOINES, IA., May 11—Almost like a triumphal procession of royalty was the progress yesterday of the Glidden 1910 Pathfinding Chalmers car from Omaha to this city. The roads were in almost perfect condition, having been worked over with split-log drags just prior to the passage of the official party, and as this section of Iowa is one of the richest and most prosperous agricultural sections of the land, where the automobile is the valued possession of a big percentage of the farmers, the visit of the pathfinders is appreciated and prized in extraordinary degree.

The route from Omaha to Des Moines is 159 miles and will constitute a day's run of the tour proper. The rest of the distance across the State to Rock Island is also in perfect shape.

South Leg of Elgin Road Race Course Makes Fine Going

Turn on Elgin Race Course, at Udina Corner

Chalmers Pathfinder in Front of Lee Huckin's Hotel, Oklahoma City, Okla.

Pathfinder Car in the Wqods, De Kalb, Tex.

Carnival to Open New Elgin Course

CHICAGO, May 9—Inside the next week it is expected the Chicago Motor Club will make application to the A. A. A. for a sanction for a road race carnival to be run this Fall at Elgin, Ill., 38 miles from this city. It looks now as if it would be a two-day meet with a small-car event for an opener and the big race on the second day. Negotiations with this end in view have been in progress for some time, and matters were brought to a focus last night when the citizens of Elgin decided to form the Elgin Automobile Road Race Association and to incorporate under the laws of Illinois with a capitalization of $20,000.

This means that Elgin will finance the races and that the Chicago Motor Club will organize and run the contests. All that remains to complete the deal is the formal meeting of the two organizations when the agreement will be drawn up and signed by both parties.

Considerable preliminary work has been done already. A committee of Elgin citizens has visited the owners of property surrounding the course and has secured the written consent of three-fourths of the thirty-eight property owners, while the remainder have given verbal promises to permit the use of the roads for racing purposes. This deal is unique in motoring annals, in that the farmers are partners in the enterprise, the Elgin association which is financing the deal having agreed to give each farmer 33 1-3 per cent of the sale of tickets for viewpoints on his premises.

The course the promotors have in mind is regarded almost ideal for racing purposes. In shape it is an irregular pentagon with two long strips of about equal distance, a connecting one mile strip at its western end and a short stretch on the east which almost makes it a hairpin at that end. The surface of the road is stone the entire distance around and there is only one place where there is any suggestion of a grade.

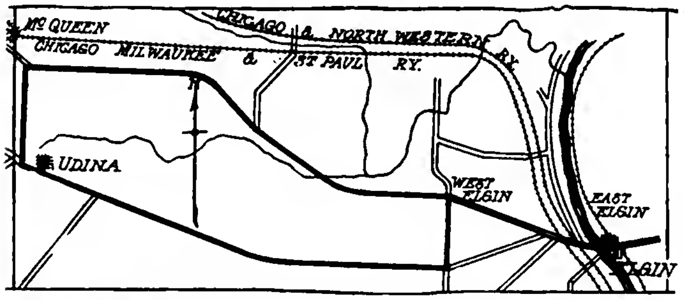
As it stands now the roadbed is 14 feet wide and almost a boulevard in smoothness, but in addition to this there is 1 foot on each side of the visible roadbed that is of the same stone formation, but covered by grass. In addition to this there is a side dirt road with no appreciable drop from the main highway.

There are three bridges on the course. One is of stone and iron; about one-third of the way down the north leg it is 28 feet in width. The other two are wooden bridges and as wide as the road itself. Outside of the four turns, each of which is a four corners, there is not a highway crossing the course, and but two roads lead into it, one on the north leg and the other on the south. Probably sixty buildings are scattered around the circuit representing thirty-eight property owners. The course is 8.4 miles around.

At present the circuit needs some attention, although not very much. There is some loose gravel on the road which must be removed, and the south leg is dippy. However, an expenditure of $8,000 or $10,000 for scraping and oiling should make the course one of the fastest, if not the fastest, in the country.

In the map below. the actual layout of the course may be seen, as well as the straightaways and the nearness to cities.

Chance for Speed on Elgin Course, After Rounding the Hairpin



Map of Elgin Circuit, Which Chicago Motor Club Will Use

Willys Overland "Thirty" To Be Tested Out

FROM New York to the "coast," by a route which will cover upwards of 3,500 miles, is the distance which a regular stock Overland "thirty" will have to make, and what is equally to the point, the car is to be driven for the whole distance by a woman, Miss Blanche Scott, who hails from Rochester, New York. The idea of the Willys-Overland Company, of Toledo, O., is to furnish an object lesson to the women of America; a lesson in fact that will answer for all time. There have been various kinds of tours from coast to coast, but they were handled on a basis such as lent the impression that it was a very grave undertaking, and special cars were frequently used for the work. Then, the drivers were heralded as "dare devils," ready for a fight or a frolic as the weather might seem to indicate.

The belief is that a well made car may be piloted from coast to coast with about the same facility that it may be driven from New York City to Buffalo, Boston or Philadelphia, excepting that the distance is enough to try out the staying qualities of the automobile, and it is admitted that some of the roads will be hilly, soft in places, and capable of taxing the power plant of a good automobile. This is not a matter which should be viewed with great alarm by the maker of any automobile which may be regarded as abreast of the times, but the run will serve as a proof of the pudding, so to speak. It will also tell the ladies that the time has arrived in the world of automobiles when they need have no fears or qualms.

For the most part the route will be in accord with the "surveys" as made by the topographical engineers who did the work for THE AUTOMOBILE BLUE BOOK and in a general way as follows: Starting from New York, north along the Hudson river to Albany, thence west, touching Syracuse, Rochester, Buffalo, Cleveland, Toledo, Chicago, Milwaukee, Cedar Rapids, Des Moines, Council Bluffs, Omaha, Hastings, Julesburg, Denver, Cheyenne, Laramie, Rawlings, Rock Springs, Granger, Ogden, Tonopah, Goldfield, Beatty, Kelly's Well, Cajou, Los Angeles and San Francisco.

From New York to Ogden the route follows beaten paths, but west of the Great Salt Lake the car will traverse a desert that will test its quality. The southwest trip through Nevada will undoubtedly prove interesting enough and even in the present advanced stage of motor construction it would furnish a test which will have to be regarded as up to the most strenuous requirement from the stock car point of view. It will be remembered that the Model 38 Overland sells for $1,000; this is an interesting phase of the problem; it emphasizes the advance which has been made in automobile construction in the last few years, and, in all truth, were it not for this angle, together with the fact that a woman is to make the trip, the undertaking would have little or no interest for autoists. This, however, makes a vast deal of difference, showing as it does indirectly, the simplicity of control of the machine in question.

Herald-Journal Pathfinder Starts

In a big Columbia touring car, the pathfinding party of the New York *Herald*-Atlanta *Journal* road tour scheduled for next month, started from Herald Square Saturday. The party consists of James Rolfe, driver; L. M. Bradley of the United States Motor Company; a representative of the *Herald* and N. Lazarnick, official photographer.

A big crowd gave the pathfinders a send-off on their long trip. The run to Philadelphia was without special incident, but some bad roads were encountered this side of Gettysburg. Reports from the roads ahead are all more or less favorable and a splendid trip is predicted for the party. Much interest has been aroused through the South.

Special Speedway Trophy, Atlanta

K. C. Hill Climb

KANSAS CITY, Mo., May 9—There are 22 entries in the annual hill climb of the Automobile Club of Kansas City May 14. Dodson Hill is being put in faultless shape by the County Highway Engineer, R. T. Proctor, and all necessary arrangements for a successful meet have been made by P. M. Stevens, secretary of the club and representatives of the A. A. A.

A. A. A. Rules Govern Norristown Run

White-winged peace has settled down upon the tentative battle ground of the Norristown Automobile Club and the Contest Board of the A. A. A. When the rules for the coming reliability run of the Norristown club to Scranton and return were framed, the club injected several innovations to fit local conditions that were at variance with the road tour rules of the national organization.

One of these was a change in the classification of the cars entered of about $100 in each class and another rule provided for the entry of toy tonneaus in the touring car class, while another required a brake test backward on a ten per cent grade.

These rules were all promptly blue-penciled by Chairman Butler and red war was threatened on the part of the club. But chief among the demands of the Norristown organization was a rule to prevent scorching between controls and in that respect the club was successful in gaining recognition. At one time the direct ultimatum was delivered by the club that it would run its tour without sanction unless its rules were confirmed, but the diplomatic appeal of Chairman Butler to the sportsmanship of the club turned the tide in favor of peace.

A. L. A. M. Threshing Out Tire Problem

One of the largest meetings of the board of managers of the A. L. A. M. ever held, assembled Wednesday at the headquarters of the organization to consider the problem of tires for the 1911 output. The present level of rubber prices and the impossibility of tire makers to buy at current rates and supply their product to the automobile manufacturers at the figures of last year, were two of the subjects discussed at the meeting. The rubber corner was thoroughly treated from every viewpoint and its causes and probable effects were considered.

The Detroit contingent arrived in New York Tuesday morning and a series of conferences, held at various hotels, tended to promote an understanding between the manufacturers before the meeting was called.

Atlanta's Epochal Spring Meet Ends

(Continued from page 871.)

THERE were a number of accidents on the opening day, but not any on the later days, with the exception of some minor changes in the way of substituting one engine for the power plant of another car, both of the same make, etc.

Event 6—Fifty-mile free-for-all:—

American, Lytle	7:53	15:87	23:09	32:22	40:20:02
National, Kincaid	3:16	16:21	24:20	32:21	40:21:27
Marmon, Dawson	9:03	19:31	23:36	38:51	*
Fiat 90, De Palma	10:49	19:59	30:20	39:43	**
Marmon Six, Harroun	7:56	15:39	26:53	***	

*Finished 46 miles, 43:59:13. **Stopped. ***Stopped.

Event 7—Two hundred mile-stock chassis, 301-450 cubic inches:—

	10-m.	20-m.	30-m.	40-m.	50-m.	60-m.	70-m.	80-m.	100-m.	120-m.	140-m.	160-m.	180-m.	200-m.
Marmon, Harroun	3:46	17:02	25:27	33:47	42:04	50:36	59:48:00	69:09:00	37:26:00	106:34:00	125:43:00	144:30:00	163:22:00	132:31:24
S. P. O., Strang	...	....	....	....	....	62:17	31:53:00	91:24:00	113:30:00	137:50:00	160:50:00	133:31:99	Still run'g at finish	
National, Aitken	3:20	16:25	24:23	32:29	out									
Knox, Cliquot	3:46	17:02	25:30	37:14	48:42	out								

National went out with broken steering knuckle.
Knox went out. Motor ran out of oil and broke crankcase.

MAY 7.

Event 1—Ten-mile free-for-all:—

	2-mile	4-mile	6-mile	8-mile	10-mile
Fiat	1:36	3:04	4:34	6:05	7:39:4
American	1:44	3:14	4:44	6:13	7:43:46
National	1:49	3:26	5:03	6:41	8:19:65

Event 2—Twelve-mile stock chassis, 161-230.

E.-M.-F.	2:19	4:39	6:50	9:00	11:11	13:22:6
Cole	2:13	4:39	6:50	9:00	11:11	13:21:95
Firestone	2:23	5:41	stopped.			

Event 3—Two hundred-mile stock chassis, 451-600 cubic inches:—

	10-mile	20-mile	30-mile	40-mile	50-mile	60-mile	70-mile	80-mile	90-mile	100-mile
National	3:34.4	16:53.92	25:19.77	33:50.26	42:21.78	50:49.27	59:13.45	67:48.85	76:10.45	36:19.59
American	3:33.5	16:52.41	25:13.01	33:41.67	42:21.72	50:37.22	53:51.74	66:42.71	74:50.30	82:55.40
Fiat	3:53.6	17:33.53	26:15.11	34:31.72	42:43.53	50:49.27	59:44.63	67:44.22	77:23.35	39:22.80
Marmon	9:13.32	13:00.26	26:50.62	35:39.84	44:36.12	61:14.50	69:56.73	73:43.36	37:31.05	96:22.12
National	9:23.5	13:14.92	27:09.39	36:05.65	47:24.57	56:37.95	66:02.65	75:12.76	91:22.24	101:02.06
A. K.	9:32.4	13:26.41	27:10.32	35:56.32	51:02.30	60:19.15	93:04.70	102:39.52	113:00.40	123:43.05

	110-mile	120-mile	130-mile	140-mile	150-mile	160-mile	170-mile	180-mile	190-mile	200-mile
National	94:47.9	103:50.35	114:16.53	124:44.16	135:13.34	144:51.08	154:43.55	164:05.94	173:13.39	132:24.21
American	96:29.07	106:51.33	119:57.34	129:54.6	139:17.89	143:34.75	158:05.04	166:56.07	175:18.40	185:10.25
Fiat	102:15.58	112:07.34	123:06.63	136:46.57	146:00.00	153:50.4	163:20.07	177:45.25	136:56.65	193:11.53
Marmon	105:43.56	116:26.00	128:57.26	141:17.29	153:25.09	164:42.07	176:24.35	137:97.74	Running	
National	111:58.43	123:21.00	135:40.81	146:43.3	157:59.3	171:26.53	182:35.05	192:17.21	Running	
A. K.	189:22.7	144:44.08	154:55.15	167:31.7	177:07.72	136:26.93	196:55.52	Running		

Three-Day Minnesota Tour

The second annual reliability run of the Minnesota State Automobile Association will go this year to Aberdeen, S. D., and the pathfinder, a five-passenger E-M-F car will start out over the route May 9.

Dr. C. E. Dutton, of Minneapolis, chairman of the contest committee, will go with the car. The main trophy, that offered by the St. Paul Dispatch, is now in possession of the Minneapolis club and will be competed for again this year.

Last year the total entry was seventeen contestant and half a dozen non-contestant cars, while local cars along the route to Fargo and return joined in. Governor Eberhart may enter the run.

Club May Use Indianapolis Speedway

INDIANAPOLIS, May 9—An automobile club is being organized in Indianapolis by private owners, dealers and manufacturers, and an effort is being made to obtain 1,000 charter members at a membership fee of $15. Carl G. Fisher, president of the Indianapolis Motor Speedway Company, has agreed to build a club house at the Speedway grounds and to allow members access to the Speedway course for pleasure driving. The club will be separate from the association organized recently which affiliated with the American Automobile Association. The committee on organization is composed of F. I. Willis, A. R. Kling, T. E. Hibben, Frank Staley and Charles A. Bookwalter.

Many Cars for Orphans' Day

Responses came promptly in answer to the appeals and entry blanks sent out for cars for the Orphans' Automobile Day. E. Lascris, manager of the De Dion Bouton Selling Branch, made the first entry of two cars, this being followed by two National touring cars by the Poertner Motor Car Co. The Maxwell-Briscoe Co. offered 20 cars and one Grabowsky truck, which will carry 60 children. This was followed by an offer from Manager George W. Bennett, of the White Co., for two big White gasoline trucks accommodating 80 children.

1910 Touring Information for Automobilists

(Continued from Page 877.)

The surveys are much more complete, comprehensive, the style is brief and terse. The type is large and clear, so that it will be possible to open the book while riding in a car, turn to the part which gives the information desired, and readily read the instructions and directions, even under conditions of great disadvantage. This particular book also includes routes in the Provinces of Quebec and New Brunswick, and directions for getting in and out of New York are also given their proper spacing. There is one other point, the consolidation of the Red Book with the Blue Book adds materially to the comprehensiveness of the latter, in that it includes all worthy information which formerly obtained in the Red Book proper. The Official Automobile Blue Book is published by The Automobile Blue Book Publishing Company, 239 West 39th street, New York City.

Trophy for 200-Mile Event, Atlanta

Medals for Drivers

CHICAGO, May 2—Following up its offer of the Chicago trophy for the roadster division of the Glidden tour, the Chicago M. C. has decided on another innovation—a gold medal to the winning driver.

AMONG THE GARAGES

William G. Grieb, new president of the Ajax-Grieb Rubber Company, Trenton, N. J.

Regal Plugger, which is making a tour of the principal cities of the country, stopping to ask road directions

Haney-Pistor Co., of Kewaunee, Wis., is building a large public garage, the first in Kewaunee.

A two-story garage and office building is being erected at Fond du Lac, Wis., by J. L. Remington and R. H. Lee.

An electric automobile garage has been opened at 2174 East Ninth street, Cleveland, by Clarence A. Downey.

Park Automobile Company, of Johnstown, Pa., has opened its new garage on Locust street. Floor space for fifty cars has been provided.

The Russell Garage at Berlin, Wis., was almost totally destroyed by fire on May 5. Several other adjoining buildings were badly damaged.

P. J. Needham, agent for the Columbia and Maxwell at Scranton, Pa., is about ready to move into his new garage in Wyoming avenue.

Dusseau Motor Car Company, of Toledo, O., was incorporated with a capital stock of $30,000 to conduct a sales agency and garage in Toledo.

L. De Stwolinski, manager of the Central Garage of Fort Scott, Kan., announces that his concern will occupy one of the new buildings at First street and Scott avenue next week.

Quarters for the Auto Sales Company's garage at Lynchburg, Va., will be located on Main street and will be ready for occupancy this month. The garage can take care of twenty-five cars.

Florida Automobile and Gas Engine Company, of Tampa, is building a garage 70 by 90 feet, two stories high. The cost will be $16,000 and the structure will contain many modern improvements.

G. W. Worthing, formerly of the Worthing-Clark Automobile Co., at Fond du Lac, Wis., has established a new garage at 22 East Second street. He has been appointed district agent for the Overland.

The new Curtis Garage, erected for the Curtis Auto Co., Milwaukee agents for the Reo, Corbin and Hupmobile, is about ready for occupancy. It is located on Eighth street, just south of Grand avenue.

The Dominick Automobile Company, of Chicago, has been incorporated with a capital stock of $10,000. The company will engage in the automobile business and conduct a general repair and machine shop.

The Pittsburg Automobile Academy has established a general repair shop and garage at 5811 Penn avenue, East End, where it is now overhauling from six to a dozen cars a day for the benefit of its students.

Duluth will have a $50,000 garage in June. The building is almost completed. It is located back of the Board of Trade and is owned by E. J. Filiatrault. It will be two stories and of the most substantial concrete construction.

Manager Harry A. Bell, of the Metropolitan Motor Car Company, Spokane, reports the completion of his new garage. The building is of brick, two stories high, with an approximate floor space of 15,000 square feet. This firm handles the Premier, Pullman and Lozier cars.

Mathias R. Kondolf has lately secured the agency of the National car for Rochester, N. Y., and vicinity, and intends to occupy a large garage at Monroe avenue bridge, in the near future. This garage is 71 ft. front on Monroe avenue, and runs back 115 ft.; three stories high, of steel and concrete construction and fireproof.

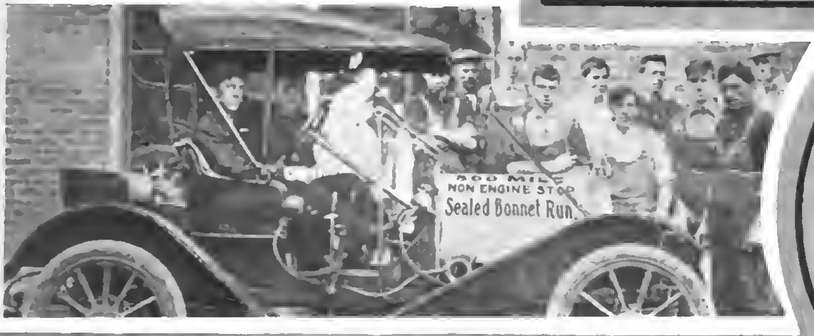
The Metropolitan Garage, which will be located in the quarters formerly occupied by the Roberts Motor Company, of Jacksonville, Fla., will handle the Gramm truck throughout Florida. The remodeled building will be ready for occupancy in the near future. W. F. Alley is in charge.

Standard Automobile Company, Cleveland agents for the Packard, and the Ohio sales branch of the Baker Motor Vehicle Company have just occupied the largest salesrooms and garages in Cleveland. The structure is located at Euclid avenue and East Seventy-first street. The building is of brick and stone construction and has a frontage of 160 feet on Euclid avenue and 200 on East Seventy-first street. The Baker department is capable of charging sixty cars at one time.

W. P. Crowley and A. H. Grindle, of San Francisco, are erecting a garage and will open for business July 1. The building will be a two-story brick, 82 ft. 6 in. by 137 ft. 6 in., costing $16,000, with basement the same size, for dead storage, lockers and machine shop. On the main floor there will be three large show windows for rent, and, with the exception of the office and store room, the rest of the floor will be devoted to live storage. The second story extends back only about one-third of the length of the building, and will be used exclusively as a lounging room for the chauffeurs.

The Buick Auto Supply and Garage Company has purchased a site on North Grand Boulevard, Detroit, and plans are being prepared for what will be one of the largest garages in the country. The property has a frontage of 245 feet and a depth of 150 feet, and the structure will cover the entire lot. The building will have an area of 36,750 feet, the front portion, 50 feet deep, being two stories in height. Back of this will come the garage proper, one story in height, 100 by 245 feet, and entirely free from posts. A complete machine and repair shop will be maintained, and it is the intention to have machines from all over the State sent here for overhauling and repairs. The Detroit garage will be the first of a string of forty it is proposed to establish throughout the State, and will be operated by the Michigan Buick Auto Supply & Garage Company. Despite the similarity of names, there is no connection between this concern and the Buick Motor Company, of Flint.

WITH THE AGENCIES



Hudson car which made 500 mile non-stop run in far away Hawaiian Islands, averaging nearly 19 miles per gallon

G. C. MacCullough, new appointee as manager of Penna. Rubber Co.'s N. Y. branch.

A. S. Lanich, of Baraboo, Wis., is a new agent for the Halladay in Western Wisconsin.

T. G. Coburn and E. B. Dennie, Newport News, Va., have become agents for the Studebaker, E-M-F and Flanders cars.

H. J. Smith, of Ravenna, O., has been appointed Regal agent by J. C. Hipp, manager of the Regal Motor Sales Company, Cleveland.

The Duquesne Motor Company has secured the Greater Pittsburgh agency for the Auburn car. It is also handling the Sebring car this year.

H. Heller, of Youngstown, O., has been chosen agent for the Clark and Empire cars by the Vail Motor Sales Company, of Cleveland.

Seamless Rubber Company, New Haven, Conn., opened a Boston salesroom at 685 Boylston street for the sale of the Bragg stitched tire and the Kantleak inner tubes.

The LeGrand Automobile Company, of Wilkesbarre, Pa., has taken on the agency of the Cole "30" for Luzerne, Columbia, Lackawanna and Carbon counties.

G. E. & H. J. Habich Company have taken the agency for the Cole "30" for New England and have opened a temporary salesroom at 185 Summer street, Boston.

Delaware Automobile Company, of Delaware, Ohio, of which Joseph Neville is general manager, has taken the agency for the Buick, and E-M-F lines for Delaware County.

Standard Tire Traction Company, manufacturers of Standard Chain Grips, opened salesrooms at 399 Boylston street, Boston. M. A. Kennedy is general manager.

The Columbus branch of the Studebaker company, of which A. J. Pray is manager, has been extended to include all of Southern Ohio, a part of West Virginia and Northern Kentucky.

The Gehl Bros. Manufacturing Company, of West Bend, Wis., has taken the agency for the International line. Each of the company's traveling men will be equipped with an International.

The Acme Auto Car Company, of Covington, Ky., has secured a floor space of 12,000 feet on one floor. The concern has the agency of the Badger and Clark cars. L. H. Sackett is manager.

The B. F. Goodrich Rubber Company opened new salesrooms in Cleveland last Saturday. A complete repair department and a full line of tires is on display. The new quarters are fitted up luxuriously.

F. C. Wiswell, of Elkhorn, Wis., is a new Studebaker agent in the south central Wisconsin territory. Mr. Wiswell will open a garage on May 15. Hugh Squires will have charge of the repair department.

J. Ernest Quimby has joined the Boston sales force of the E. R. Thomas Motor Company. Percy Musson has been appointed assistant superintendent of the service department of the same Thomas agency.

H. S. Moore, one of the oldest automobile dealers in Cleveland, has taken over the agency of the Overland line for Northern Ohio. He will have an allotment of 200 cars and will open a branch office on the west side of the city.

Commercial Auto Sales Company has been organized and located in salesrooms at 2158 East Ninth street, Cleveland. Chase delivery wagons and Gramm-Logan trucks will be distributed. J. A. Boyd has been chosen local manager.

H. H. MacDonald, C. T. Schaefer and J. E. Ellison, formerly in the St. Louis Car Company automobile department, are now connected with the Embree-McLean Carriage Company, of St. Louis, in making and selling the Embree-McLean "35."

Personal Trade Mention

Z. B. Leonard, of South Bend, Ind., will have charge of the Perfection Spring sales in the Middle West.

The Gasoline Motor Efficiency Company, of Jersey City, manufacturers of the Home, has secured the services of Jacob Hoffman as superintendent.

W. Owen Thomas will be identified henceforth with the Fal Motor Company as consulting engineer, according to an announcement made recently by that company.

A. R. Brown, formerly with the Interstate Sales Co., has returned to the Atlanta Ford branch, with which he was connected before he went over to the Interstate forces.

P. S. Steenstrup, former manager of the Hyatt Roller Bearing Company, has been appointed manager of the new branch of the Columbia Motor Car Company at Seattle.

Earl J. Moon, who was dangerously ill with diphtheria in Chicago, is convalescing at his home in Washington Terrace, St. Louis. He is still under the care of his physician.

George G. Dunham, president of the Royal Tourist Car Company, spent the week at the New York branch. Several new salesmen will be added to the sales force of the metropolis.

Roy Thomas, former centerfielder of the Philadelphia and Boston National League clubs, has signed with Manager W. F. Smith, of the Maxwell-Briscoe Company, of Philadelphia, in the capacity of salesman.

W. T. Helfer, formerly branch manager of the Diamond Rubber Company, Boston, Mass., and recently sales manager of the Springfield Metal Body Company, Springfield, Mass., has severed his connection with the latter concern to join the Racine Mfg. Co., of Racine, Wis., in which he has taken an interest.

REALM OF THE MAKERS

Party of 75 St. Louis automobilists lined up on the principal street of Stuttgart, Ark., upon occasion of a recent trip there

Richard Bacon, Jr., latest addition to sales force of Hudson Motor Co., Detroit

The Pullman Motor Car Company increased its capitalization April 30 from $100,000 to $500,000.

Oscar Lear Automobile Company, of Springfield, O., increased its authorized capital from $100,000 to $500,000. The increase was made to permit enlargements.

Columbus Buggy Company, manufacturer of the Columbus-Electric and the Firestone-Columbus, is now engaged in preparing models for the 1911 season.

The Nickel Manufacturing Company, of Pontiac, Ill., has placed on the market a five and a half pound automobile pump, standing ten inches high. The pump is operated by the engine.

Stewart & Clark Mfg. Co. is enlarging its factory plant at Chicago with an addition 110 by 125 feet. The building will be two stories and basement and is expected to be completed by July 4. The concern makes speedometers.

Factory Auto Supply Company was capitalized with a capital stock of $10,000. The company will be located in Chicago, and will deal in automobiles, motorcycles, accessories and supplies. The incorporators are George W. Stephens, William A. Conover and Spencer Wood.

The Universal Tire Protector Company, Angola, Ind., has been reorganized with a capital stock of $30,000 fully paid, the officers being S. C. Wolfe, president; E. S. Croxton, vice-president; J. R. Nyce, secretary and W. W. Love, treasurer. Mr. Croxton is vice-president of the First National Bank of Angola.

After two years absence from the track, Montague Roberts, it is announced will drive the Houpt-Rockwell entry during the 24-hour race which will be held at Brighton Beach, May 13-14. Mr. Roberts has had much to do with the designing of the car he will drive. Stanley Martin will be with Mr. Roberts.

The Brown Auto Carriage Company, of Cleveland, builders of automobile bodies, moved to a new factory May 1. The new plant has a floor area of 40,000 square feet, and gives this company one of the largest body factories in the country. Tops, windshields and upholstery work are side lines of this concern.

The Temperin Company was incorporated in Illinois by Secretary of State James A. Rose, with a capital of $5,000. The company will locate offices in Springfield, Ill., and will manufacture Temperin, a product for tempering and saving the temper of steel tools. The product was invented by Justis Moore.

The Overland Automobile Company states that it purchased material for 20,000 cars for 1910, that the material is in hand, and that the production will be nearer to 25,000 than to 15,000 which was scheduled on page 683 of THE AUTOMOBILE, April 7 issue. Overland shipments for March were 2,300 cars; April will reach 3,000.

The Detroit Carbureter Company has been organized with Byron Robbins as president, E. M. Broderick, vice-president and general manager, Dr. H. S. Kiskadden, secretary and Newton Annis, treasurer. Within a month the new company, which has established offices at 239 Jefferson avenue, Detroit, will be turning out 200 carbureters.

The New Departure Manufacturing Company, of Bristol, Conn., is making additions to the big plant, which will afford an increase in floor space of 32,000 square feet. The foundations have also been laid for additional gas-engine equipment. Gas engines have been used by the company for power purposes for some time with good results.

W. T. Ensign, of La Crosse, Wis., has perfected a pistonless gas engine for use in motor cars, boats, cycles and stationary work. The engine is said to utilize the power created by the combustion of two gases, is a great fuel saver and may be geared to tremendous speed. Two La Crosse engine builders are negotiating for the purchase of the rights to manufacture the motor.

Barndt and Johnston Auto Supply Company which has been located on Donaldson street since its organization in 1905, has been moved to South Columbus, where it will occupy the plant formerly used by the Columbus Woodworking Company. In all 45,000 square feet is contained in the new plant. The company makes bodies and accessories.

Charles T. Jeffery has assumed complete control of the manufacture and sale of the Rambler, manufactured by Thomas B. Jeffery & Co., at Kenosha, Wis., according to official announcement. Mr. Jeffery was for sixteen years a partner with his father in the big concern, and is widely known in the trade. The business of the company will continue without change in policy.

The Canton Buggy Company, Canton, Ohio, is making a new delivery wagon, and it is expected that this company will go into the production of its type of delivery wagon on a consderable scale. The idea is to take advantage of the present state of the art, produce a wagon of the greatest possible utility from the point of view of radius of action, low cost per ton mile of the goods transported, with a particular eye to the future. considering depreciation.

An addition to the Moon Motor Car Company factory is now being built for the accommodation of the increased number of cars in the testing stage. The test cars, while undergoing their road test preparatory to the 100-mile perfect score run, which each must take before it is sent to the paint shop, will be housed in the new department, to be known as the test-car garage. The garage will be large enough to accommodate thirty to forty cars. It is being built in the quadrangle formed by the three wings of the big plant and a high fence topped with barbed wire. The new department will be ready for occupancy in April.

NEWS IN GENERAL

Louis Strang in the Pierce-Racine car which he drove in the New Jersey reliability contest from New York to Atlantic City and return.

E. R. Hollander, vice-president Fiat Automobile Company, New York City

Fisk Rubber Company has been installed in one of the most handsomely arranged houses in St. Louis at 3917 Olive street.

The Monarch Auto Top and Supply Company, with offices in Chicago, has certified to an increase of capital stock from $2,500 to $20,000.

The Benoist-Buel Company has succeeded to the management of the Benoist Bros. Manufacturing Company, of St. Louis, and in a short time will move to 3923 Olive street.

R. A. Palmer has been elected president of the newly formed Commercial Club of Pontiac, Mich. Mr. Palmer is secretary and general manager of the Cartercar company.

Over 560 automobile horns made by the Gabriel Horn Mfg. Co., of Cleveland, were lost in the wreck of the steamship "Minnetonka" off the British coast. The horns were part of the jettisoned cargo.

The Thirty-eighth annual convention of the Carriage Builders' National Association will be held in Cincinnati, O., during the week commencing September 25, 1910. The exhibition will be from September 26 to 30, inclusive. The convention will be September 27, 28 and 29.

The United States Light & Heating Company, general offices at 30 Church street, New York, announce the removal of the Chicago office, May 1, from 745 Monadnock Building, to 1013 People's Gas Building, Michigan avenue and Adams street.

D. Rees Davis has taken over the Houseman-Blake Automobile Company, and in future the firm will be known as the Davis-Blake Automobile Company. The new company will handle the Springfield car and its offices will be at 5037 Delmar boulevard.

The Emergency Repair & Call Company has begun business at 2801 Clark avenue, Cleveland, with C. H. Votteler as manager. The company will remain open day and night and will make a specialty of calling for and repairing cars in any part of the county. A motor wreck train equipped with mechanics is subject to calls days and night.

E. D. Layman, manager of the Chicago Road and Realty Company, which is projecting "The Great White Way" between Chicago and Milwaukee, says that the company has begun to acquire title to lands on the proposed route. The highway will be 76 miles long, with a 66-foot highway for motor traffic and two 20-foot public roads flanking it. The center division for street railway traffic will be eliminated.

The Clark Motor Company, capitalized at $50,000, to manufacture and deal in motor cars and to carry passengers, has been incorporated in Buffalo. The directors are Stanley B. De Long, John W. Van Allen and Henry J. Rente. Incorporation papers were also filed in Buffalo by the Regal Auto Company, with a capital of $10,000, with Clarence E. Hancock, Wilfred W. Porter, Jr., Myron S. Melvin, Robert G. Boyd and Harry D. Van Brunt, all of Syracuse, as the directors.

Pittsburgh automobile firms are studying the matter of outdoor motor carnivals. They believe that more real good can be accomplished in a sales way through these outdoor carnivals than through the winter indoor meetings. It has been found that in general prospective buyers take much more interest in seeing the cars in motion than they do in a long continued study of them under electric lights, and arrangements are being made by leading companies in this city to put on one or more big summer carnivals this year.

George C. John, New York agent for the E-M-F and Flanders, has sold out to the Studebaker Company, the purchase being in pursuance of the latter company's policy of handling these cars, the manufacture of which it now controls, from its own branch offices. The deal was made last week at a meeting at the Hotel Belmont in New York, between Mr. John and Walter E. Flanders and Clement Studebaker, representing the Studebaker Company. It is said the price received by Mr. John will practically cover his season's profits, and that as an evidence of good will he will this summer drive a handsome Studebaker-Garford car.

Gibney & Bro. Invade New York

The announcement is made that the well-known Philadelphia house of James L. Gibney & Brother is going to invade New York with a tire and accessory store at 248-52 W. Fifty-fourth street.

James L. and John L. Gibney opened a bicycle-tire repairing establishment in a back room at 1015 Arch street, Philadelphia. They soon outgrew their quarters and in the following year tripled their space and started the sale of bicycle tires and later in the year removed to still larger quarters at 916 Arch street where they took on agencies for pneumatic automobile and solid carriage tires. In 1902, they moved to 828 Arch street. Shortly after establishing themselves in this place they extended their scope by beginning the sale of solid motor tires.

In 1905 a location was secured at 211-13 N. Broad street, and accessories were added to the line.

In April of 1909 they erected a three-story building at 215-217 N. Broad street, where they carry one of the very largest stocks of auto tires and accessories in the country and also have exceptional facilities for repair work.

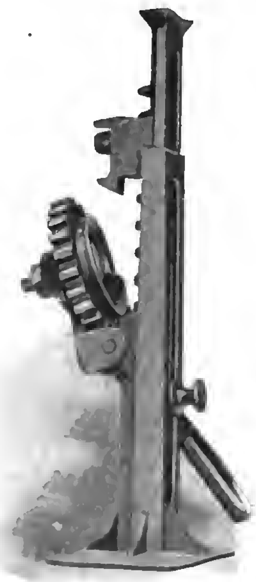
The Gibney firm developed the sale of the Fisk, Continental and Firestone tires in the Philadelphia field.

The establishing of the New York store, which will occupy the ground floor and basement of a large new building just off Broadway is the latest development in the upbuilding of this great business from an insignificant start.

Prominent Automobile Accessories

NEW JACK WITH QUICK ADJUSTMENT

The Ashland Manufacturing Company, Ashland, O., offers a new jack of which much interest is being taken by autoists. The illustration here given of this jack shows how simple it is, and it is claimed by the maker that the adjustment feature is of particular value, it being the case that the action is not only quick but positive. The Crown jack, as it is called, is made in the usual sizes, the materials employed are the best for the purpose. For a double-acting jack, considering the high character of the material and workmanship, the price is well within bounds, and



Ashland Jack Demounted

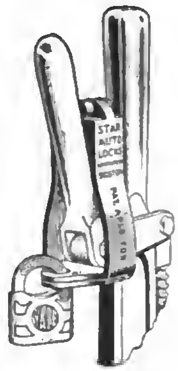
the rate at which these jacks are being made and shipped speaks well for the enterprise of the firm making them. The cut elsewhere on this page shows the jack partly dissembled, this act of taking it apart showing better than could any other the actual construction. As is to be seen from the cut, there is a large toothed wheel on the end of the operating lever. This gear and lever are finished and inspected with unusual care, in order to make the jack one that can always be depended upon.

THREE IN ONE OIL FOR MAGNETOS

The well-known lubricating oil, which is sold everywhere under the brand name "Three in One," has recently attracted the notice of the automobile fraternity as a lubricant to be used in magnetos, and the Three in One Oil Company, 42 Broadway, New York City, claims for this oil that it will serve extremely well for this important purpose, its advantages being set forth as (a) it may be obtained even in the remotest districts in country general stores, as well as in the large distributing centers; (b) it has exactly the right consistency for use in delicate bearings, and will prove efficacious in magneto work on this account; (c) the oil will not gum up, is free from deleterious admixtures, and has the especial virtue of coming in sealed packages, which serves as a guarantee.

EMERGENCY LOCKING DEVICE

Automobiles continue to be stolen and there are still many accidents which occur solely through someone, humorously inclined or otherwise, changing the positions of the operating levers so that a gear is engaged when the driver thinks that the lever is in the neutral position. This will now all be changed by the use of a new emergency lock, known as the Star Auto Lock, which has just been put on the market by the Star Auto Locks Company, 53 State street, Boston. The device is the acme of simplicity, consisting of a simple metal loop which may be placed over the operating handle in such a way as to prevent the working of the latch. In this way the lever may not be moved. The metal loop, as the cut shows, is locked in place with a padlock, the owner of the car carrying the key. The construction is so simple and the work of putting it on and taking it off so easily done that no time is added to the usual time of starting or stopping.

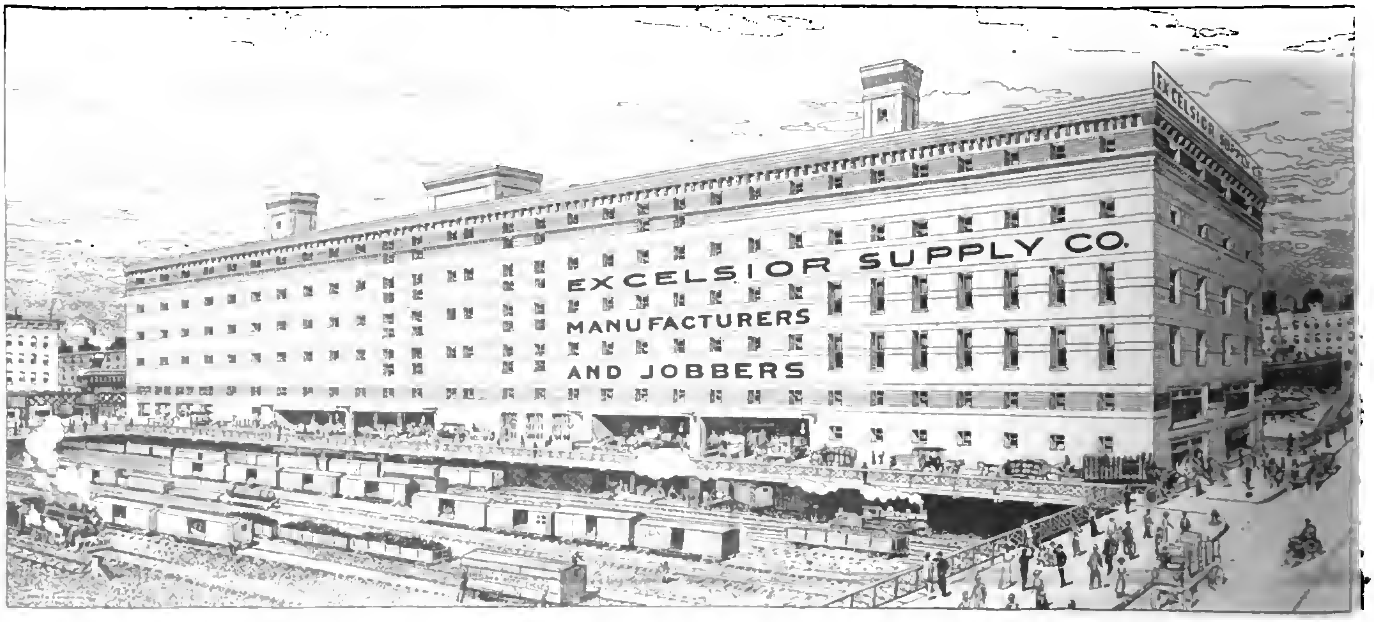


Star Auto Lock

RONSON AUTO INITIALS

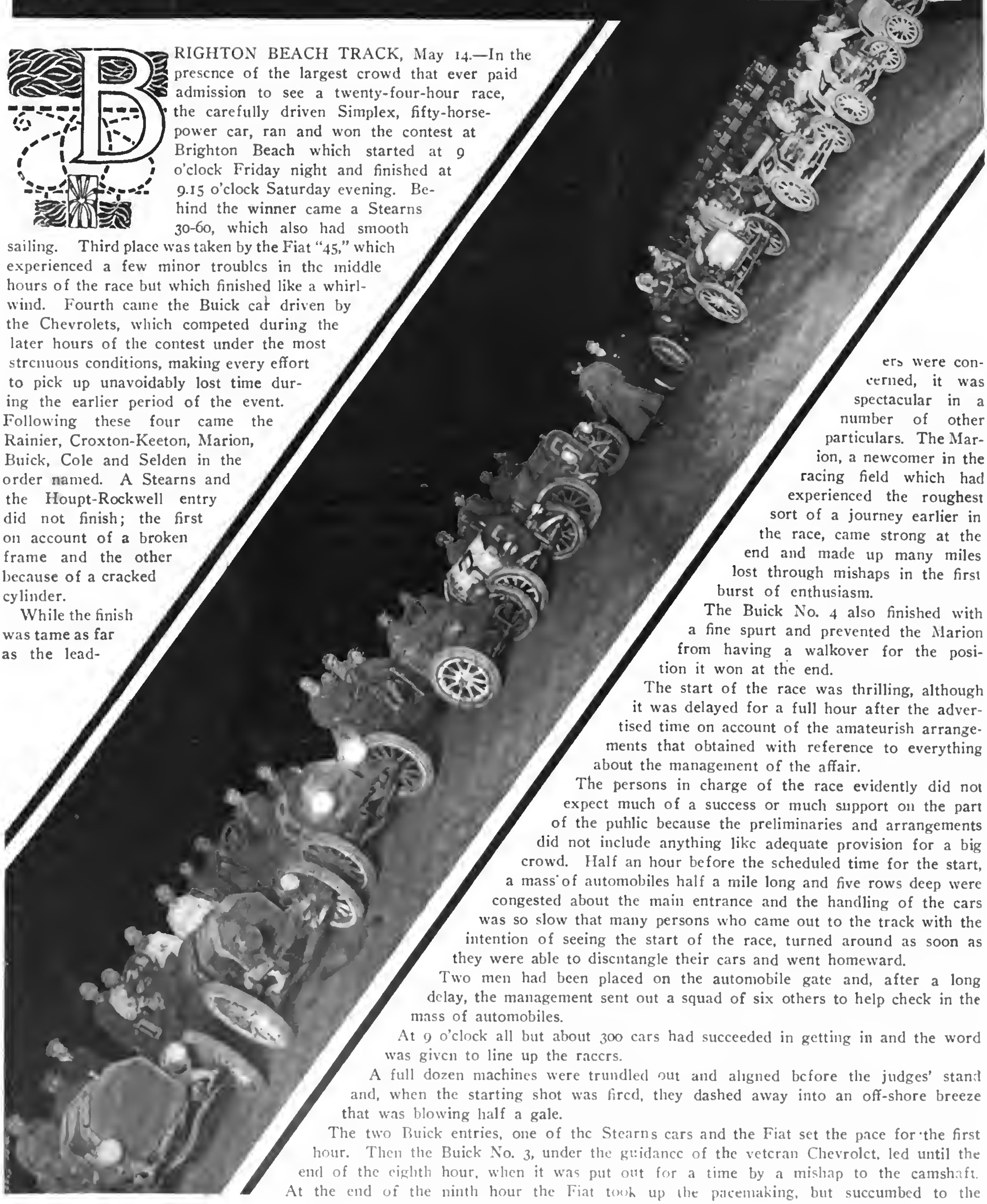
Everyone has a certain pride in letting it be known that he or she, as the case may be, possesses an automobile. This pride of ownership which works out in the mass of names found in all public places, in an automobile takes the form of an ornamental letter or monogram of highly polished brass, which may be placed on the radiator front or elsewhere. The monogram shown is a specimen of the work done in this line by the Ronson Specialty Company, 7-15 Mulberry Street, Newark, N. J.

Ronson Monogram



Immense New Home of Excelsior Supply Company at Chicago, Where Everything in the Accessory Line Is Carried

THE AUTOMOBILE



BRIGHTON BEACH TRACK, May 14.—In the presence of the largest crowd that ever paid admission to see a twenty-four-hour race, the carefully driven Simplex, fifty-horsepower car, ran and won the contest at Brighton Beach which started at 9 o'clock Friday night and finished at 9.15 o'clock Saturday evening. Behind the winner came a Stearns 30-60, which also had smooth sailing. Third place was taken by the Fiat "45," which experienced a few minor troubles in the middle hours of the race but which finished like a whirlwind. Fourth came the Buick car driven by the Chevrolets, which competed during the later hours of the contest under the most strenuous conditions, making every effort to pick up unavoidably lost time during the earlier period of the event. Following these four came the Rainier, Croxton-Keeton, Marion, Buick, Cole and Selden in the order named. A Stearns and the Houpt-Rockwell entry did not finish; the first on account of a broken frame and the other because of a cracked cylinder.

While the finish was tame as far as the leaders were concerned, it was spectacular in a number of other particulars. The Marion, a newcomer in the racing field which had experienced the roughest sort of a journey earlier in the race, came strong at the end and made up many miles lost through mishaps in the first burst of enthusiasm.

The Buick No. 4 also finished with a fine spurt and prevented the Marion from having a walkover for the position it won at the end.

The start of the race was thrilling, although it was delayed for a full hour after the advertised time on account of the amateurish arrangements that obtained with reference to everything about the management of the affair.

The persons in charge of the race evidently did not expect much of a success or much support on the part of the public because the preliminaries and arrangements did not include anything like adequate provision for a big crowd. Half an hour before the scheduled time for the start, a mass of automobiles half a mile long and five rows deep were congested about the main entrance and the handling of the cars was so slow that many persons who came out to the track with the intention of seeing the start of the race, turned around as soon as they were able to disentangle their cars and went homeward.

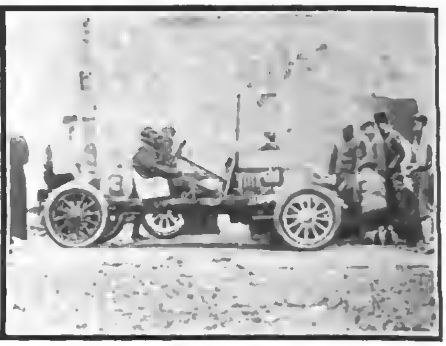
Two men had been placed on the automobile gate and, after a long delay, the management sent out a squad of six others to help check in the mass of automobiles.

At 9 o'clock all but about 300 cars had succeeded in getting in and the word was given to line up the racers.

A full dozen machines were trundled out and aligned before the judges' stand and, when the starting shot was fired, they dashed away into an off-shore breeze that was blowing half a gale.

The two Buick entries, one of the Stearns cars and the Fiat set the pace for the first hour. Then the Buick No. 3, under the guidance of the veteran Chevrolet, led until the end of the eighth hour, when it was put out for a time by a mishap to the camshaft. At the end of the ninth hour the Fiat took up the pacemaking, but succumbed to the





Mulford in Stearns Speeding at Brighton   DePalma Making Fast Time in Fiat Car   Arthur Chevrolet in Buick Three, Buick Camp

Ranier at the end of the tenth. By the twelfth hour the steady pace of the Simplex began to tell, and a little extra speed on the part of Basle and Poole put their machine out in front. From the twelfth hour to the finish the Simplex went on about its business and widened the gap between it and its competitors. The winner only made one sharp spurt during the race. All the rest of the time it was driven with just a shade in reserve. It laid off the furious pace of the start and was ready when the time came to shoot past the tiring field. The Stearns car that finished second also avoided the terrific speed of the early pace, and while prominent throughout the struggle did not show its real running until after the fifteenth hour, when it passed the Fiat and settled in behind the Simplex for the run home. The Fiat showed sparkling speed in half a dozen wild bursts and was always a dangerous contender.

Winning Simplex, Poole Driving, As It Appeared After the Strenuous Race

Chevrolet's Buick which set the early pace made a gallant showing despite the loss of nearly two hours early Saturday. At the end it was going along smartly and holding its own. The Rainier plugged along steadily from start to finish, occasionally making high figures and once assuming the lead, but never having quite the necessary ground to loom up as the winner. The showing of the Croxton-Keeton machine was creditable and its progress throughout the race was steady. The Marion, which went through the fence early in the race, made an astonishing finish, running tremendously in the last stages of the contest. This applies also to the Burman Buick.

The Cole and Selden entries were given easy drives and both showed good speed and staying qualities.

Weather conditions were varied during the running of the race. The start was made in the cold, snappy wind, which quieted down as the night grew older. During Saturday afternoon heavy rain fell, soaking the track and the racers but really doing a service in that it smoothed out some of the ruts and furrows that had been torn into the turns by the whirling cars and really made the going a trifle safer.

If the rain had not fallen, some sort of repair work would have been necessary on the clubhouse turn and also on the far stable turn. As it was, the effect of the drenching was to make the course slower for a while. There was only one delay during the race. Shortly before 1 o'clock Saturday morning the red and green signals were displayed at the judges' stand and for fifteen minutes the cars were halted. The incident proved to be a false alarm and the cars were soon sent away again upon their long journey.

The conditions of the race were as follows: It was run under sanction of the A. A. A. Contest Board and in accordance with its rules. The classification was under Class D, which reads: "Open to any gasoline car which complies with the definition of a motor



Disbrow in a Rainier, a Prominent Contender. Croxton-Keeton, a Newcomer, Gained Fifth. Strang in a Marion on One of Lower Turns car, without restriction as to piston displacement, weight, price or quantity produced."

The start was standing.

A. B. Cordner, chairman of the Brighton Beach committee of the Motor Racing Association, in defining the status of the entries, stated that "There may be stock cars in the race. They are not barred. Neither is any other kind of a gasoline automobile. Any old kind of a teapot had a right to go."

When permission was requested to view the contesting cars from the vantage ground of the paddock, Mr. Cordner emphatically denied it.

"What's the use," he remarked.

But without reference to the value of the race from the viewpoint of the maker and the public, it was a gallant spectacle. Despite inadequate preparations for such a crowd, the sporting picture afforded by the racing machines was inspiring. The successive spurts of the contestants always brought the crowd to its feet and the fine points of driving were liberally appreciated and applauded. Full 30,000 persons paid admission during the 24 hours. Possibly there were 5,000 more.

Behind the stands, in the runways and parked along the streets surrounding the track the greatest aggregation of automobiles ever gathered together, in this country at least, brought the major portion of the crowd. It is variously estimated that there were between 3,000 and 4,000 that succeeded in gaining entrance to the enclosure while the race was being run, and Friday night there were hundreds that did not succeed in getting in. The public got its money's worth of spectacular track racing enjoyment.

The racers failed to break the record through the shower Saturday afternoon, although the pace was not of the record-breaking variety even before that time. However, it is likely that one or two cars, possibly three, might have pressed the mark closely if the rain had not intervened.

Circular Track Collects Its Customary Toll

The weather was inclement; it was much too cold for drivers to remain long in good fettle and the wind blew at a terrific pace, all of which, together with the fact that it was night time and that the track had furrows cut in it to quite some depth after the first hour or so, led up to a rather bad accident to the Marion car which crashed through the fence. It was 18 minutes after 11 on the upturn of the track. William F. Bradley, the mechanician on the car, was the victim whom the grim specter came after. He was taken to the Coney Island Reception Hospital at about 12 o'clock, but his injuries were too severe to be coped with by capable medical attention and his death was ultimately announced. The driver, Gilbert Anderson, was thrown out of his seat and escaped, it is said, without any hurt. The mechanician, Bradley, was 29 years of age, was married, and lived at No. 11 Halsey street, Newark, N. J. He presented much promise in the racing field, and among his most recent achievements was that of driving a Marion car to a perfect score in the Around New Jersey Reliability Run during last Tuesday and Wednesday.

Following is the score of contestants and drivers by hours:

Score by Hours During the Whole Day

No.	Car.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Stearns—Mulford, Patschke	54	109	160	210	221	289	325	370	423	475	528	579	530	677	725	775	824	857	901	952	993	1,038	1,075	1,120
2	Stearns—Howard, Dearborn	56	108	160	213	258	310	349	400	435	Out with broken frame.														
3	Buick—L. and A. Chevrolet	55	112	153	219	269	320	370	408	408	453	508	558	509	654	703	730	774	810	852	894	933	979	1,015	1,049
4	Buick—Burman, De Witt	56	112	160	209	242	242	242	242	268	305	351	405	458	500	535	586	628	661	712	752	793	840	881	927
5	Marion—Strang, Anderson	51	102	151	151	205	249	288	327	375	425	473	520	563	513	651	598	742	770	805	828	870	906	947	989
6	Cole 30—Endicott, Edmonds	49	99	145	185	187	227	236	270	314	353	389	430	448	456	466	503	533	556	588	527	650	692	723	756
7	Houpt—Roberts, Martin	27	72	125	175	203	235	265	256	256	255	296	344	385	422	445	490	526	535	539	571			*	
8	Simplex—Basle, Poole	54	106	155	202	240	289	341	388	440	492	545	598	649	697	745	794	842	880	926	971	1,014	1,059	1,103	1,145
9	Fiat—De Palma, Parker	56	109	155	202	244	299	352	395	448	497	545	593	541	689	729	759	808	842	881	930	974	1,018	1,060	1,107
10	Selden—Mack, McMahon	48	94	127	151	155	201	248	285	319	367	399	399	407	451	495	531	569	588	609	537	566	582	591	718
11	Rainier—Disbrow, Owen	54	108	156	208	256	305	353	404	443	496	550	580	515	552	703	747	793	818	855	906	935	959	998	1,087
12	Croxton-K'ton—Lund Spenny	48	95	143	185	231	273	317	350	405	451	491	535	581	521	654	705	752	774	802	845	889	920	953	1,004

*Cracked cylinder.

Paulhan to Try Long Flight

Cable dispatches report that Louis Paulhan, encouraged by the success of his remarkable aerial journey from London to Manchester, will soon try to win the special Michelin prize of $20,000, for the first flight from Paris to Clermont-Ferrand, a distance of 217 miles "as the crow flies" and 268 miles by road.

The rules for the Michelin prize are very simple. The aviator attempting the journey from Paris to Clermont may start anywhere in the departments of the Seine or Seine et Oise. He must first turn a complete circle around the Arc de Triomphe in Paris, and on arriving at his destination he must circle the spires of the Cathedral at Clermont-Ferrand, landing on the summit of the Puy-de-Dome, 4,800 feet high. Two must make the trip, and the time limit is six hours.

Galveston Races in August

Preparations are being made for the automobile races to take place on Galveston Beach, August 3, 4 and 5. Capt. J. W. Munn, who has the arrangements in charge, has announced that more than $3,000 will be awarded as prizes for the winners of the various events.

Entry blanks for the race meeting which will be held on the Galveston, Tex., beach August 3, 4 and 5 have been distributed. The program provides for ten events and cash prizes amounting to $2,225 will be distributed. The ten-mile events will be run over a five-mile circuit and the twenty-mile races will be decided over a ten-mile course. No admission fee will be charged this year and a big attendance is looked for by the management.

Queen City to Have Auto Speedway

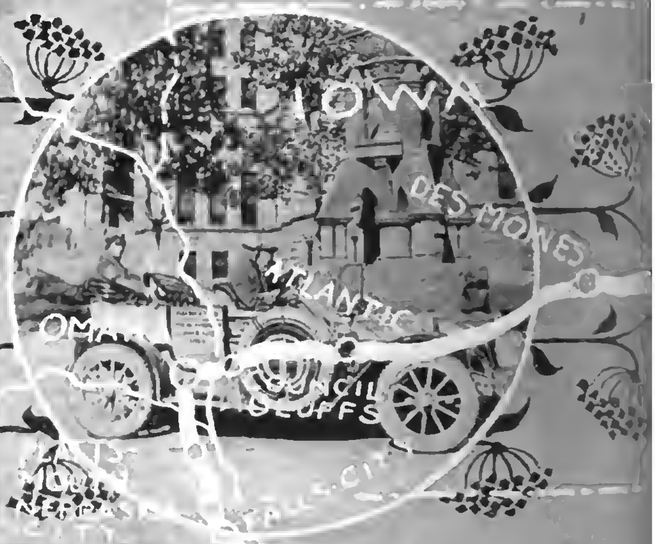
CINCINNATI, May 16—J. T. Earle, president of the National Bank of Latonia, H. H. Meyers, president of the Latonia Jockey Club, and an executive official of the Chesapeake and Ohio Railroad are behind a plan to give Cincinnati a speedway similar to the ones in operation at Indianapolis and Atlanta. Options on a tract of land lying between the Licking River and the Louisville and Nashville Railroad right of way in Covington have been taken, and the purchase of it seems quite probable within a short time.

Two Runs for St. Louis Motorists

ST. LOUIS, May 16—Motorists of St. Louis are enthusiastically preparing for the two reliability runs to be held in June. Both the automobile club, which is to give a one-day contest the first week in June, and the Manufacturers and Dealers' Association, which will give a three-day contest the last week in June, have had scouting parties out for a week in an effort to determine the best route. Neither has announced the exact date of the contest it is to give.

Indianapolis Gets Cobe Race July 4

CHICAGO, May 17—The deal between the Chicago Automobile Club and the Indianapolis Motor Speedway, relative to the running of the Cobe Trophy race on the Hoosier Motordrome, was completed to-day when E. A. Moross, manager of the Indianapolis track and the Contest Board of the Chicago Automobile Club, settled the details.



Glidden Pathfinder Com

VIRGIN territory has been mapped out for the Glidden tour for this year; thirteen states are included in the orbit; much of the way is yet to be traversed by automobiles in numbers, but the surprise of the last two years came from the very country traversed. It was not so long ago that automobile makers labored under the impression that automobiles would not find a market in the remote districts for years to come, and it came as a surprise to them when the Western farmers fell into line and became heavy purchasers of the better makes of automobiles.

The path of the Glidden Tour follows the original itinerary, beginning at Cincinnati, O., thence through Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Texas, Oklahoma, Kansas, Missouri, Nebraska, Iowa and Illinois, terminating at Chicago

The Utility Side of the Glidden Tour

While there is a sportive phase involved in the tour, the fact remains that the industry as a whole is to be benefitted, and in the important ways as follows:

(A) Road building will be given an impetus; this is probably the most important angle.

(B) Manufacturing, not only of automoblies, but accessories as well, will be extended; the Southwest is not now without its automobile industries.

(C) The good news of the splendid ability of automobiles will be spread to the remotest hamlet in the outlying counties; farmers will find further reason for taking an interest in the problem of the emancipation of the horse, and artisans will learn how to part the shackles of industrial life; they may be privileged to work as usual, but they will also learn how to enjoy life in companionship with the automobile.

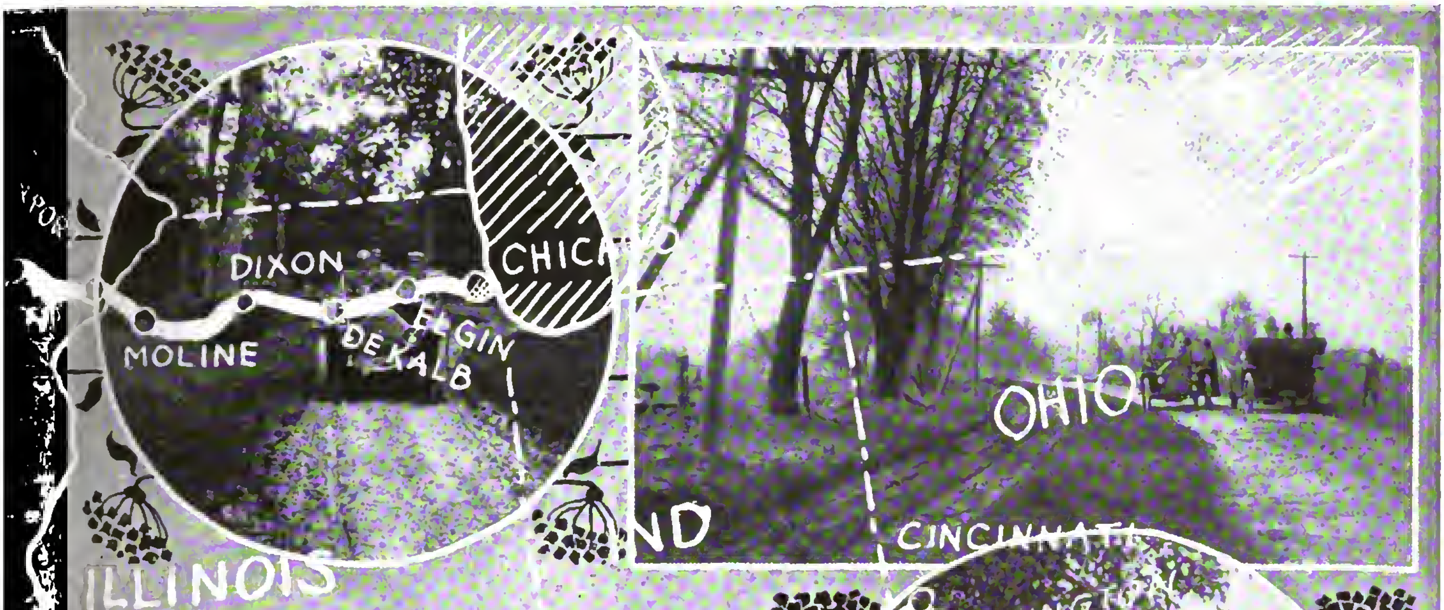
Present State of Industry in the Southwest

The State of Ohio is now the largest producer of automobiles of all the states through which the tour will be made; Illinois comes next, and the remaining states mentioned are more or less in embryo, but they are accomplishing more than a little, as the following tabulation will show:

Production of Automobiles By States

STATE	AUTOMOBILES	VALUATION
Ohio	40,000	$80,000,000.00
Illinois	10,000	15,000,000.00
Iowa	5,000	10,000,000.00
Missouri	4,000	9,000,000.00
Kentucky	500	600,000.00
Tennessee	300	400,000.00
Kansas	300	400,000.00
Nebraska	250	300,000.00
Texas	100	100,000.00

The total production of automobiles in the states through which the Glidden Tour will pass is in excess of 60,000, as estimated for 1910, the total value being $134,000,000.00, giving employment to 60,000 men, expending for labor more than $50,000,000.00 in the manufacture, which figure allows nothing for the indirect expenditures, as in garages, repair shops, and in divers other ways. That these secondary methods of employment are beyond the dream of the man who contents himself with merely existing will be indicated



pletes Its Strenuous Task

the mere statement that the upkeep of the automobiles made in these states worth $25,000,000.00 to the men who do the work, counting the money which ust be devoted to this service.

The cost of upkeep of the automobiles made in these states is figured on a asis of 20 per cent. of the selling price, and considering this basis it is fair to int out that good roads are needed. It is hoped that the citizens of these ates will reach the same conelusoin as that which actuates the road comissioners of such states as Massachusetts, New Jersey, and divers other astern states; it has heen learned that the cost of upkeep of automobiles and roads falls upon the citizens at large.

Good Roads Will Help To Solve Problems

If the Glidden Tour is in the nature of a missionary undertaking, it is t too much to say that the propaganda for good roads is one of the prime, if t the paramount, considerations. The progressive idea everywhere in Ameri- is based upon better means of transportation; improvement is the high aim, d the time has come when scientific road building must support mechanical ans of hauling merchandise.

It is estimated that $90,000,000.00 represents the present annual expend- re for road improvement, of which considerable sum fully one-half is utterly sted. It has been said that much of the money expended on road-building s to no purpose, the rain and the frost undoing the work as fast as it is comted. The great question is to build roads, but it is of equal importance to ld them well. Just now the Federal Government is taking an interest in work; just at the present time the Federal Government is indicating its ous intentions through Bill No. 6931, which has been favorably reported the Senate Committee on Agriculture, which provides for an appropriation $500,000 for the extension of the work of the U. S. Office of Public Roads aiding in the improvement of the public highways.

Highway Departments To Care For Roads

The several states are awakening to the seriousness of this great situation, evidence of which is sufficiently indicated by the proposed act creating a State Highway Department, and establishing a State Highway Commission, and the office of State Highway Engineer, all with a view to the construction, maintenance and repair of public highways and bridges in the State of Michigan. To fully appreciate the part which the Federal Government is taking in these matters, knowledge of the activity of Logan Waller Page, Director of Public Roads, U. S. Department of Agriculture, will have to be taken into account. The activities in Michigan at the present time reflect the skill and knowledge of Director Page, who drafted the Michigan Act on behalf of the Michigan State Grange. Many states are falling into line, the National Grange is doing masterly work, and it is the idea everywhere to study the whole situation from a scientific point of view and respond to the demands of the farmers.

It is the confidential hope of the projectors of the Glidden Tour, that citizens throughout the Southwest, to whatever extent they fail to appreciate the true situation, will reach a better understanding of the importance he automobile and good roads. Instead of wasting nearly $50,000,000 per num in the maintenance of roads which are but roughly improved, and ind of wearing out good automobiles on just such highways, the light, as it es from the experiences gained, reflects the more stable condition—it is light of experience.

(Continued on Page 941)

Last Word About Harrisburg Endurance Run

HARRISBURG, Pa., May 12—The final results of the 3-day reliability tour conducted by the Harrisburg Motor Club were announced by Referee W. R. Douglas at 5 o'clock this afternoon, practically the entire day having been consumed in giving the cars a strenuous brake test and a thorough technical inspection to discover all breakages.

In the class A for touring cars, $2,000 and over, a Pullman was the winner with a perfect score. In class B touring cars, under $2,000, the Inter-State was victor with 11 points penalty, 8 points received on road work the last day and 3 points in the final examination, made up of 1 for bent fender iron, and 2 for a loose motor bearing, which bearing was not in adjustment when the tour started. In the runabout division, class C, over $1,600, a Kline Kar was winner with a perfect road score and perfect technical examination. In the runabout division, class B, under $1,600, a little two-cylinder Maxwell carried off honors from larger cars, winning as it did with a perfect road score and passing a perfect technical examination.

The report of the first two days of the tour as far as road performances are concerned appeared in last week's issue of THE AUTOMOBILE. The third day's run from Wildwood, N. J., to Harrisburg, by way of Philadelphia, a distance of 197 miles, proved the hardest of the tour. A heavy rainstorm drenched the tourists as far as Philadelphia, and from Philadelphia to Harrisburg a previous rain had put the roads in bad shape.

The Franklin No. 13, driven by John Burns, was the only car to have a perfect road score and outdoor tests but to suffer on the technical examination, receiving as it did 3 points, 2 for a broken muffler support, and 1 for a loose cover on a universal. No. 9 Kline Kar made a particularly good performance, being clean in every respect except for 5 points brake penalty. Of the nineteen cars which took the final examination eight passed it without revealing any derangement that brought a penalty upon them, these eight being the Pullman, Kline Kar in class A, the Enger in class B, two Kline Kars and a Pullman in class C, and the Maxwell and a Kline Kar in class D.

FINAL RESULTS—HARRISBURG 3-DAY RUN

Car No.	Make of Car	Entrant	Driver	Time and Work on Road 1st D'y	2nd D'y	3rd D'y	T'l	Penalties for Outdoor Tests Br.	Cl.	G'r	Pts	Technical Test	Grand Total Points
			Class "A" Touring Cars, $2,001 and Over										
36	Pullman	Pullman Motor Car Co.	Norman Gallatin.	0	0	0	0	0	0	0	0		0
13	Franklin	H. H. Franklin Mfg. Co.	John Burns	0	0	0	0	0	0	0	3	2—Broken Muffler Support 1—Loose Cover Universal joint	3
8	Kline Kar	Keystone Motor Car Co.	R. L. Morton....	0	0	0	0	7	0	0	0		7
10	Kline Kar	T. C. Neely	Sam Cole	0	0	0	0	42	0	0	4	1—Fan belt off 1—Water leak 2—Loose muffler	46
37	Pullman	W. C. Longstreth	Herb Bitner	0	1	2	3	46	0	0	2	2—Glass oil gauge lost	51
45	Columbia	Prescott Adams	E. Yeager	19	0	0	19	26	5	0	18	3—Loose ignition coils 7—Disabled throttle control 2—Loose mud apron 1—Oil plug lost	63
			Class "B" Touring Cars, Under $2,001										
41	Inter-State	Inter-State Auto Co.	W. W. Vandergriff	0	0	8	8	0	0	0	8	1—Fender iron bent 2—Loose motor bearings	11
12	Regal	Andrew Redmond	Frank Hosmer ..	0	6	0	6	24	0	0	20	15—Broken manifold exhaust 2—Mud apron loose 2—Loose muffler 1—Lock nut loose	44
46	Enger	Enger Auto Co.	H. L. Brownback	0	9	5	14	45	0	0	0		59
49	Kline Kar	B.C.K. Motor Car Co.	W. McCully	0	3	22	25	53	0	0	3	2—Petcocks leak 1—Lost spring bolt nut	81
			Class "C" Runabouts, $1,601 and Over										
7	Kline Kar	B.C.K. Motor Car Co.	J. H. Kline......	0	0	0	0	0	0	0	0		0
35	Pullman	Pullman Motor Car Co.	Herbert Welker .	0	0	0	0	5	0	0	0		5
47	Marion	W. J. Sprankle	E. Greenwood ..	0	0	0	0	4	0	0	5	2—Front fender bent 2—Front guard rod bent 1—Lost hub cap	9
56	Kline Kar	B.C.K. Motor Car Co.	W. P. Seig	27	0	3	30	5	0	0	0		35
84	Pullman	Pullman Motor Car Co.	H. P. Hardesty..	1	0	0	1	36	0	0	2	2—Nuts off rear spring hanger	39
11	Mitchell	Ideal Motor Car Co.	G. F. Snyder	15	Faulty Carbureter							Withdrawn	
			Class "D" Runabouts, Under $1,601										
57	Maxwell	Andrew Redmond	A. D. Rea	0	0	0	0	0	0	0	0		0
9	Kline Kar	B.C.K. Motor Car Co.	C. C. Fairman....	0	0	0	0	5	0	0	0		5
48	Overland	W. J. Sprankle	E. Craig	0	12	0	12	0	0	0	24	20—Broken spring 2—Loose truss rod 1—Rear mud guard bent 1—Water leak	36
43	Warren-Detroit	Keystone Motor Car Co.	Tom Berger	0	0	58	58	9	0	25	1	1—Gasoline leak	93
39	Pullman	H. R. Averill	Geo. Iches	0	15	Universal broken						Withdrawn	

Kansas City Automobile Club Annual Hill Climb

KANSAS CITY, Mo., May 14—Watched by 3,000 spectators who had driven 10 miles to reach the firing line, the annual hill-climb of the Automobile Club of Kansas City, which was held on Dodson Hill this afternoon was a most interesting affair which resulted in a new record for the climb, made by A. O. Brooke driving a Lexington 40. Brooke, agent for the car here, held the previous record of 59 3-5 made in a Stoddard-Dayton in 1908, but he eliminated this entirely to-day when he climbed in 55 2-5 for the .6 mile. Summaries:

Event 1—Cars costing under $800. Krit, time 1:31 1-5.

Event 2—Cars costing between $801 and $1,200. Ford, time 1:06 1-5; Ford, 1:27.

Event 3—Cars costing between $1,201 and $1,600. Parry, time 1:06 2-5; Great Western, 1:07 2-5; Everitt, 1:18 3-5.

Event 4—Cars costing between $1,601 and $2,000. Jackson, time :58 4-5; Henry, 1:10; Auburn, 1:12; Enger, 1:15; Herreshoff, 1:27 1-5.

Event 5—Cars costing between $2,001 and $3,000. Pennsylvania, time 1:03; Jackson, 1:06 4-5; Great Smith, 1:10 2-5.

Event 6—Cars costing between $3,001 and $4,000. Palmer-Singer, time 1:05; Palmer-Singer, 1:06 1-5; Palmer-Singer, 1:26.

Events 7 and 8—No entries.

Event 9—Free-for-all, cars under $3,000. Jackson, time :55 4-5. Lexington, :56; Great Western, 1:00; Apperson, 1:00 4-5; Ford, 1:00 4-5; Great Smith, 1:02; Jackson, 1:05.

Event 10—Free-for-all. Lexington, time :55 2-5; Jackson, :56 1-5; Apperson, :59 1-5; Great Smith, 1:00 4-5.

Improving the Roads at Perth Amboy, N. J. Roller at Work

Steam Tractor Pulling Scraper, Road Improvement at Roanoke, Va.

New York Atlanta Pathfinder Enthusiastically Received

AFTER a trip that consisted of a series of ovations and receptions, the pathfinder car of the New York *Herald*-Atlanta ***Journal*** National Highway, Good Roads tour reached its destination in Atlanta, Monday. The Columbia 45-horsepower car made the trip without major mishap of any sort.

The car traversed every known variety of roads and a few that had been practically unknown up to the time of their discovery by the explorers. But in the main the going was good and in fully half of the course selected for the tourists next month, the roads were almost good enough to race over. Here and there a bad spot was found and then a little further along, the way would be worse, but from one end of the line to the other, there was only one space of any great importance upon which road-builders and road-repairers were not busy.

This spot is near Gettysburg, Pa., where the attitude seems to be that "we get all the tourist travel anyhow; what's the use of spending money on the roads?"

Across New Jersey and almost as far as Gettysburg, the roads were in their usually excellent shape and after passing the scene of the fiercest battle of the Civil War, with all its historic interest, the highways toward the South improve with abruptness. Through the foot-hills of the Blue Mountains and down the valley of the Shenandoah the going was enjoyable, although it will be better when the tour proper passes that way. The Maryland roads were in fair conditon and the course from Hallstown to Charlestown was being given a very thorough scraping and filling in preparation for the tour.

From there to the Virginia line, road building machinery was to be seen all along the way. In Virginia road-rollers and gangs of men were engaged in road work at several places and already the route to be followed by the tourists is comparatively free from "thank you ma'ams." From Harrisonburg to Staunton, the road is in racing condition. When the pathfinder approached the mountains near the Natural Bridge some dangerous bits of road were encountered on account of rains that fell earlier in the week but there was no mishap and the scenic bit of the tour was accomplished with ease.

At various points along the way, delegations of automobilists met the pathfinders and escorted them from time to time. Everybody seemed enthusiastic over the tour and numerous tentative entries were made by enthusiasts along the way. Good roads and the reasonable administration of just laws were the keynotes of the welcoming speeches delivered everywhere. Whenever the car crossed a state line, there was always a delegation awaiting to give greetings and good cheer.

The effect of the road building last year was still distinctly in evidence and the effort that is being made all along the route, indicates that before the tour starts, the course will be in good shape all the way from Atlanta to New York. In addition, many roads are now being hurriedly improved.

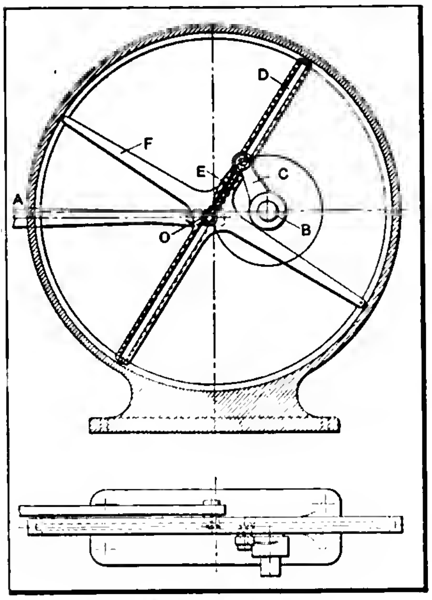
Passing the Historic Battlefields of Gettysburg, Pa.

Good Macadam Roads Among the Hills Near Staunton, Va.

Engineering Digest

A carefully abstracted digest of accounts of engineering activities as they are reported in society transactions and technical papers throughout the world.

A mechanical movement which might permit designers of four-cycle motors to realize a long power stroke, with complete expansion of the gases, in conjunction with short suction and compression strokes, is suggested by E. L. Doaré in *Revue Mécanique* for December, 1909. The expulsion stroke must of course be as long as the power stroke. The author is not sanguine with regard to the practical utility of his plan, but submits it for what it may be worth, and *La Technique Automobile et Aerienne* of February 15 presents it with more confidence in its practicability. The basic idea is to make the connecting-rod knuckle describe alternately a small complete turn and a larger complete turn, instead of two circles around the crankshaft axis. Means to this end is found in the Pascal snail curve described by the point *M* on the line *OR*, when the latter turns around *O*, and *M* is a constant distance from the point *N*, which is the variable point of intersection between the circle *W* and the line *OR*. While no shaft fixed at *O* can be used in a motor without interference with the crankshaft, which is represented by the center of the circle *W*, the point *O* can be fixed by means of a revoluble ring with a slotted diametrical member, the latter representing the line *OR*. In the illustration, *A* is the connecting rod, *B* the crankshaft, *C* the crankarm, *D* the slotted diametrical member, *E* a sliding member connecting the connecting-rod knuckle with the crankarm pin, and corresponding to the distance *MN* in the diagram. *F* is another diametrical member serving to brace the revoluble ring. It will be noticed that the slotted member turns only 180 degrees when the crankarm makes a complete revolution, and that the movement of the connecting-rod knuckle must be on the order of the double curve shown in the diagram. The mechanism devised would admit of only single-cylinder construction, for reasons which are made apparent by glancing at the plan view below.

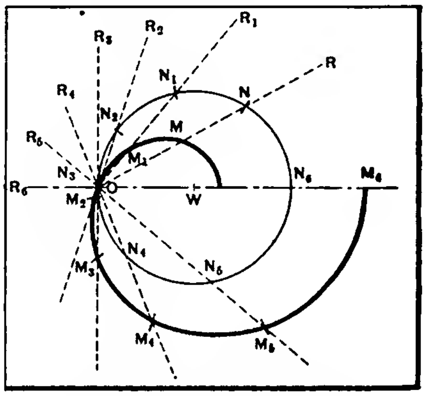


Doaré's Mechanical Movement

Diminutive electrical motors, which may be used for laboratory work, and perhaps for models of aeroplanes in connection with a diminutive rapid-discharge storage battery, engaged the attention of the members of the *Académie des Sciences*, as reported in the *Comptes Rendus* for this institution for April 11. Mr. Carpentier showed the members a dynamo which, so far as known, is the smallest that has ever been made, though its maker, a Mr. Trévet, thinks he could make one still smaller if put to the test. The dynamo is of the Gramme "superior type" and weighs 7 grammes, or 0.3 ounce. It is 15 millimeters in height and length and about 13 millimeters wide. The field is wound with wire of 0.05 millimeter thickness, silk-insulated, and carries 600 turns. The armature is keyed to a shaft whose bearings are only 0.5 millimeter wide, and measures itself only 6.02 millimeters in diameter. It is of the toothed type and in twelve sections. It is wound with 1.67 meters of wire 0.05 millimeter in diameter. The collector-ring and brushes are put together as those of large dynamos and composed of many pieces. The brush-holder is keyed adjustably. All pieces are assembled by means of screws, no solder being employed, and the whole little machine can be taken apart and put together like a standard dynamo. With a little pocket battery, Mr. Carpentier made the dynamo turn as a motor at the meeting. Idle, it turned at extreme speed, causing a buzzing like that of a large insect, and used 0.2 ampere at 3.5 volts, say 0.7 watt. Neither its work nor its speed could be measured.

Recent advancement in economy to be gained by the use of internal combustion motors in seagoing vessels is illustrated through the results obtained with the tug boat Rapido, built at the Krupp Germaniawerft at Kiel. The trials of this boat were witnessed by representatives of the German navy and by many shipbuilders and chandlers from other countries. The Rapido is 15.3 meters (50.20 feet) over all, has 3.6 meters (11.82 feet) beam, 1.15 meters (3.77 feet) draft, and a displacement of 20.7 tons. The motor is of Krupp design with self-ignition on the Diesel plan, and is reversible. At 400 r.m.p. the six cylinders develop 120 effective horsepower and produce a speed of 10½ knots. The towing pull at 6½ knots reaches 1,200 to 1,300 kilograms (2,645 to 2,866 pounds). The measured fuel consumption is 180 grammes (7.70 ounces) per horsepower-hour. The total weight of the motor with full running equipment is 4,400 kilograms (9,700 pounds). These figures compare well with those of stationary Diesel plants.

Considering that the towing capacity referred to is obtained with a displacement of only 20.7 tons, an important superiority in this respect is noticed over steam tugs, writes *Teknisk Tidskrift* of Stockholm for March. A steam tug with the same towing capacity would require a displacement of 50 tons, and the larger boat requires more power to move itself and must have a more powerful engine in order to tow as well. In calculating fuel cost, one should, therefore, compare the 120-horsepower crude oil motor with a larger steam engine, but even if similar horsepowers are compared, and it is assumed that steam consumes 1 kg. coal as against



One-Half of the Pascal Curve

180 grammes (7.70 ounces) of crude oil, a considerable saving is shown. If a ton of coal costs 16 kroner ($4.30) and a ton of crude oil 40 kroner ($10.75), without duty, and 72 kroner ($19.35) with duty paid, the fuel cost for steam will be 0.016 kroner per horsepower-hour (0.45 cent), and for crude oil 0.0072 kroner (0.2 cent), without duty, and 0.0139 kroner with duty (0.37 cent); in other words, a saving of 20 to 56 per cent., according to whether duty is paid or not. (For government use the duty need not be considered, of course, and the Swedish engineers evidently have this in mind.) Another advantage, especially for larger vessels, lies in the reduction of personnel. Stokers are dispensed with, and this about balances against higher cost for attendance and maintenance. These advantages and the larger radius of action for the vessel with oil motor, appear most clearly by comparison of the engine plants of larger vessels. Suppose a freighter of 7,500 tons and of 2,500 effective horsepower makes 11½ knots. With a steam plant, such a vessel uses in 24 hours about 45 tons of coal and, with 2,000 cubic meters of bunker space, has a radius of about 12,000 nautical miles. The same ship equipped with crude oil motors uses under similar conditions 13 tons of crude oil. The radius is increased to 38,000 nautical miles, i.e., more than tripled. Equalizing the radii, the oil motor boat can take in freight its saving in fuel space or weight. In the example used, the additional cargo would be 1,350 tons, or a gain of 18 per cent. over steam assuming that both power plants are of the same weight. In reality, the oil motor plant can be built lighter than a reciprocating steam engine plant. The economy of the oil motor in operating cost comes under the heads of fuel, wages and materials for maintenance and lubrication, and amounts, for a voyage of two weeks' duration, for vessels such as referred to, to 2,700 kroner ($726), the operation of the steamboat costing 10,800 kroner ($2,903), and that of the oil-motor vessel 8,100 kroner ($2,177). While the first cost of oil motors exceeds that of a steam plant and calls for higher disbursements for interest and sinking fund, this is compensated for in the shorter wharfage time, since the crude oil is more easily taken aboard than coal, and also by saving in fuel for firing up and keeping up steam. Calculating that a vessel yearly makes 18 voyages of two weeks each, a total saving of 48,600 kroner ($13,037) is effected in cost of operation alone, to which should be added the gain resulting from the 18 per cent. addition to the freighting capacity. Apart from economical advantages, the absence of smoke should militate in favor of oil motors, especially for passenger boats and naval vessels, and the reduction of heat radiation, which is a source of trouble and sickness of the crews in steamships, especially in the tropics, should be considered. Even if the foregoing figures, concludes the Swedish commentator, are not yet realized for large vessels, they show the economical superiority of the large oil motor plant and furnish an argument for producing larger and larger motors so that the internal combustion motor industry may gain the place in seagoing transportation to which it is intrinsically entitled.

Many microphotographs of welds are presented in an article by Ch. Fremont appearing in *Le Génie Civil* for February 26. While dealing largely with the welding of boiler plate, with special reference to the accidental explosions which have taken place in the French navy vessels, the author arrives at the general conclusion from facts of record that riveting is always superior to hammer welding and hammer welding always superior to autogenous welding, under equal precautions for securing competent workmanship, and also that the fact that a weld has endured the normal stresses to which it is subjected for a number of years, affords no guarantee whatever against a sudden rupture. Electrical welding is not considered in the article.

M. B. Galitzine, of St. Petersburg, Russia, presents an illustrated description of a simple apparatus for measuring the horizontal and vertical tremblings of a building caused by the operation of a four-cylinder Diesel motor in an adjacent factory. *Comptes Rendus de l'Académie des Sciences*, April 11.

So as to have each automobile provide its own dust protection, Franz Ragaller, coppersmith to the Court of Bavaria, at Munich, has designed and executed a water-sprinkling device for automobiles comprising two oblong reservoirs to be attached under the running boards on both sides of the vehicle, a system of discharge valves and ingenious shields preventing dirt and dust from clogging the apparatus. The reservoirs hold 50 to 100 liters, according to the size of the car to which they are to be attached, are divided by bulkheads to obviate swashing and have bottoms sloping slightly to both ends to facilitate the feed of the water to the sprinkling roses. The feed may be regulated by means of self-closing slides in the discharge pipes which are controlled from a battery at the driver's seat. *Allgemeine Automobil Zeitung* for April 22 states that the device wets the tires and that the latter, therefore, raise no dust and leave a moistened and dustless track, but does not explain in what manner the water reaches the front portion of the front wheels before the latter strike the dry road before them.

Under the misapprehension that motors for aeroplanes should be required to work constantly close to their maximum capacity, and that 70 to 80 degrees centigrade should, therefore, be the highest temperature which the cooling water in an aeroplane motor should be allowed to reach, German manufacturers have gone into the otherwise laudable enterprise of producing radiators with a higher capacity for a given weight than is possessed by the standard automobile radiator. Erwin Aders describes the methods adopted to this end in *Der Motorwagen* for April 10, with illustrations of the construction parts. With the use of the customary materials, the desired cooling capacity could not be accomplished at less than a weight of 1½ kilograms per horsepower, and reduction of the gauge of the sheets and pipes is excluded by reason of the porosity of the metals. A change to aluminum is indicated, because this has a specific gravity of 2.75 against 8.5 of brass, and a conductivity of 175 against only 55 to 110 for the brasses. As, however, aluminum cannot yet be soldered with the same assurance of a good job by simple work methods, the true cellular types of radiators are not available, and aluminum radiators must be of the vertical pipe pattern. In one case, holes are stamped in aluminum sheets 5 millimeters in thickness, and the ends of aluminum tubes are expanded into these holes, somewhat as the fire flues are secured in boilers of certain steam vehicles. The necessity for leaving enough material between the holes reduces the weight-saving accomplished in this type. In another type, in which the tubes are flattened except at the ends the design is similar to that seen in Renault cars of the older models, and the bottom of the lower, as well as the cover of the upper water-containers, is removable, forming part of a frame composed of four tin plates braced by diagonal wires. The construction, so far, is expressly intended for aviation motors only.

Looking ahead for the revolving engine is the title of a masterly editorial in the May 7 issue of *The Autocar* (English), in which the writer takes up the reasons for the success or failure of various types of engines, as exemplified in the automobile business. Following this, he reverts to the present state of aeronautics, and deduces the idea that, first, the aeroplane owes its ability to fly, its very existence, to the automobile engine, but beyond that the revolving cylinder type of engine is the best one and the one that will be most used in the future. He arrives at this through a consideration of Messrs. White and Paulhan in their competition for the English *Mail* prize. Some of the statements made are of sufficient interest to warrant reproduction. The writer says in part: "The flying machine owes its ability to fly to the motor-car engine. Now, it seems as though it might repay its debt to the light car by the evolution of a type long since discarded by the motor-car builder, though indirectly he has made its use possible by the improvements in material, design, detail, and workmanship which he has brought about in the past ten years. The ideal engine is the gasoline turbine though that is far away.

Questions That Arise

A series of practical questions relating to the automobile, its parts, and their functions, which arise upon various occasions, together with easily understood answers to the same.

[1]—What is the relation between piston velocity in feet per minute and angular velocity of the crankshaft in revolutions per minute?

Taking the crankshaft velocity as 1,000 feet per minute for the maximum safe practice, the speed in revolutions per minute, referring to the crankshaft, may be found as follows:

$$S = \frac{F}{\left(\frac{s \times 2}{12}\right)}$$

When,

S = crankshaft speed in revolutions per minute.

F = piston speed in feet per minute.

s = stroke in inches.

Fixing the piston speed at 1,000 feet per minute, and the stroke at 6 inches, the crankshaft speed will be 1,000 revolutions per minute, since:

$$S = \frac{1{,}000}{\left(\frac{6 \times 2}{12}\right)} = 1{,}000$$

In the same way, any other crankshaft speed may be ascertained for any other assumed piston speed, for any given stroke.

[2]—Why is it necessary to limit the piston speed to 1,000 feet per minute as a maximum?

It is not necessary, but it may be desirable. The piston speed of a motor, if counted, in some measure, for several reasons, reflects the life of the motor, and the adequacy of the service it will be likely to render. In racing, the speed frequently goes up to 2,000 feet per minute, and under touring conditions, the probabilities are that the average piston speed, for all-day performance, is inside of 500 feet per minute. In a general way, the strain to which the motor is subjected, considering these differences in piston speed, is in the ratio of 1 to 16. Obviously, the racing condition, if it puts the motor under 16 times as much strain, is bound to reflect seriously upon the life of the motor, whereas, under touring conditions, the life of the motor will be very much longer. The question then, of what the piston speed should be, as it is ordinarily measured in feet per minute, is one which must be solved, in view of the effect of speed upon depreciation, and the right piston speed will be that which will limit the depreciation to, say, 10 per cent., or some other acceptable value.

[3]—What is the relation of torque to power of a motor?

The force of the twisting moment or torque is a measure of the power of the motor, the relation being as follows:

$$H.P. = \frac{2\pi R S P}{33{,}000}$$

When,

$$2\pi = 6.28$$

R = radius of the lever arm in feet at the end of which the force P in pounds acts.

S = speed of rotation in revolutions per minute.

P = pull in pounds (representing the torque or twisting moment) at the end of the lever arm of radius R.

H.P. = Horse Power.

33,000 = the number of foot pounds said to represent 1 horsepower.

Transposing,

$$P = \frac{H.P. \times 33{,}000}{2\pi R S}$$

[4]—Is the torque of a motor constant, irrespective of speed?

Theoretically, yes; practically, no.

[5]—What are the reasons in practice for torque modifications?

Since the torque of a motor is an expression of the energy set free when the mixture is ignited, and since the force of the explosion, so called, is modified (a) with changes in the weight of fuel utilized (b) with changes of compression, the conditions as follows must be recognized. The compression will be lowered when the motor is running slow, because there will be more time for mixture to leak by the piston rings, and there will be more time for the heat to pass away through the cylinder walls to the water in the water-jacket, thence to the radiator, where it will be absorbed by the passing air current.

Increasing speed also has its effect upon the torque, and beyond a certain range in the speed for any given motor, the torque decreases with further increases in speed, due to wire drawing as the mixture passes through the valves, a depression in the intake, due to the small size of the same, and back pressure in the exhaust manifold, for the same reason. There are other pumping loss factors which will have to be taken into account in a closer examination of this phase of motor operation, but these are conspicuous reasons for a modification of the torque characteristic of a motor.

[6]—If it is true that an intake depression reduces the power of a motor through its modification of the torque characteristic, and if this condition obtains because the intake is restricted, why is it not proper to enlarge the same and obviate this difficulty?

Within prescribed limits, the remedy lies in having the intake large, of suitable contour, and with a perfectly smooth bore. In view of the fact, however, that the intake valve opens before the flame is quenched in the combustion chamber, popping back must be guarded against, and this troublesome difficulty is only to be overcome if the area of the intake is such that the speed of travel of the mixture en route to the combustion chamber is higher than the rate of flame travel in the mixture itself. If the flame propagates through the mixture at a rate so fast that it will overtake the stream, combustion will take place in the intake manifold instead of in the combustion chamber and in this way the so called "popping back" difficulty is brought about.

[7]—If the torque of a motor decreases with increasing speed for reasons which are unavoidable, is it not a fact that the power of the same motor will decrease with increasing speed?

As the formula indicates, the power of a motor is proportional to the torque on the one hand, and the speed on the other. Power, then, is represented by torque multiplied by speed. The best power of any motor is found in the range of its speed at which torque time speed finds its greatest value. If the speed is very high, the torque may be relatively low for a given power; if the speed increases at a rate higher than the rate of decrease of the torque for speed, the power will be increasing with the speed, or, if the torque remains constant, power will be in direct proportion to speed. Conversely, if the speed is held constant, the power will change in direct proportion to torque changes.

[8]—To what extent are these changes to be noted in practice?

Considering automobile motors in average practice, the best condition seems to obtain when the piston velocity is between 800 and 1,000 feet per minute.

[9]—How hard should a valve spring press the valve against its seat?

There is no fixed rule for this; the pressure should be measured in pounds per square inch. It is claimed that 40 pounds per square inch will suffice for every need.

[10]—Why should the pressure be measured in pounds per square inch?

After a valve closes, which it does in response to the pressure exerted by its spring, all that remains to be done is for the valve to stay on the seat with sufficient firmness to assure that it will be tight against leakage. Despite this relatively slight duty, the situation is one demanding some pressure, for the reason that the suction tends to open the exhaust valve, due to the depression in the combustion chamber (cylinder). The amount of the depression, as measured in pounds per square inch, demands that the pressure exerted by the valve spring be more than the suction per square inch, and that this pressure on the seat by the valve be in like value, i. e., in pounds per square inch. In addition to the overcoming of the depression, it is necessary for the pressure of the valve on the seat to be enough to squash down any foreign substance that may find lodgment there, and in addition, it is necessary to squeeze excesses of oil off of the surface in order that the valve may seat; it is probable that 40 pounds per square inch is adequate for the purpose.

Were the pressure measured in pounds, independent of the area of the seat, it is possible that the pressure in pounds per square inch would be below the requirement, due to the fact that the depression in the cylinder, as measured in pounds per square inch, would be so great that the pressure on the seat, resultant of the ability of the spring, would be below the requirement, and the valve would not then press against the seat enough to assure tightness.

[11]—Why is it that conical valves are so much used?

Considering the question of the pressure, which is exerted by the valve spring, the conical seat offers certain advantages; a spring of a given strength, working against a conical seated valve, is favored by the wedging acton, due to the shape of the seat. In addition to this is the fact that the foreign substances which may find lodgment on the seat during the time the valve is opened will be scraped off as the valve is closed; this action cannot take place when the seat is flat; in a flat-seated valve, under the circumstances, the foreign substances must be pulverized, and even then they may not be driven out from under the seat, and a leak will result. There is also danger of damaging the flat seat if foreign substances find lodgment there; when the valve closes under the action of the spring, the seat pressure is enough to drive any hard substance into the metal of the seat, and in the course of time it is possible that the seat will crumble away, just as asphalt pavement does, as the direct result of small surface blemishes, they being made by the cauks of horses' shoes.

[12]—What are the advantages of flat-seated valves?

They open freely, due to the absence of wedging action. The effective area is greater, considering a given outside diameter of the valve. The area of the rest remains constant even after repeated grindings.

[13]—Why not regard these advantages as well worth having in every motor made and used?

All roads lead to Rome! As an answer, this fixed phrase may not be sufficiently clear for the purpose; it may be supplemented by the further statement that (a) the wedging action of conical valves is not sufficient to serve as a detriment; (b) the difference in area between the flat and the conical seat is not enough to make it difficult to have the conical seated valve as much larger as the difference may indicate; (c) the increase in area of the conical valve, while it may ultimately have to be corrected, is at such a slow rate that it is a matter of several years' service before the trouble will become emiuent, and, even when it does come up for treatment, it is easy to deal with; against this is the fact that the conical valve has certain advantages which are well worth considering when a decision is being made.

[14]—What other qualifications must the valve spring have?

Besides closing the valve, there is the necessity of doing so as quickly as possible. If the spring is not sprightly the cam-roller will not hug the cam, and noise will result. In addition to this, unless the spring closes the valve as quickly as the cam will permit, as it engages with the roller, the timing will go awry. There is no use of going to the trouble of timing the opening and closing of the valves unless the springs will act as quickly as to serve for the intended purpose.

[15]—How soon should the spring close the valve?

The exact time depends upon the requirement as fixed by the designer of the motor in view of the service to be rendered. This question, however, has for its scope the idea that the valve may not be closed, excepting after a certain time has elapsed, due to inertia of the reciprocating mass; the closing should take place within the time taken for the camshaft to rotate 20 deg.

[16]—What has inertia to do with the closing of a valve?

Accordingly as the valve is increased in weight, the inertia factor will increase, and the greater will the time of closing the valve be, considering a given strength of the spring placed to do the work. If the valve-lift is also operated by the spring, it, too, will have to be taken into account.

[17]—What is inertia?

It is the property of a body by virtue of which it tends to continue in a state of rest or motion in which it may be placed, until acted on by some force.

[18]—What are the laws to which inertia responds?

Newton's laws.

[19]—What are Newton's laws?

There are three to which reference will be made as having bearing upon this matter:

(a) Newton's first law: If a body be at rest, it will remain at rest; or if in motion, it will move uniformly in a straight line until acted upon by some force.

(b) Newton's second law: If a body be acted on by several forces, it will obey each as if the other did not exist, and this whether the body be at rest or in motion.

(c) Newton's third law: If a force acts to change the state of a body with respect to rest or motion, the body will offer a resistance equal and directly opposite to the force. Or, to every action there is an equal and opposite action.

[20]—What is it that causes the valve of a motor to open?

Force.

[21]—What is force?

It is anything that tends to change the state of a body with respect to rest or motion. If a body is at rest, as when a valve is on its seat, anything that tends to put it in motion is a force. If a body is in motion, as a valve which is being opened, anything which tends to change either its direction or its rate of motion, is a force.

[22]—Why is it that some motors work better than others?

It is very rarely that the principle is at fault. Design, construction, material, and method of use, more frequently have to do with poor result.

Aligning Automobile Wheels

Editor THE AUTOMOBILE:

[2,264]—Will you please tell me in your next issue of "The Automobile" the best way to tell if the four wheels of an automobile are in alignment. A. S. GARDNER.

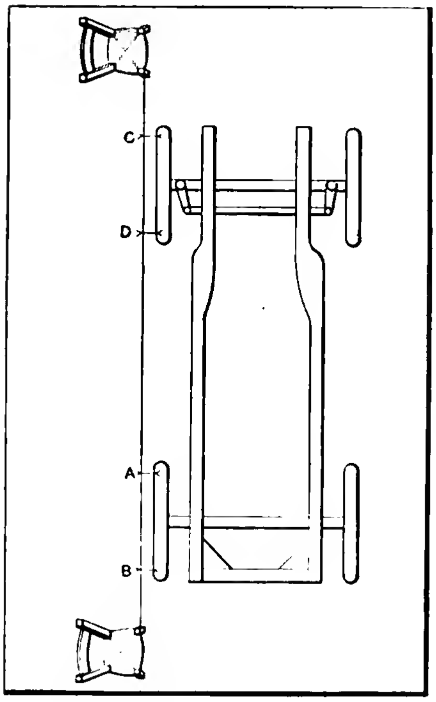
Yazoo City, Miss.

Two drawings are shown on this and the opposite page to show how this is done. First line up the wheels on one side, and then in combination with this line up the wheels on the opposite side. Take the car in any position, in the middle of a flat floor of good area, turn the front wheels as straight as possible. Set a pair of chairs on the floor facing the car, one about two feet in front of the car, and the other perhaps two feet back of it, but both so placed as to be close to an alignment with the side of the wheels, as the figures show. Stretch a string, cord, or wire from one chair to the other, being careful to maintain the same height above the floor at all points. Measure from this string or wire as a datum line to the front and rear parts of the front and rear tires. In case the distance from the front wheel to the datum and that from the rear wheel to the datum line differ, move one end or the other until the two measurements agree exactly. The datum line is then exactly parallel to the line of the wheels on that side.

Now, with a second pair of chairs and a string or wire, repeat the performance on the other side, obtaining another datum line there which is exactly parallel to those two wheels. Having done this, measure across from the one datum line to the other, both at the front, as A, B, and at the rear as C, D, taking care to measure these two at equal distances from the wheels, that is, the distance D H should equal the distance in front at B E.

Should these two measurements agree exactly, the wheels are in alignment, but should one measurement be longer than the other, they are not and a correction should be made. It is well to check up the squareness of the rear axle with the two lines, at the same time, which may be done by dropping a point from the center of the two hub caps, and drawing a cross line through these two points.

Having this cross line, which represents the center line of the rear axle, drop also lines representing the two parallels just found. Then measure the angle of the rear axle line with these. It should be 90 deg.



Method of Aligning One Pair of Wheels

"Steering Advantageously" Revised

Editor THE AUTOMOBILE:

[2,265]—It may be presumptious on the part of a modest driver of only one season's experience of 6,000 miles to venture to differ from recognized experts such as those who conduct "The Automobile," yet "fools rush in where angels fear to tread" and I dare to be one of those fools. Let me say in preface that I will take with the utmost good nature any criticism from you, and further, if you deem this screed worthy of publication, I request that my name be omitted. I am not ashamed of it, but prefer to remain, like all other great people making incursions into foreign territory, "incognito."

That which has called forth this space-wasting contribution is your comment on page 581 in the issue of March 24 on "Steering Advantageously." I must admit that I have never seen a race, and am therefore arguing from theory and possibly thereby laying myself liable to all sorts of justifiable attacks upon my attitude

As it seems to me, the racing driver and the pleasure driver are not to be classed together.The race driver is operating over a course every foot of which he knows and every turn of which he has negotiated in advance and every known contingency in which he has been able to study and provide for. When the actual race comes the unknown quantity is the presence on the track of his competitors and the complications which may arise therefrom. Under ordinary conditions he has only to keep his car steady on the straight stretches and negotiate the turns under the circumstances which seem to him most advantageous, and except at turns, and not always then, he has little or nothing to do with spark or throttle; both are wide open in the position which will do him the greatest good. Understand, please, that I am not attempting to underrate the skill, nerve and coolheadedness which are required in race driving. No reward of which I can conceive would tempt me to try it.

The pleasure driver faces conditions which are constantly varying. Occasionally he reaches long stretches where he can lie back at ease and assume the race driver's position, and under certain circumstances that position is undoubtedly the best, but in a day's drive of 100 to 125 miles, which is all that any ordinary pleasure driver ought to attempt, he is occupied the greater part of the time in meeting varying conditions of direction, grade, speed and highway surface so far as his own car is concerned, and of the occupancy of the road by other vehicles going in both directions and by the crossing of the road by pedestrians. I have been told on reliable authority that the racing driver shrinks from driving through crowded city streets, preferring to let some other hand take the steering wheel, and I can readily believe the statement. The method of steering which has given me the greatest comfort is that in which both wheels are placed in front of a line across the car at right angles, one hand being very near the front and the other about 45 degrees forward of the cross line, that is, with both hands above the forbidden horizontal center. The left hand grasps the wheel firmly and does the greater part of the work. In cases of emergency it can control the greatest average deflection both ways. With the thumb of the right hand for the spark and the forefinger for the throttle the movements of these two essential levers are easily controlled and the other fingers can grasp the wheel lightly and aid the left hand. In addition the right forearm lies across the wheel, affording a rest to that member. As I noted before, when long, straight stretches are met, both hands can be dropped to the race driver's position, affording a welcome variation.

It should be remembered also that the race driver is not hampered by any considerations of economy of fuel or solicitude for the welfare of his car, points which are ever present with the careful pleasure driver.

It must not be forgotten that this is a matter into which the personal equation enters very largely and that the position which I have found to be the best for a long day's run may not meet the requirements of someone else.

As a former newspaper man of more than twenty years' experience I know the value of time and space; yet there are times when even an old newspaper man becomes prolix—"garrulous," if you choose to put it that way; and this seems to be one of those times. For which I ask your pardon.

Boston. LEIGHTON.

Despite the fact that a racing driver has been over the course on which he is driving and should know it perfectly, the speed at which he is traveling makes his case a parallel one to that of the driver who is traveling over unknown roads but at a very moderate speed, being thus able to stop quickly, whereas the racing driver stops after the accident, sometimes stopping only when heaven is reached. This being the case, the argument above is upset.

Still Starting on the Spark

Editor THE AUTOMOBILE:

[2,266]—I am at present a subscriber to your valuable journal and have been for several years past. I wish to say in regard to Starting on the Spark, letter 2,201, that it is not impossible to remove plugs or open pet cocks, and then start on the spark. While I readily agree that this cannot be done with any certainty, I have done so on a few occasions. Another test I wish to call your attention to is: Start up the motor, run till it has warmed up a little, open the pet cocks, inject gasoline into the cylinders, and then try starting on the spark. A trial or two will demonstrate this to be a thing that can be done occasionally. Now, as to compression, I realize that it is absolutely necessary to the proper working of a gas engine, but here is a little story along that line. This has to do with a friend and his car. He never drove a car until he purchased a popular priced thirty-horsepower machine last June. You know how a novice usually handles spark and gas; it was true in his case, late spark and open throttle. We all know what this does to valves. Now up to the present date he has covered over six thousand miles without touching a valve. You will agree that they are bound to be leaky; it is impossible that they should be otherwise. Last Wednesday I looked over his car, enriched the mixture, and it now starts on the spark, but his valves will be ground in to-morrow. F. M. GIVENS.

Bayonne, N. J.

No comment on the above letter is necessary, except to state that when it was said that starting on the spark was nearly impossible, the average case was referred to and not the three-times-in-three-years case, or anything of that sort.

Blower Pressure and Strong Metals

Editor THE AUTOMOBILE:

[2,267]—Please answer the two following questions, both of which have reference indirectly to a new type of automobile engine that I am building: About what pressure can be obtained from two fans 18 inches diameter, similar to the kind used on automobile engines, attached to the same shaft, each one enclosed in a separate casing, but the first drawing from the open air, while the second draws from the outlet of the first, the two fans being driven at the same speed? What strong metals will withstand a very high temperature, say 400 to 1,000 deg. C.?

New York City. M. E. M.

A fan two feet in diameter (24 in.), will, at 600 revolutions per minute, deliver about 5,000 cubic feet of air per minute. This velocity is approximately equal to a pressure of 1 oz. per sq. in. As the first fan would deliver the air at this pressure to the second fan, the latter may be expected to raise the pressure starting from that point in about the same ratio, namely about 60 to 1. This would give a resulting pressure at the outlet of the second fan under favorable conditions of about 60 oz. or roughly 4 lbs. It must be remembered in this connection that this is a matter in which even experts sidestep direct figures.

Steel is a strong metal, so too, is manganese bronze, and in a relative sense, cast iron. All of these will withstand the temperature mentioned.

Horsepower Formula Once More

Editor THE AUTOMOBILE:

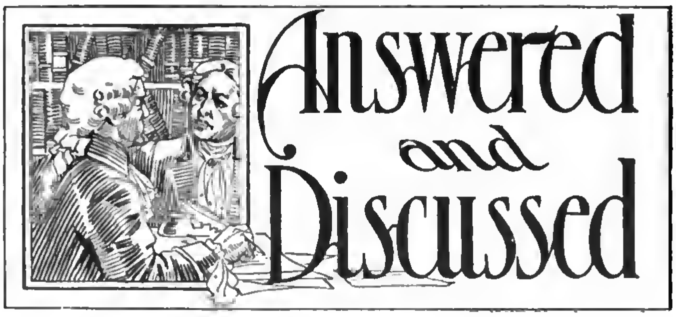
[2,268]—Please answer me through your question box, giving the formula used at the present time, that is, the generally accepted one, for figuring the horsepower of gasoline automobile engines. LOYD H. JORDAN.

Gordon, Neb.

That formula known as the R. A. C. or A. L. A. M. is now in general use. It is:

$$\text{Power} = \frac{D^2 N}{2.5}$$

this rendered into words is the square of the cylinder bore times the number of cylinders, divided by 2 1-2. Apparently it does not consider the stroke, but it is based upon a piston speed of 1,000 ft. per minute, so that longer strokes would yield the same amount of power but at a slower speed, according to it. This latter point has caused much confusion in the use of the formula.



Cranes Made in New Jersey

Editor THE AUTOMOBILE:

[2,269]—In "Letters Interesting" could you give me some information about a car called the Crane, made at Bayonne, N. J.? I have looked in vain through recent issues of "The Automobile" and "Motor Age" for a description of this car, and as it appears to be a first-class machine, I would like to know something about it. J. J. IDE.

New York City.

Unfortunately, this car has never been called to the attention of THE AUTOMOBILE previous to this, and so we have no information whatever about it. Any of our readers who have may send in such information, and THE AUTOMOBILE will be glad to publish it.

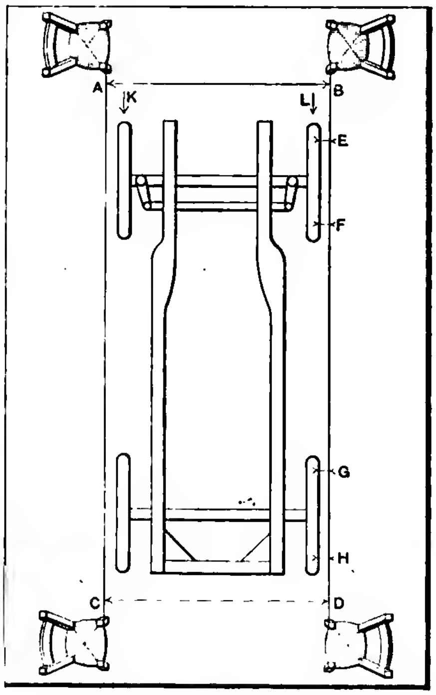
New Engine for an Oldtimer

Editor THE AUTOMOBILE:

[2,270]—I have a little car with a cone-cylinder engine of 3 1-2-inch bore and 3-inch stroke. It has 28-inch wheels, and is geared down 3 to 1, so that 3 turns of the crankshaft give one of the rear wheels. The engine is four-cycle and air-cooled. Could I put in it a new engine with two-cylinder 4-inch bore and 4-inch stroke, air cooled, and get good results? My car is a Crestmobile, model D, shaft drive. The firm making this car originally is now out of business, having failed. WILLIAM P. GILMAN.

Franklin, Pa.

Unfortunately, not enough detail about the construction of the car is given to enable one to state intelligently whether the new engine would go into place or not. If this can be proven to the owner's satisfaction, doubtless the extra power from the larger engine would not be sufficient to do any damage, that is, if the engine can be put into the old chassis, the transmission parts back to the rear wheels will doubtless carry the additional load in a proper manner. A single thought in this connection is that the new engine would require more fuel in any given length of time, this meaning new gasoline tank of large capacity, while the engine itself and all of its accessories will add weight. The result may be to add more weight than the small tires will carry. This should be looked into very carefully before making the change as tire depreciation and repair form a very large part of the motorist's weekly bill, and not the most pleasant part.



Completing the Alignment of all Wheels

Some Leading Magneto Details

By HERBERT L. TOWLE

IN last week's article were explained the principles of action of the three leading types of geared magnetos, i. e., low tension, low tension with separate coil, and high tension, properly so called.

Before taking up the different commercial types of magnetos it will be best to present the above mentioned classes in simplified form. By this means the different details of armature, interrupter, distributor, etc., will be more easy to understand.

In Fig. 1 is shown a typical H armature core, together with the bronze heads, *B B'*, which are screwed to it, and the shaft ends *A A'*, driven and riveted into the bronze heads. As the shaft is not continuous, the open spaces *C C'*, at the ends of the core are available for the coil windings. It will be seen that the core is not a solid casting; rather it is a pair of castings between which is clamped a group of soft iron stampings *D* having the form shown in the detail sketch. The object of thus laminating the core, as it is called, is to retard the circulation of "eddy currents" in the core due to induction. The same forces of induction which are at play in the windings operate also in the iron core itself, and if unchecked would both consume power and heat the armature unduly. As the voltage of these currents is very low, even the slight obstruction of the laminations is sufficient to retard them.

The bronze plates *B B'*, are not intended to be disturbed outside the factory. This is essential, as such disturbance would probably result in breaking the wire leading from the coil through the hollow shaft *A* to its outer end. It would also be likely to result in the shaft ends not being perfectly aligned when reassembled. Owing to the extreme care that must be taken, first in insulating the core, then in winding it, then in baking the coil to expel extra moisture from the insulation, and finally shellacking it to make it permanently watertight, it is essential that the work shall not subsequently be touched by unskilled hands.

Fig. 2 shows how the low-tension armature of Fig. 1 appears when completed and in place. The coil windings are bound around with brass wires laid in grooves in the core to prevent the coil from expanding from centrifugal force and striking the pole pieces. Before the necessity for this precaution was fully understood it was not unheard-of for armatures to "burst" or "swell," with the result of tearing or chafing away the outer wires of the coil, which of course put the magneto out of service till repaired. The inner end of the coil (not shown), is connected permanently to the iron core. The outer end is led, heavily insulated, through the hollow shaft to an insulated steel or copper button at its end, against which bears an insulated hardened steel button under the pressure of a spring. The mounting containing the steel button or collector is insulated from the rest of the magneto, and a binding post on it affords connection for a wire which carries the current to the bus bar on the engine. The ground connection to the switch is attached either here or to the bus bar. Closing the switch, it will be remembered, short-circuits the armature by giving its current a

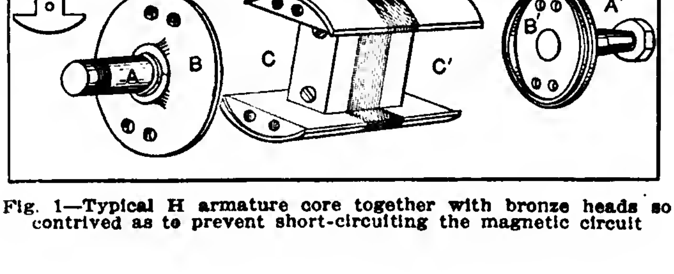


Fig. 1—Typical H armature core together with bronze heads so contrived as to prevent short-circuiting the magnetic circuit

direct path to "ground," i. e., to the engine and magneto frame, through which it returns to the inner terminal of the coil.

The ball bearings in which the shaft runs are supported in bronze plates screwed to the pole pieces. An aluminum or bronze plate closes in the bottom, and a cover plate over the armature between the pole pieces protects the armature from dust. The driving end of the shaft is tapered to receive a pinion, and the latter is jammd home on the taper by a nut, and usually keyed as well. The ball bearings are oiled about once a month. Other care is seldom if ever required. Before ball bearings were adopted it was customary to use plain bearings, which required frequent oiling, and sooner or later wore so loose as to permit the armature to strike the pole pieces. With ball bearings the clearance may be reduced to a few thousandths of an inch without danger of striking, thereby minimizing resistance to the lines of force.

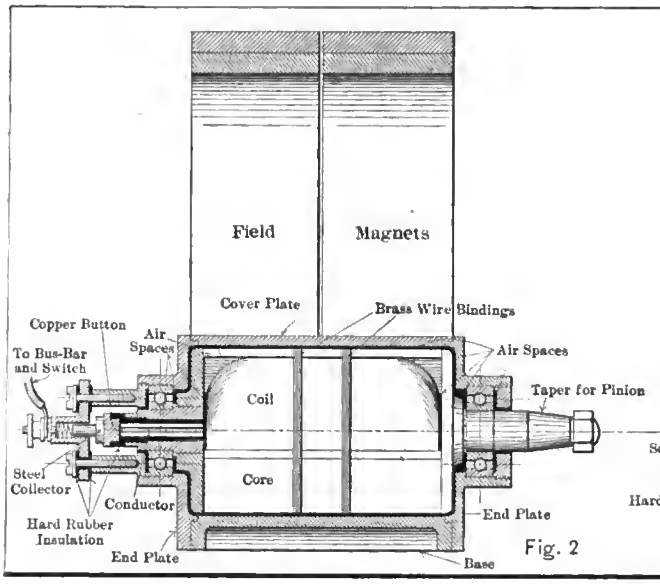
The average magneto user, it may be remarked in passing, does not realize the importance of giving the lines of force of the field magnets an easy path. It is well known that a common horse-shoe magnet becomes weaker if deprived of its "keeper." The same applies with even more force to the magneto. It is not even desirable to run a magneto with the armature circuit open, and this is one reason for short-circuiting the armature to interrupt the spark. When the armature is in position it affords a good path for the lines of force. If, however, it should ever be necessary to take out the armature for the purpose of repairing, this must never be done until a substantial plate of soft iron has been laid on top of the pole pieces; and the plate must not be removed till the armature has been re-inserted.

The magnetizing of the field magnets is an intricate problem, not so much to render them strongly magnetic for a time as to persuade them to retain their magnetism indefinitely. Certain steels refuse altogether to come up to the proper standard in this regard, and in fact most of the successful field magnets now used are made in Europe from foreign steel. When they come to this country they are "aged" to determine whether or not they hold their strength. If not, and if re-magnetizing does not cure the trouble, they are rejected.

Turning now to the second type of geared magneto, namely, the low tension type with separate coil, we find it a little more complicated than that shown in Fig. 2. It will be recalled that in this type the armature is short-circuted just before the spark is desired, and that breaking the armature short-circuit causes an extra current to flow through the primary winding of the induction coil. This winding has a high resistance in order to compel the bulk of the armature current to flow through the short-circuit till the latter is broken. In addition to the elements shown in Fig. 2 two others are necessary, namely, a mechanical interrupter for short-circuiting the armature at the proper time, and a high tension distributor whereby the secondary current from the coil is delivered to the spark plugs in order. The distributor for a 4-cycle engine is driven from the armature by gearing with two to one reduction.

The interrupter is simply a device for making and breaking the armature circuit, once for each explosion or twice per revolution. Interrupters are of numerous forms, but in all of them a pivoted lever carries a platinum contact point normally abutting against a platinum-tipped screw, and a moving cam striking the lever causes it to break contact. Frequently the cam is stationary, and the lever with its mounting revolves with the armature. The contact screw is insulated and current is led to it by an insulated screw or other conductor through the armature shaft.

One form of interrupter is shown in Figs. 3 and 4, the latter giving an end view of it with the cover plate removed. The cams are stationary and the interrupter mounting, called the



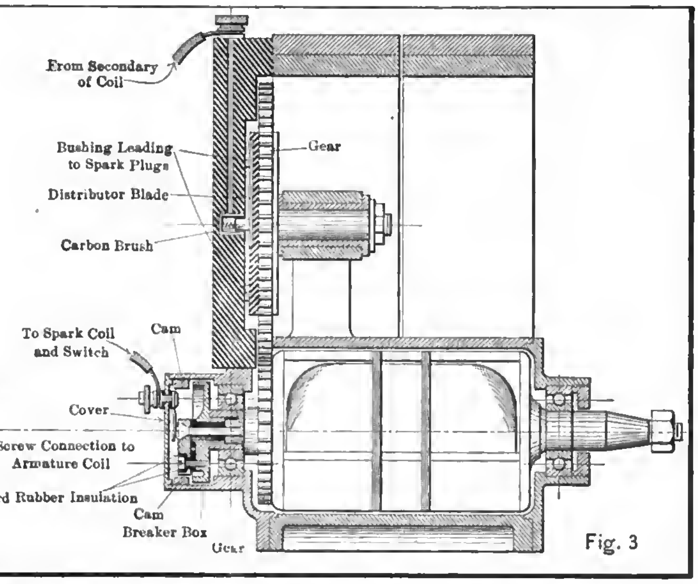


Fig. 2—Section of a simple form of low-tension magneto as used in conjunction with a high-tension coil. Fig. 3—Section of a geared type of magneto with means for short-circuiting just before the current is delivered

"breaker box," is attached to the armature shaft. A spring holds the platinum points normally in contact, and they are separated when the small end of the lever runs over the cams. An insulated spring contact leads the momentary extra current to the primary winding of the outside spark coil, the other terminal of the coil being grounded. To cut off the spark the coil is short-circuited.

In the distributor shown in Fig. 3, the high tension current is led to the top binding post and thence to the central carbin brush, which bears against a radial brass strip, called the distributor blade, embedded in the hard rubber disc attached to the large distributor gear. This blade runs in order under four other carbon brushes spaced equally around a circle and leading current to the spark plugs through connections not shown.

We next come to the high tension magneto, Fig. 4. It has the same form of armature, field magnets, and interrupter, as that in Fig. 3. The distributor may also be similar, though that shown is a little different for the sake merely of illustrating another type. The armature coil of course is different, having a small primary winding with a heavy secondary winding outside of it.

The high tension magneto contains two new features, namely, the condenser and the high tension collector ring. The condenser is usually, though not necessarily, located on the armature shaft in order to get it as close to the interrupter as possible, and it is there shown in Fig. 4. In some magnetos, for the sake of greater accessibility and other reasons, the condenser is located outside the armature in a stationary sealed box.

The high tension collector ring performs for the high tension current the same function that the copper button at the end of the armature shaft in Fig. 2 does for a low tension current. That is to say, it permits the high tension current to be taken off and led to the distributor. The collector ring is of hard rubber with a brass ferrule surrounding it, against which ferrule a heavily insulated stationary carbon pencil bears. The hard rubber spool has wide flanges for the purpose of preventing the high tension current from escaping, by giving it a long path to travel from the brass contact ring to the shaft. As hard rubber is much more resistant than air the current tends to travel over the surface of the spool instead of striking through it. From the carbon collector brush the current is led through a suitable conductor to the center of the rotating portion of the distributor—in this case through a spring and a carbon pencil projecting from the distributor shaft, which is hard rubber with a metal sleeve over it for bearing purposes. Instead of the flat distributor blade of Fig. 3 we have a carbon distributor brush pressed radially outward by a spring and running against the inner surface of a hard rubber ring, in which are inlaid the contact segments from which the current goes through suitable terminals to the spark plugs.

A feature of high tension distributors, which is not shown in these drawings, is the safety spark gap. This is a spark gap between insulated metal points, one in the high tension circuit, and the other grounded. If for any reason the high tension current should exceed the safe voltage (e. g., if the spark plug cables were to be disconnected), the spark would jump the safety gap and thereby prevent the secondary voltage from becoming so high as to endanger the insulation of the coil. The distance of the gap is about one-quarter inch.

Although the illustrations herewith show the essential elements of the three principal types of geared magnetos, they must not be taken to show actual construction very closely. Numerous details making for better insulation, protection against oil, water and dirt, ready accessibility, etc., have purposely been omitted in order to make the drawings so simple as to be easily understood. In a later article will be given illustrations of actual commercial magnetos. By comparing these future illustrations with those given herewith, the reader will be able to identify the various parts without much difficulty.

In order to be able to follow the trend of the articles as they will discuss magnetos of the various commercial forms, it will be desirable to study this article, and thereby become accustomed to the methods of connecting up, as well as the reasons for doing so in the several ways talked about.

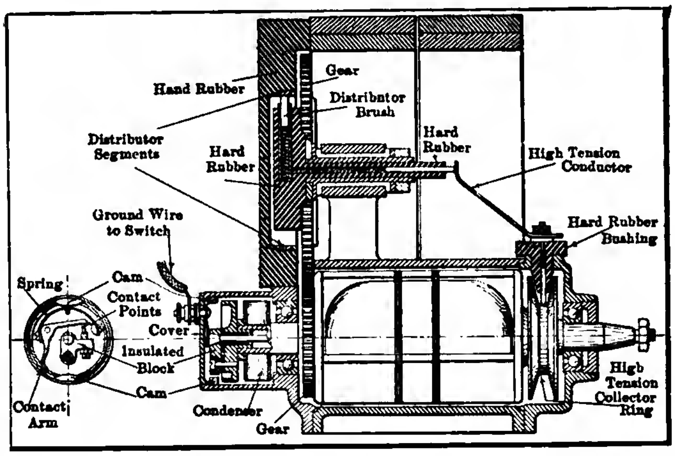


Fig. 4—Section of a high-tension form of magneto with connections in conformity with accepted practice

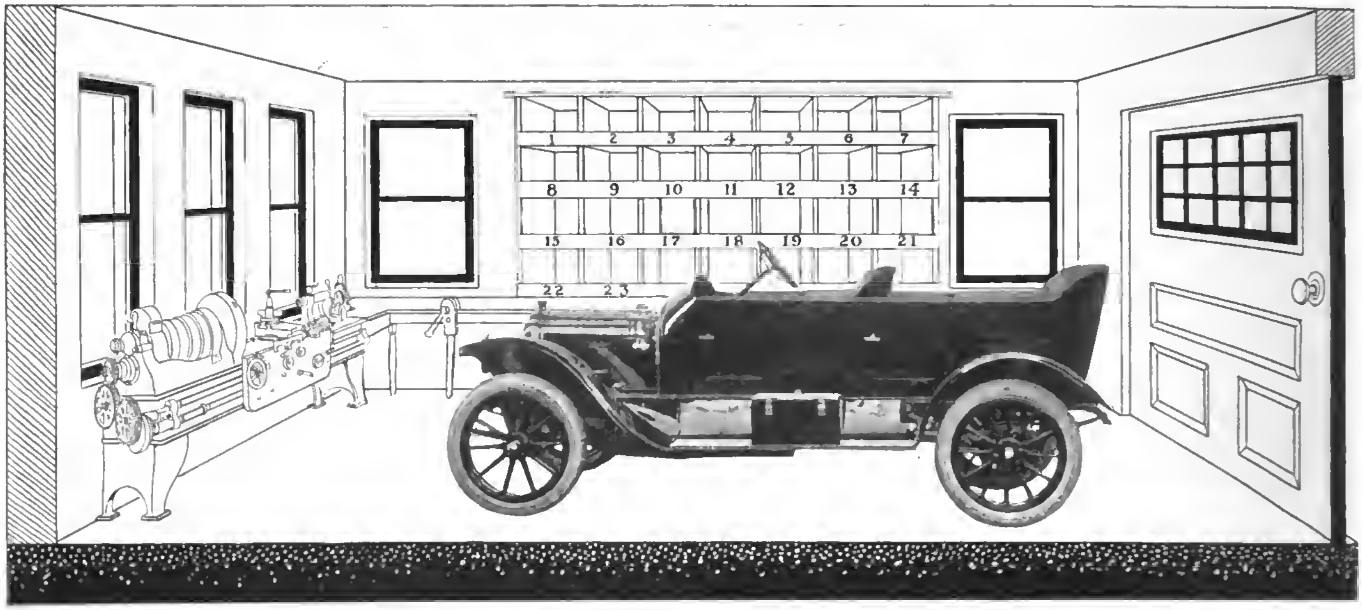


Fig. 1—Length of garage in proportion to the length of the automobile, indicating facilities accompanying ample space

Important Construction Details of Garages

ROOM is desirable for reasons entirely outside of the lighting consideration, and Fig. 1 is offered as a fair illustration of the conditions which should obtain in a private garage. This figure shows the length of the garage in comparison with the length of the car as about in the ratio of 2 to 1. It is impossible to expect to be able to keep a car in good working order if it is so cramped for want of space that work cannot be done upon it excepting under conditions which retard effort, and defeat the use of proper tools.

With sufficient space, good lighting, and certain tools, it is possible to maintain a car in good working order at small cost. There are many little things which happen in the everyday effort of running an automobile that will lead to a large outlay if they are not given the attention they deserve. It will not be necessary at this time to enumerate the tool equipment which might be advantageously employed even in a single-car garage, but it should be remembered that enough space ought to be afforded when the building is planned, so that a lathe and a drill press may be added at any time. In this example (Fig. 1) the lathe is shown at the end opposite the entrance, and since the building is in section, it will be fair to assume that there would be ample room for a drill press and a light forge in the portion of the space not here given. The same illustration presents evidences of a work bench, and what is equally to the point, a shelving system with numbered pockets, so that the parts which might be carried in stock may be kept therein, and a record may be made of the pockets in which the parts are stored, so that when the occasion requires they may be found without much trouble. Leaving the question of the tool equipment as one to be dealt with separately, this illustration will suffice for the intended purpose, but it may not be sufficient to convince the new owner of the fact that he will need more room than that occupied by the car. The usual way is to build the garage first and thereafter discover that room is at a premium.

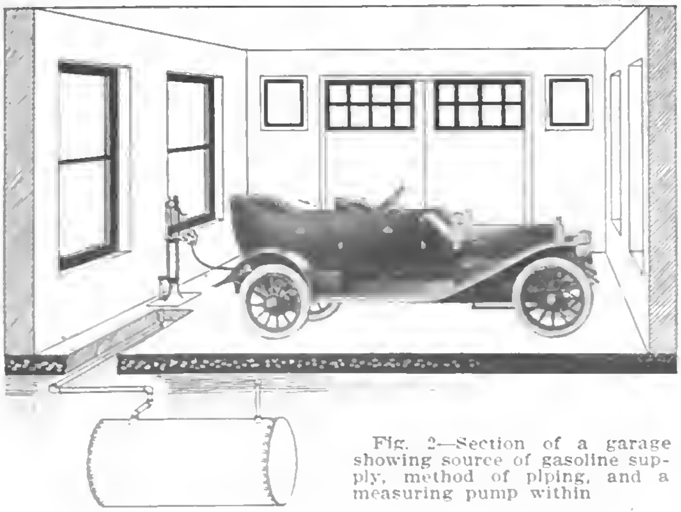


Fig. 2—Section of a garage showing source of gasoline supply, method of piping, and a measuring pump within

Gasoline Should Be Purchased in Quantity and Stored

The fuel problem in the isolated private garage is a particularly difficult one to handle; it would seem not at all difficult to ring up the nearby store at any time and order 10 gallons of gasoline; the boy ought to bring it around in a few minutes The trouble with this plan lies in the fact that he will not be there on Sunday morning, and the gasoline problem will become a serious one. It may take two or three hours to find a place, and so much time wasted on a fine morning when one desires to go for a ride, seems much longer.

If it may be taken for granted that the hand-to-mouth method of obtaining gasoline is not a good one on the ground that it has its decided uncertainties, even so, the Board of Fire Underwriters will object to the presence of more than 10 gallons of gasoline in a garage, unless provision is made for its proper storage. It will also be remembered that the cost increases substantially 50 per cent. when the fuel is purchased in 10-gallon packages, instead of by the barrel: then too, it is a better grade of fuel as a rule which comes in the original barrel.

Fig. 2 is offered as an indication of the customary manner of disposing of the fuel problem, in which a galvanized steel fuel tank is buried outside of the building line of the garage, and a supply pipe is led from the tank to a measuring pump, which may be placed at any convenient point within the building proper, with the understanding, however, that the pump should be free from leaks, so that gasoline will not be spilled about, or it should be placed in a suitably contrived fireproof closet with proper means of ventilation. All these details, in any event, will best be cared for by consulting the rules and regulations of the Board of Fire Underwriters having jurisdiction, and it will

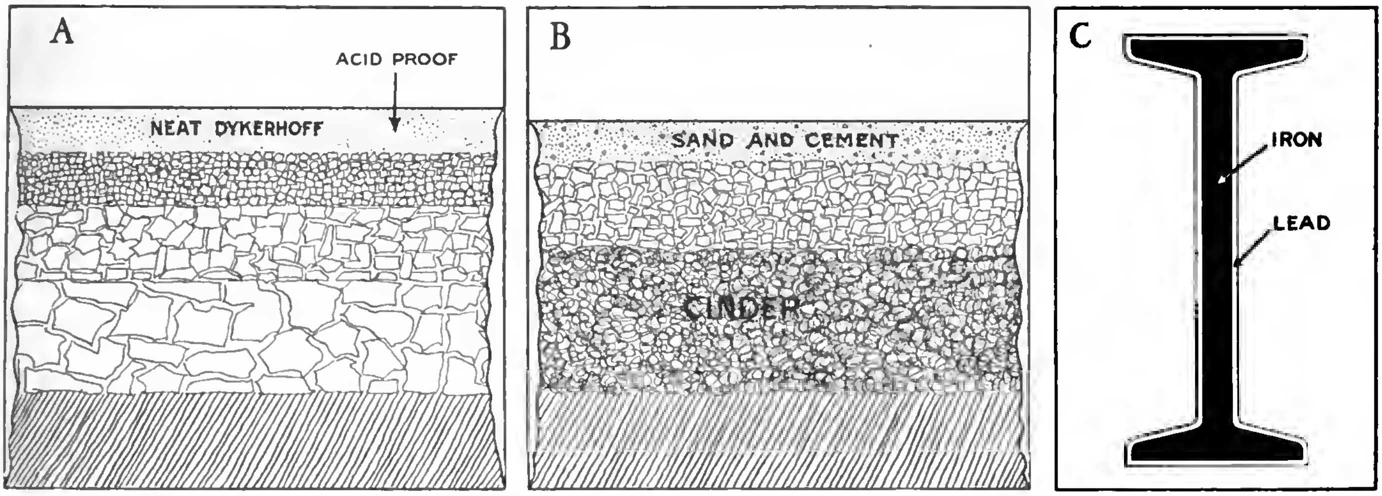
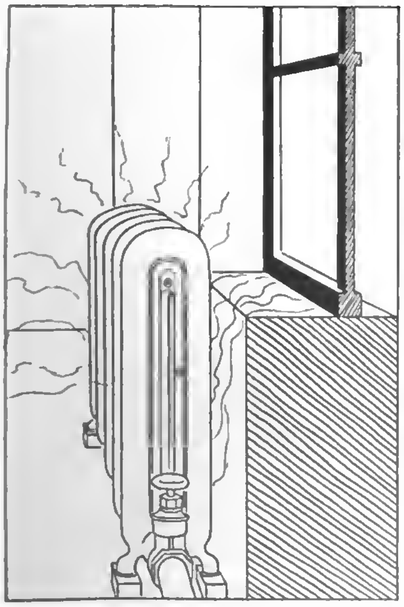


Fig. 3—A presents an acid proof cement floor employing neat Dykerhoff cement for the top layer, and broken granite with Dykerhoff cement beneath. B, cement floor using ordinary cement on a cinder bed when gasoline automobiles are stored. C, lead sheathing over iron work to render it acid proof in an electrical garage

be well to remember that the respective Boards in the several districts do not always agree as to the efficiency of a plan. Money will be saved by consulting the rules and regulations of the Board first, and making the plans in the light of information which may be so obtained.

Cement Floors Are Sources of Possible Annoyance

If a small garage is designed for gasoline automobiles only, the cement floor may be composed of (a) a cinder bed, possibly 6 inches deep; (b) a grout of broken stone, 7 to 1 cement with sand filler, for about 3 inches, topped off by sharp sand cement in the ratio of 1 of cement to 2 of sand, worked to a neat condition for the surface. Such a floor will afford the desired solidity, and will last for a very long time because the oil and other accumulations from a gasoline automobile will work no ill effect. Should the garage be devoted to the storage of an electric automobile, if the battery is of the lead-lead genera, and provided it is to be charged by means of a suitable equipment attached to the garage, there is an excellent opportunity to induce a relatively high depreciation of the floor, in view of the fact that the sulphuric acid electrolyte used in the battery will attack ordinary grades of cement, and if this condition goes on sufficiently, the floor will be destroyed.



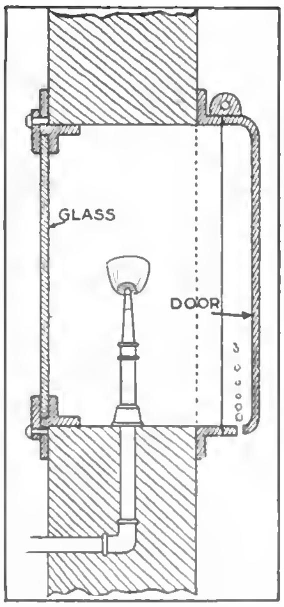


Fig. 4—Steam heating radiator placed adjacent to the window, so that the cold air is heated as it enters. Fig. 5—Lighting pocket located in the wall with a tight glass bull's-eye separating source of light from the gasoline contaminated air within the storage space

To get around trouble of this sort, the plan as indicated in Fig. 3, may be accepted. In this plan, the lower strata is broken granite, coarse at the bottom, and tapered off to sizes which will pass through a one-inch mesh, the whole occupying a depth of say 4 inches. The next layer is made up of broken granite in sizes which will pass a 3-4-inch mesh and is grouted down, using Dykerhoff cement in fine granite screenings for the layer next to the top to a depth of possibly 2 inches, and finally neat Dykerhoff cement to a depth of three-quarters of an inch for the top coat. Fig. 3 shows how iron work may be protected from the corroding effect of acid and its fumes which come from charging the battery; the plan comprises sheathing over the iron work with thin sheet lead. In a small establishment this sort of thing should not be necessary; iron work may be avoided.

If the building is well ventilated the question of the acid action on the surrounding metal will be lessened in any case, but it is necessary to settle a matter of this sort when the structure is being planned.

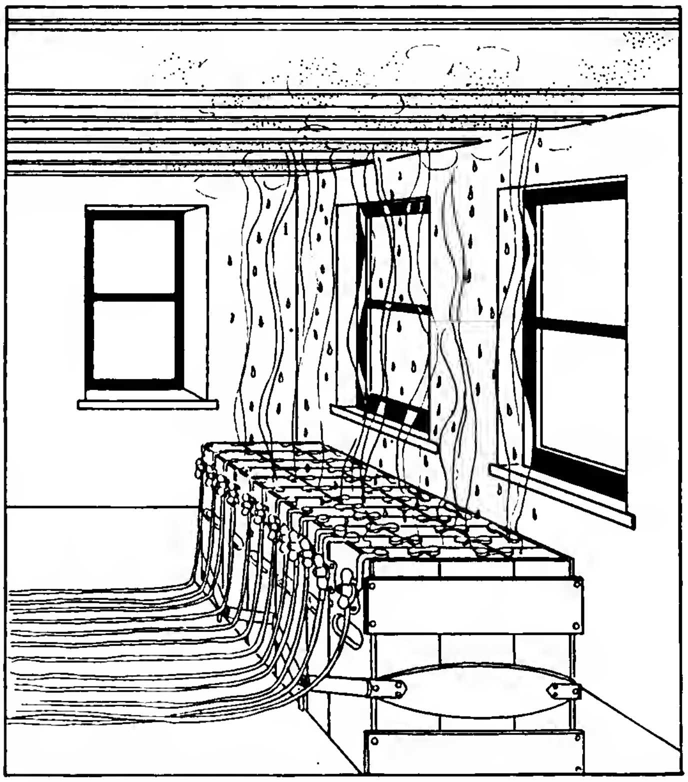


Fig. 6—Shows a storage battery on charge, and the acid fumes given off as the battery nears its complete state of charge, which fumes are corrosive

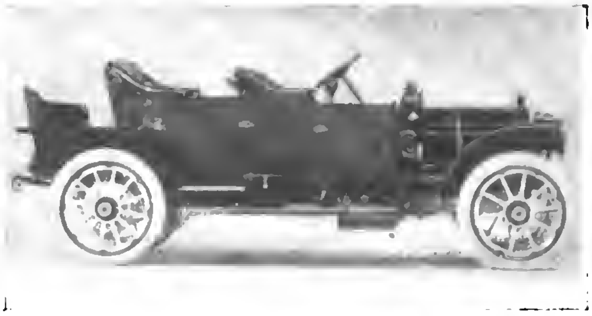
Packard Nineteen

THIS year the new models are being presented a little early, due, perhaps to the briskness of the automobile trade, but quality must be reflected in this same story, on the count that if the automobiles were not good, to sell them would be a relatively difficult matter. At all events the Packard line for 1911 is here and the Packard Motor Car Company, of Detroit, Mich., offers the statement, with its data of the cars, to the effect that the newer body work is a departure from former practice in important particulars, among which the new fore-door style of body is accentuated. Then, it is pointed out that the painting colors are different; Packard blue and cream yellow vies with Packard gray, and a Packard method is also given prominent mention by the company.

The new open cars, instead of having bodies of the "torpedo" type, are made with both the front and rear body panels in strong relief and with victoria carriage lines. These panels are painted Packard blue, striped with Packard gray. The frame, bonnet, fenders and similar parts are black, while the wheels and running gear are Packard gray, striped with black.

Packard from the Mechanical Point of View

The mechanical improvements in the 1911 cars are extensive



but are all in the nature of detail refinement, developing previous models. The "Thirty" line and prices are as follows:

Touring car, phaeton or with close-coupled body, in standard finish and equipment, including Packard extension cape cart top, $4,200.

Runabout, in standard finish and equipment, including runabout top, $4,200.

Touring car with leather victoria top, in standard finish and equipment, $4,450.

Phaeton with leather victoria top, in standard finish and equipment, $4,415.

Touring car with full glass canopy top, in standard finish and equipment, $4,645.

Limousine, in standard finish and equipment, $5,450.

Landaulet, in standard finish and equipment, $5,550.

Fore-door limousine, in standard finish and equipment, $5,650.

Fore-door landaulet, in standard finish and equipment, $5,750.

Coupé, in standard finish and equipment, $4,900.

Packard "Eighteen" offers the following choices:

Open car or with close-coupled body, in standard finish and equipment, including a five-ton extension cape cart top, $3,200.

Runabout, in standard finish and equipment, including runabout top, $3,200.

Open car with leather victoria top, in standard finish and equipment, $3,415.

Limousine, in standard finish and equipment, $4,400.

Landaulet, in standard finish and equipment, $4,500.

Fore-door limousine, in standard finish and equipment, $4,600.

Fore-door landaulet, in standard finish and equipment, $4,700.

Coupé, in standard finish and equipment, $3,900.

General Specifications of the Cars

Motor.—Four vertical, water-cooled cylinders, "Thirty," bore, 5 inches; stroke, 5½ inches; 30 brake horsepower at 650 revolutions per minute. The "Eighteen" bore, 4 1/16 inches; stroke, 5⅛ inches; 18 brake horsepower at 650 revolutions per minute.

Wheel base in the "Thirty" standard chassis is 123½ inches; runabout, 108 inches. The "Eighteen" standard chassis is 112 inches; runabout, 102 inches. Tread, 56½ inches.

The "Thirty" tire equipment is, front and rear, 36 by 4½ inches. For the "Eighteen," front and rear, 34 by 4 inches. Continental demountable rims. Flexible bead clincher tires of any of several standard makes.

The painting situation is represented as follows:

Open cars.—Body and door panels, Packard blue, striped with Packard gray. Under-body, bonnet, radiator, frame, fenders, splashers, battery and tool boxes and moldings, black. Wheels, axles, springs and other running gear parts below the frame, Packard gray, striped with black.

Enclosed Cars.—Body lower and door panels, Packard blue, striped with Packard gray. Upper-body, under-body, bonnet, radiator, frame, fenders, splashers, battery and tool boxes and moldings, black. Wheels, axles, springs and other running gear parts below the frame, black, striped with Packard gray.

In trimming the automobilist has the following choices:

Open cars.—Seats, black, hand-buffed, straight-grain leather, tufted. Running boards and front floor and heel boards, cork carpet. Fiber mat in tonneau.

Enclosed bodies.—Front seats, black, hand-buffed, straight-grain leather, untufted. Front floor and heel boards, cork carpet.

Top—Inside Driven Brougham, on Eighteen Chassis
Middle—Thirty Touring Car with Seven Passenger Body
Bottom—Thirty, Front Door Runabout Body and Chauffeur's Seat

Hundred and Eleven

Rear compartment, below the belt, blue goatskin, tufted; roof and quarters, blue broadcloth, untufted; floor, blue carpet to match.

Standard Car Equipment Furnished

Extension cape cart top, with side curtains, corner light curtains, storm front and envelope on all open cars except runabouts, the equipment of which includes runabout top, with corner light curtains, storm front and envelope. Storm front omitted when corner light curtains are fitted to windshield. Two gas headlights and gas tank, two oil side lamps and oil rear lamp, horn, complete set of tools, with tire repair and rim changing equipment, one extra demountable rim, irons for two extra tires, one-ton jack.

Enclosed body equipment consists of dome light, with switch and battery, toilet cases to match upholstery, push button and buzzer, speaking tube, folding foot rail, hat and parcel carrier, coat hook, adjustable ventilators, morocco-covered robe rail and two umbrella holders in "Thirty" bodies. This equipment is unusually complete even for a car of this type.

The Motor Details

Cylinders are cast in pairs, with integral water jackets and valve chambers. Cylinders and pistons are ground and interchangeable. Pistons are fitted with four rings, ground top, bottom and sides. Cylinders, pistons and rings are lapped together after assembling. Castings for cylinders, pistons, etc., made in the Packard foundries from especially imported gray iron.

Crankshaft has three large main bearings, supported by massive webs. Connecting rods are drop-forged.

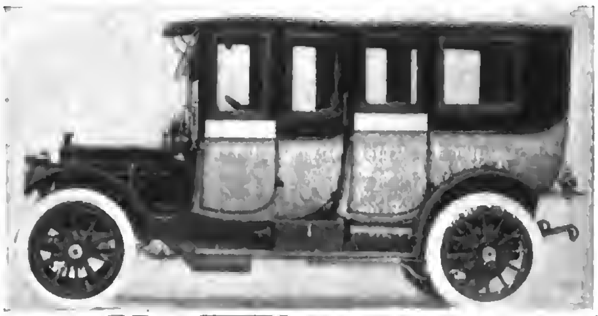
Quiet running is obtained by great rigidity and accuracy in manufacturing and inspection. All bearing surfaces are ground. Bushings are all carefully fitted.

Valves are all mechanically operated and interchangeable. Positively lubricated camshafts are enclosed within crankcase. Inlet and exhaust valves are on opposite sides of the cylinder pairs. Camshaft, magneto and water pump gears are positively lubricated and protected from dirt, being contained in a separate but integrally cast, oil-tight extension of the crankcase. The latter, it will be remembered, is cast in two halves, split horizontally on the center line.

Crankcase has three horizontal sections. Uppermost section is supported by main frame and forms engine base. Crankshaft bearings are held between the uppermost and middle sections. Bottom section is an oil well, easily removable for inspection or adjustment of connecting rods, camshafts and other inside parts without disturbing crankshaft bearings.

Entire crankcase is cast of special aluminum alloy in the Packard foundries. All motor parts are protected by integral web enclosing space between motor and frame. Crankcase is divided into front and rear compartments by a central partition supporting the center crankshaft bearing.

Carburetor is of the firm's own design and manufacture, combining float feed, automatic mixture regulation for all motor speeds and uniform temperature. Primary air intake may be shut off to assist starting in cold weather. It has a water-jacketed cylindrical mixing chamber. Auxiliary air inlet is automatically regulated for varying speed by a spring-controlled poppet valve. Small lever on dashboard governs the poppet-valve spring tension to suit different atmospheric conditions.



Top—Front Door Limousine Is a New Departure for Packard
Middle—Front Door Landaulet Has a Distinctive Appearance
Bottom—Touring Car with Torpedo Body Looks Natty and Neat

Butterfly throttle is above aspirating nozzle in mixing chambers.

Gasoline supply is by gravity from a copper tank under the front seat, with a three-way gasoline valve which controls the main supply. There is, also, a 5-gallon reserve and shut-off. The capacity of the standard "Thirty" tank, including reserve supply which is contained within main tank, is 21 gallons. Capacity of the "Eighteen" tank is 18 gallons. In runabouts, phæton and close-coupled cars, gasoline feed is by pressure, there being an automatic pump on the engine and also a hand pump for emergency.

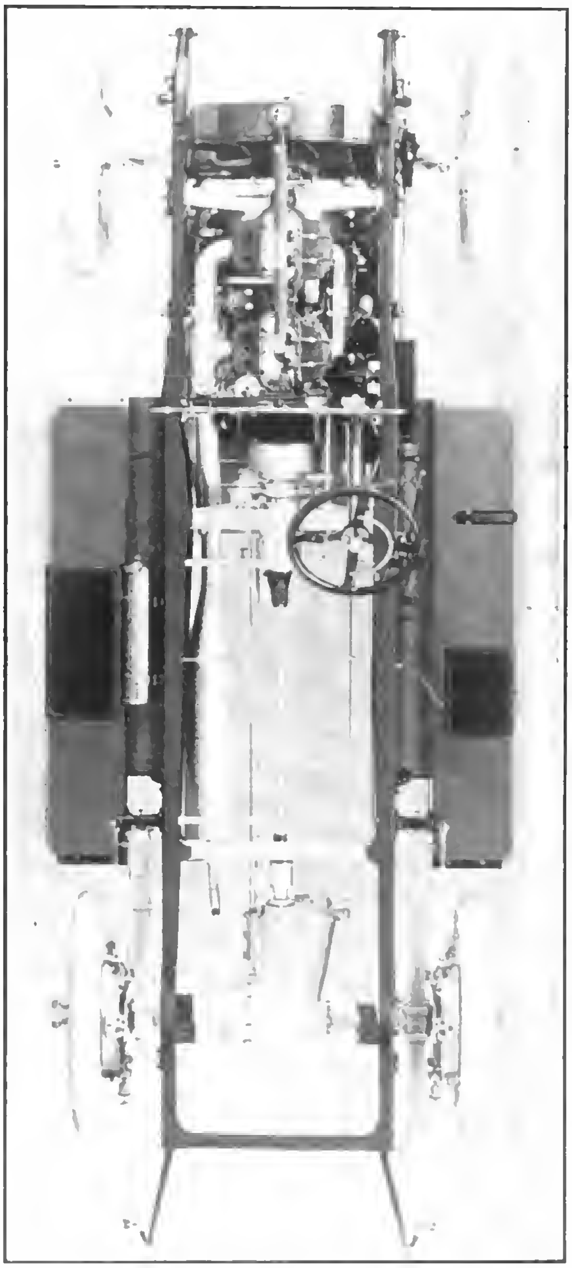
Ignition is the jump spark by special system, current supplied by Eisemann low-tension magneto with storage battery for starting and reserve. Transformer coil for magneto current and vibrator coil for battery current are located in unit box on dashboard. Coils and primary circuits are independent but secondary circuits and spark plugs are common to both systems. Magneto is placed on the left side of the motor bed and is driven by enclosed gears. Storage battery is in a box on the running board. Convenient hand and "kick" switch, combined with a Yale lock, is placed between battery and magneto coils. Commutator for the battery primary current is on a vertical shaft at the rear of the motor and is driven from the exhaust valve camshaft by enclosed bevel gears. Primary wiring from battery to coil is carried through protecting tube. Secondary wiring from magneto distributor to universally-jointed knife switches at spark plugs is also satisfactorily carried through a copper pipe.

Lubrication has a number of features, motor being oiled by splash from crankcase to cylinders and all motor bearings. Positive supply of oil flowing independently to front and rear compartments of crank-case by means of a double plunger pump. Oil feed is easily regulated, pump strokes being adjustable. The pump is accessibly located at left of motor and is driven by a worm on the exhaust valve camshaft. An oil reservoir placed between the pairs of cylinders—this location insuring uniform temperature and fluid—gives easily flowing oil, even in cold weather. The capacity of the "Thirty" oil tank is one gallon; "Eighteen," 2½ quarts. Two drip sight-feeds are placed on the dashboard. Anti-clogging devices on crankcase drain cocks and stops to prevent their accidental opening. Transmission and differential are run in oil. All universal joints are encased and packed with grease. Other running and wearing parts are provided with grease cups or oil holes.

Methods of Motor Control

Motor speed is regulated by hand lever on steering wheel and by foot pedal, both acting directly on throttle. Hydraulic governor to steady the motor running and compensate for varying loads within the limits of volitional throttle setting. The pedal provides means of instantaneous acceleration as well as continued high-speed running. The governor is incorporated in the water circulation system, being part of the pump unit. The ignition spark is advanced or retarded for most efficient ignition under every running condition by a small lever on the steering wheel.

Starting crank has an automatic latch which holds starting crank in upright position when not in use. There is a compression relief handle near starting crank.



"Thirty" Chassis from Above

Motor cooling is by positive water circulation through cellular radiator and motor cylinder water jackets by gear-driven centrifugal pump. A noncaking filler cap is placed on the radiator water tank. A suction strainer on water pump is easily removable for cleaning without breaking any water connections. Belt-driven, ball-bearing fan is provided with an adjustment for belt tension. Capacity of water circulation system in Packard "Thirty" is 5 gallons; in "Eighteen," 4½ gallons.

Unit Principle of Speed Changing Used

Clutch is of the dry plate type, engaging gradually with delicate positive action at all times. Casing plates are faced with special friction material. The shaft plates are of metal.

Unit principle of speed changing is used with the final drive and differential gears contained in rigid rear axle unit. This method has as its advantages few parts, light weight, high efficiency. No transmission elements are on main frame and no intermediate parts require alignment between the clutch and rear axle. A long propeller shaft having minimum angularity is used with effectively encased universal joints at each end.

Speed changing gives three forward speeds and reverse, providing most efficient gear ratios for all kinds of driving, obtained by simple arrangement of sliding gears. Third speed forward is direct drive. Gear shifting lever has selective action in single quadrant.

This lever moves forward and backward for forward speeds, and laterally into a notch for reverse. Reverse movement is locked by thumb latch. Gear shifting is assisted by spring locks on the shifter shaft, which determine correct engagement of gears. Gear shifting toggles and other actuating parts are enclosed in gear housing and protected from dirt. Annular ball bearings are used throughout transmission.

Aluminum housing that contains speed changing gears, final drive bevel gears and differential is internally ribbed for strength and rigidity.

Housing provided with oil plugs and inspection holes. Differential gear unit supported by its own bearings, rear axle sections being removable without disturbing gears. Rear axle and final drive and differential gears run on annular ball bearings. Ball end thrust bearings

There are four brakes, all acting directly on rear-wheel brake drums, thus obviating braking strain on transmission.

Service brakes are external contracting bands, operated by pedal. Emergency brakes are internal expanding segments, operated by hand lever. Internal brakes enclosed and protected by drum disks. Bayonet locks on internal brakes to prevent rattle. All brake operating systems are equalized through toggle levers, with operating pull on one end and direct connection to the brake levers on the other. This results in an even pull on both brakes, which serves to prevent skidding of the car on many occasions, particularly on wet days.

Running Gear and Chassis

Main frame is a channel section, pressed steel frame, arched above the rear axle to allow liberal spring action in connection with the desirably low body. Top and bottom flanges of side bars have integral gussets for the reception of cross bars, simplifying the construction and increasing the strength.

Steering is by means of a worm and sector steering gear with large hand wheel, entirely wood covered, including spokes near the rim, for comfort.

Worm and sector are forged integrally with their respective shafts. Large, rigid steering column. Heavy drop-forged jaw type yokes on front axle and forged steering knuckle spindles. Ball thrust bearings in steering knuckles. Steering connecting rod ball and socket joints encased. All steering gear bearings and connections directly lubricated by grease cups. Steering connecting rod is above front axle, being in position to minimize transmission of vibration to driver's hands.

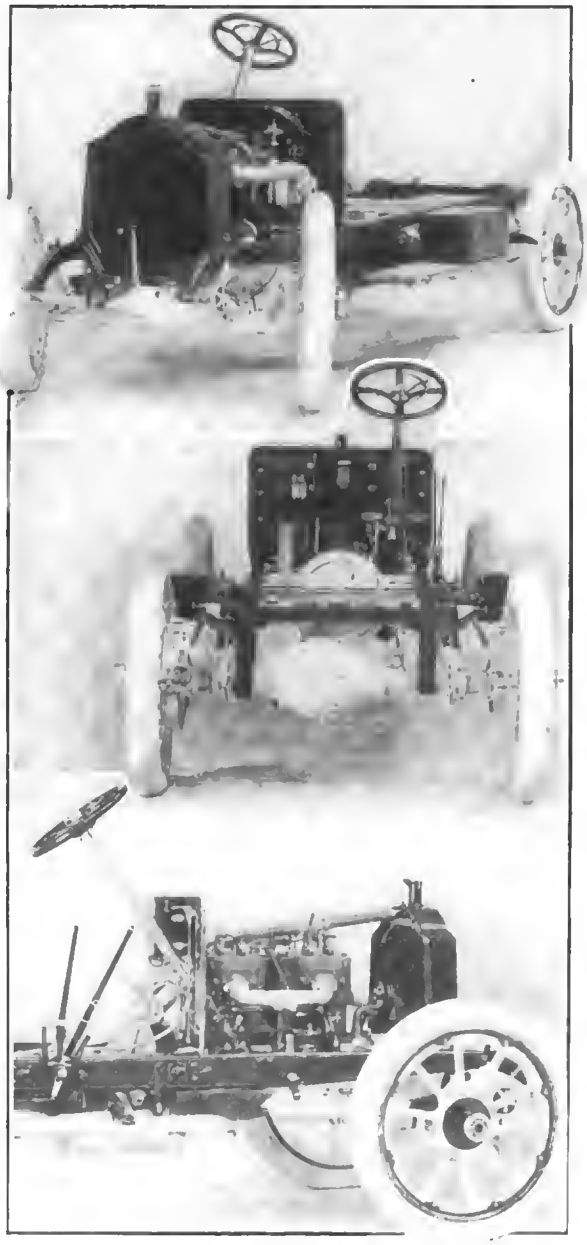
Four wide, semi-elliptical springs carry the load. Rear springs are 56 inches long in the "Thirty," and 50 inches long in "Eighteen." Front springs are 40 inches long in both. Compression grease cups lubricate all spring shackle bearings. Shock absorbers are placed on both front and rear axles.

Front axle and stationary sleeves of rear axle are of steel tubing of large diameter and heavy gauge. Rear axle tubes are pressed into and riveted within flanged collars bolted to the aluminum differential gear housing. Roller bearings in front wheels.

Body construction is of sheet aluminum panels over wood framework. Bonnet is of aluminum and secured against rattling. Fenders, aluminum, flanged for rigidity. Splash aprons between front fenders and car. Rear fenders so attached to body as to be practically water-tight. Splash aprons between frame and running boards.

On this and the opposite pages are shown a plan view of the chassis, and front, rear, and side views as well. From these some idea of the construction of the car may be gained by anyone, whether familiar with Packard construction or not. In this connection, the brakes just mentioned, for instance, will be found to be practically the same as last year, at which time attention was called to the fact that all brakes were located on the rear hubs, thus avoiding any pull of the gears ahead of this, or any braking through the transmission, as it entailed by the use of a shaft brake.

So, too, with the steering gear, this was brought out last year for the first time with grease cups to supply the internal lubrication, which practice is now continued, a year's usage having developed no defects in it. Speaking of the steering gear, the spindles and jawtype yokes are drop forged. The connecting rod, between the knuckles and the steering column, is placed above the front axle in a manner which minimizes stresses, vibrations, and consequent jar on the driver's hands.



Front, Rear and Sides of Chassis

Last year, when the dry-disc clutch was brought out for the first time, there was, perhaps, a slight doubt as to whether this was the perfect form of clutch for Packard cars, but after a season, it is again announced as the type to be utilized, proving that the move was in the right direction. This clutch is described as of the dry-disc type, that is, it is a disc or plate clutch so designed as to run perfectly without lubrication, the absence of the latter giving it the designation, dry. This clutch affords the desirable feature of gradual engagement, and, as it operates without lubrication of any kind, provides the same action in cold as in warm weather. By the use of a special lining material, the clutch will not burn.

Effective Lubrication

Lubrication is a decidedly interesting subject, if for no other reason than from the fact that delicate machinery can not be run, at least not successfully, without some form of lubrication. In this copious lubrication is far better than a scanty supply, so the decision to use the combined pump and splash system is a wise one, for this double system has the merit of supplying not only continuous flow of oil to all bearings, but to the fact that it is also an economical one, the same oil being filtered and used over and over again. As to details, the splash lubrication system is the same simple, positive system formerly used. A double plunger oil pump feeds the front and rear compartments of the crankcase, in which are independent oil levels. The oil pump strokes being adjustable, the oil feed is easily regulated. The pump is accessibly located at the left of the motor and is driven by a worm on the exhaust valve camshaft. Oil is taken from a vertical copper reservoir close to and between the pairs of cylinders, this location insuring uniform temperature and fluid, easily-flowing oil, even in the coldest weather. The capacity of the oil tank of the "Thirty" is one gallon. There are two drip sight feeds on the dashboard.

Model L Cartercar, Made by the Cartercar Company, Pontiac, Mich., in Both Side and Front Views

SPECIFICATIONS OF THE CARTERCAR, CARTERCAR COMPANY, PONTIAC, MICH.

Motor, four vertical cylinders.
Bore, 4¼-inch.
Stroke, 4½-inch.
Cylinders, pairs, and offset.
Valves, all on right side.
Finish, all engine parts ground.
Power, 30-35-horsepower.
Cooling, by centrifugal pump, direct-driven.
Radiator, flat tube.
Lubrication, combined pump and splash.
Ignition, dual jump spark, magneto and batteries.
Transmission, Carter patented friction drive.
Final drive, single chain in oil.
Frame, pressed steel, of channel section.
Springs, semi-elliptic, 52-inch rear, 46-inch front.
Wheelbase, 110 inches.
Tread, standard
Axles, front tubular, rear live.
Wheels, twelve spoke artillery.
Tires, 34 by 4 quick detachable.
Brakes, internal expanding hub brakes and friction reverse.
Steering, irreversible worm and sector.
Steering wheel, 16-inch, with spark and throttle levers.
Body, straight line design.
Colors, three options—Brewster green, Cartercar red, or combination.
Upholstery, black leather, dull finish.
Equipment, magneto, two gas lamps, generator, horn, mats, complete set tools, jack, tire repair outfit, etc.
Price, $1,600 f. o. b. Pontiac.

FRICTION driving being the central idea about which the Cartercar is constructed, it will be well to give that part of the whole chassis greater prominence. Since this replaces both the transmission and clutch of the ordinary case, it will at least be fair to devote as much space to it as would ordinarily be given to those two very important parts of the automobile mechanisms.

This drive and the name of the car are both due to Byron J. Carter, now dead, but who, in 1901, designed and built the first friction-driven car. This progenitor of the modern and up-to-date Cartercar was still in use up to two years ago, in Ann Arbor, Mich., when the company purchased it for exhibition purposes. So well and wisely did Carter construct his first vehicle that the cars to-day show little variation from the original design, aside from the natural progress which the industry as a whole has showed in the nine years, and smaller refinements added to make it a more comfortable and better looking machine.

Two models are made and sold to-day, known by the trade names of Model L and Model H. Barring such slight differences in the chassis as the larger size of one motor makes, the two are identical, one being made to sell at $1,150, while the higher powered Model L sells at $1,600. For this reason only the larger model will be described in detail.

The motor of this machine is of the usual four-cylinder type, water-cooled, with cylinders cast in pairs. The cylinders are of the L-head type, with all valves on one side, this being the right-hand side of the machine. The cylinders are cast from a close-grained run of gray iron, and are first roughed out in the lathe, seasoned, then ground to size, using micrometer gauges. Pistons, too, are of gray iron, and ground to size, both top, bottom and sides. The bore is 4¼ inches, and the stroke 4½ inches, resulting in a power output of 30-35. The valves used are of the best quality steel, with electrically welded heads, a form which experience has proven very successful. The three-bearing crankshaft is of a selected grade of open-hearth steel, machined and ground to size, the pins being very carefully ground after hardening. Rigid specifications in the drop-forging process insure a good class of material and fair workmanship in this very important part of the engine. In assembling much pains is taken with the camshaft and crankshaft location and alignment, special jigs being used for this purpose. The crankshaft bearings are plain, but of fine material, which, aided by the careful assembling process, results in a very low loss through internal friction.

Following the assembling, the work is proven true by a long run-in test, after which the motor is inspected. It is then, after passing inspection, tested out on the test-block, when the actual power delivered is measured. The final result is a motor of ample power, high and very low speeds, and one that runs quietly and well at all times, and answers the throttle readily. Lastly, the engine is thoroughly tested out when the whole car has been assembled and is ready for the road, the engine doing the bulk of the work on this tryout.

As to disposition of the accessories, it will be noted in the cuts of the engine on the opposite page that the inlet pipe is led downward from the ports in the cylinders, thus giving it a very simple and symmetrical form, while at the same time making it unusually accessible. The exhaust pipe, on the other hand, is carried up above the ports, this also resulting in simplification. Since heat is disastrous to magnetos and other forms of ignition apparatus, the magneto is located on the opposite side of the engine to the valves and pipes. It is driven from the gear compartment in front, through a side shaft, which also drives the water pump, the latter in fact being forward of the magneto. The former as well as the latter may be disconnected at will and taken out, without disturbing the other parts. This desirable result is accomplished through the medium of universal couplings in the driving shaft, which permit the taking out or replacement of either one of these accessories.

Cooling is made effective, regardless of the heat encountered by this pump, which is of the centrifugal type, gear-driven, as just described, very liberal water-jackets on the engine, a large flat tube, cellular type of radiator, with a fan as an auxiliary. The radiators are of the first grade of flat copper tubes, designed to present the greatest surface to the cooling action of the air, which action is assisted by the rapidly revolving fan located just back of the radiator, and belt-driven off of the crankshaft. An eccentric hanging provides a means of taking up any slack of the belt, which change is effected through the loosening of a single bolt, making the change, and tightening the bolt again.

Crankcase is cast in two parts, an upper and a lower. The upper carries the crankshaft bearings, as well as the supporting arms and the pads for the various accessories, while the lower acts as an oil reservoir and dust extruder. The lubrication system is a combination of the splash and the forced circulating methods. For the splash system, the lower half of the crankcase is kept half filled with oil, in which the connecting rods dip on each revolution, at the lowest point in the cycle, thus splashing the oil around the inside of the motor in the form of a mist, which lubricates everything therein very thoroughly. This oil level is a fixed one, and is maintained by the oil-circulating pump, which is gear-driven off of the camshaft.

Ignition is by dual systems, a low-tension magneto, previously spoken of, which furnishes current to a single, non-vibrating dashboard coil, the voltage being raised there to a sufficient amount to bridge the usual spark gaps, the final spark being of the jump variety. In addition to this jump-spark magneto system, an auxiliary battery is carried in a battery box on the running board, this working through the same dashboard coil, and a timer carried on the rear end of the camshaft.

A carbureter of the central float type is carried low down on the valve side of the engine, the low position assuring the use of every drop of fuel available, and insuring positive fuel feed on steep hills. This carbureter, like the other components of the car, is very simple, being made with a single setting, which makes the device self-adjusting after setting.

Coming next to the friction drive, which makes for higher power at the road wheels, simpler control, fewer parts, and easier operation, there is a driver, so called, which transmits the power of the engine to the friction disc, from which the drive is by means of a chain enclosed and running in oil, back to the rear axle. This transmission driver consists of a cross member keyed rigidly to the forward end of the disc shaft, and to which are secured two flat tempered steel plates, the opposite ends of which are bolted to the flywheel itself. The rotation of the flywheel exerts a straight pull on these plates, thus rotating the disc, and at the same time the disc and shaft are free to slide forward and back along the disc shaft, thus allowing the changes in the speed of the car, differing positions giving different speed ratios. It will readily be seen that the disc shaft is by this means made an integral part of the crankshaft, in so far as rotary motion is concerned, although the two happen to be made for manufacturing convenience in separate parts, and entirely independent as to forward and backward movement.

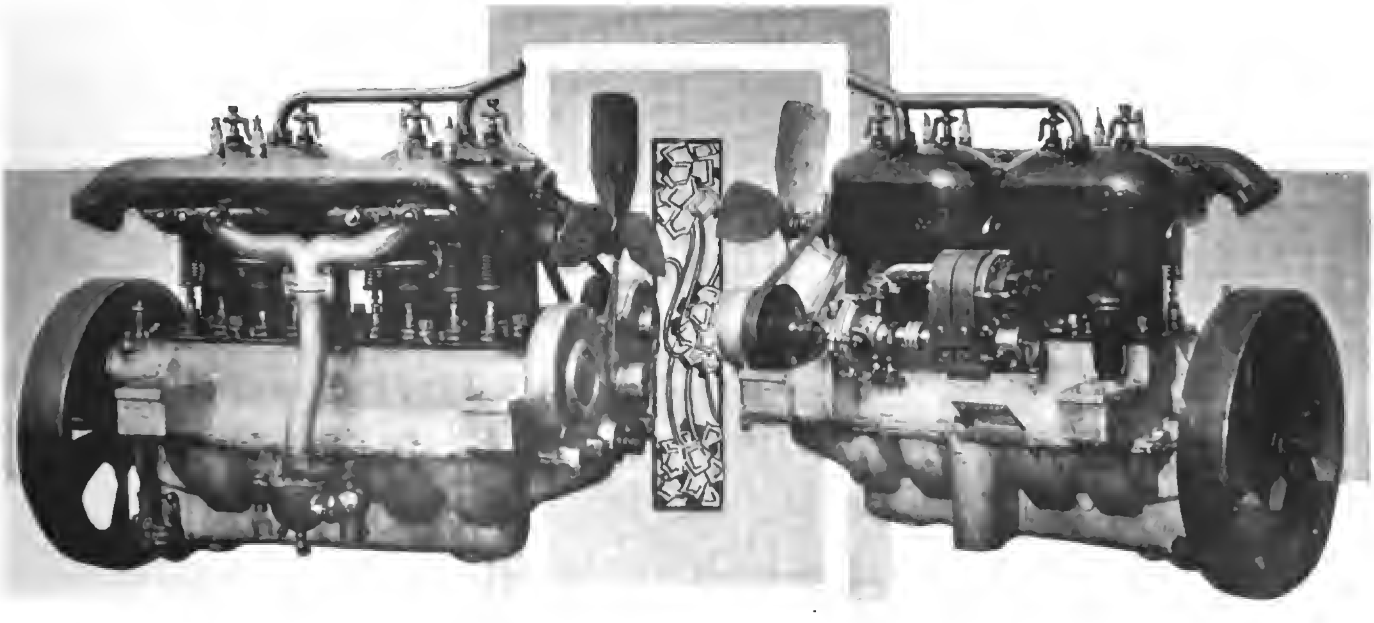
To reduce the frictional losses to an absolute minimum, the transmission shafts are mounted upon high-duty ball bearings of large size, great strength, and thus, high capacity.

The thrust bearing of the disc shaft is carried in a hanger immediately in front of the disc, and is of the four-point type, with balls of large size. This bearing is of special design and construction, and the ball races are of the finest tool steel, accurately machined, hardened and ground to micrometer gauge true to a half thousandth of an inch. This four-point type of bearing is the nearest possible approach to entire absence of fraction, owing to the fact that the periphery of the balls' travel is always exactly perpendicular to their axes of rotation, and thus there is no tendency to jam.

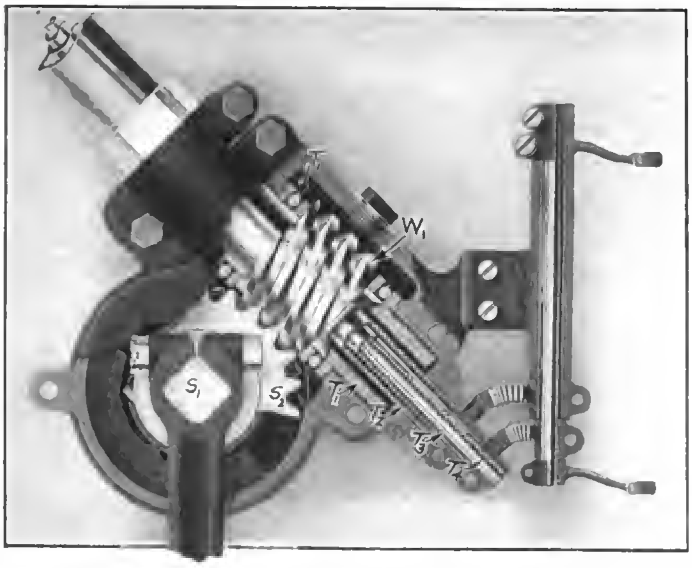
To return to the transmission considered as a whole, that is, from the viewpoint of the man who is about to buy one, the friction transmission is of the simplest possible construction, has the fewest number of moving parts, and is the most economical to maintain and the easiest to care for. It consists of a special alloy disc on the terminal of a shaft connected with the flywheel. Against this disc a sliding friction wheel with a fiber rim is engaged at any point on the surface from the center to the outside, thus giving any speed desired. Sprockets and chain connect this countershaft with the rear axle.

Speed changes are made by means of a hand lever, this one lever determining all speed ratios from low to high; also the reverse. After the lever has been placed in the desired position, control is then obtained by means of the left pedal which engages the friction, thus corresponding in action to a clutch as commonly used on other automobiles.

The control afforded by this transmission is one of its chief features, and its great superiority over other forms of trans-



Valve Side of 30-35 Horsepower Engine of Model L Cartercar Accessory Side, Showing Magneto and Pump, Also Fan



Section Showing Construction of Carter Steering Gear

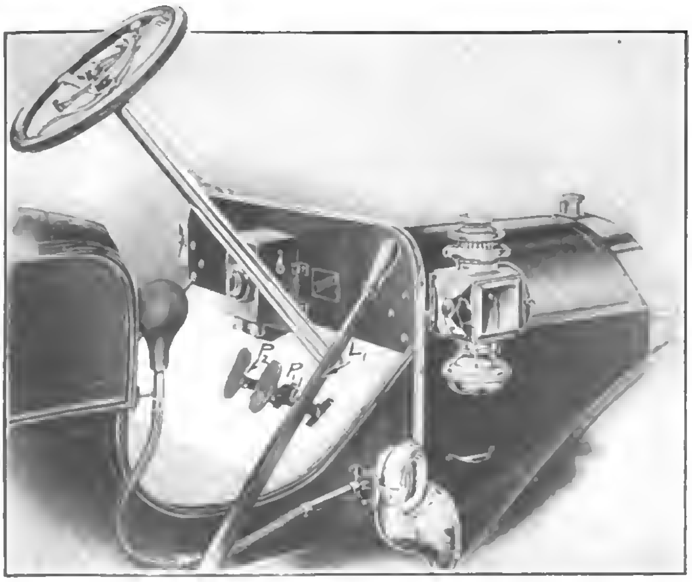
mission is instantly apparent. Any number of speeds is provided from zero up to the maximum, and changes can be made instantaneously without noise.

The car is started or stopped by the use of this friction pedal with the left foot, in conjunction with a powerful brake, operated by the right foot through a similar pedal. It will be seen that the operator has instant control of the car at all times without the necessity of reaching for hand levers, or of removing the hands from the steering wheel.

The fiber rim or filler on the friction wheel can easily be renewed after it has become worn down. The car will run upwards of 4,000 miles before the filler needs replacing.

The moving parts of this transmission are lubricated by turning three grease cups occasionally, an operation which can be performed by a lady or gentleman without soiling the clothes.

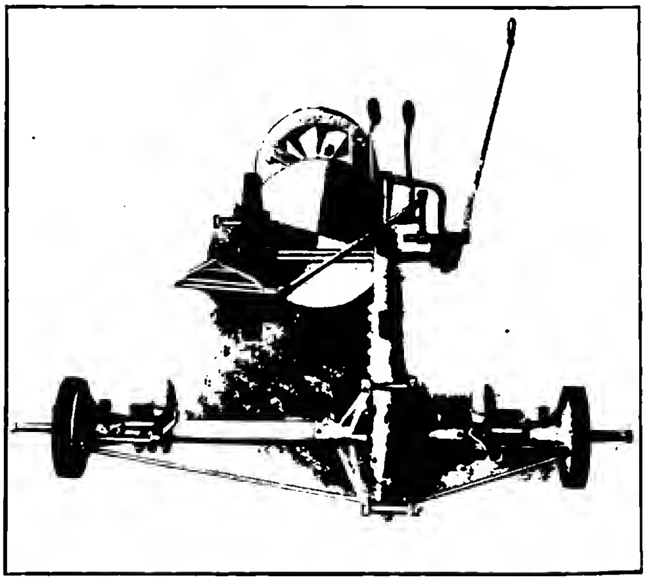
Simplicity of control always appeals to the man about to purchase a new car, for he has visions of the ten or more things to be done at once, all of the things to be thought of, all of the parts, levers, etc., to be operated, and anything that sounds like a reduction in the number of parts, a lessening of the things to be cared for or done, and a reduction in the worry incident to the whole, sounds very advantageous. Thus, with the friction transmission, while operating the car through crowded streets, or on thoroughfares where frequent slowing and stopping are necessary, control can be had entirely with the feet, acting in connection with the throttle and spark levers on top of the steering column. There is no need for changing speeds as in other cars, for the extreme flexibility of the friction permits the car to be run as slowly as need be on the high, and with no danger of jerking the car or of stalling the engine.



Friction Drive Makes a Very Simple Control System

It is a well-known fact that there is a great waste of power on low and intermediate speeds in a gear transmission: also that the meshing and turning of a number of gears produce considerable noise. The Cartercar friction transmission is noiseless on all speeds, and has a very high efficiency, delivering more power to the rear wheels than any competitive form of transmission. This has been proven, in part, by the great success of this particular form of transmission in this make of car in hill climbing contests and private trials of the same nature, in which the car is said to have ascended grades of 50 per cent, that is a rise of 50 ft. in 100 ft. length.

Referring specifically to the cut of the transmission as a whole shown on this page, the parts may be noted in their correct positions, relative to one another. Referring also to the steering gear drawing at the head of the page, this will be seen to be of the worm and segmental gear type. The worm W_1 meshes with the segment S_2 which carries on the end of a squared



Detailed View of Whole Driving System, Both Friction and Chain

shaft S_1 the operating lever, which is connected to the front axle, and through which the actual work of steering is done. This squared shaft is made an integral part of the worm segment, and the necessary strength of this combination is thus gained. The thrust from worms is known to be considerable, and in this case, proper provision is made for it, by fitting the two ball thrust bearings, T_1 on each side of the worm. Steering is actually effected by the movements of the external tube T_1, upon which the worm is fixed. Within this, there is another tube T_2, which forms a bearing for the lower end of the larger-sized tube, while within this in turn is a third tube T_3 which operates the throttle lever. This Chinese nest of tubes carries still further, the final inner one T_4 carrying the movement of the fingers on the steering wheel down to the spark lever, operating the timing disc on the magneto and timer.

At the bottom of the page is shown a photograph of the dash board, front seat, and control mechanisms, revealing clearly the small number of parts necessary to complete operation. The hand lever L_1 operates the changes of speed, the two foot pedals corresponding to the usual clutch and brakes, one, the right, P_1 operating the internal expanding foot brakes, while the other, the left, P_2 throws the friction disc out of engagement so that changes of speed may be effected.

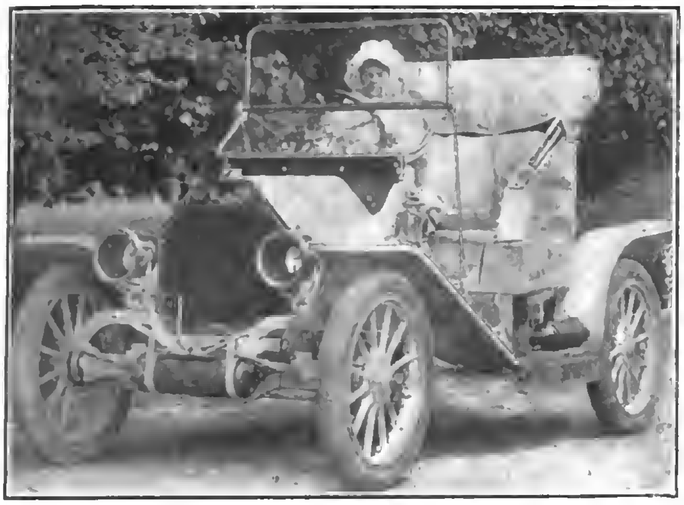


Fig. 1—Willys-Overland Model 38 equipped for a trip to the coast with a woman pilot

Characteristics of Model 38 Overland

THIS model of the Willys-Overland cars is the one which is being used in the "transcontinental" run. The start was made from New York for the Pacific on May 23, and, while it is not the idea of the projectors of the trip to do any speeaing at all, the fact remains that the automobile will be tested out to the limit of its touring capabilities, and it will also have to sustain its reputation for ease of operation in the hands of a woman driver. As reported last week, Miss Blanche Scott has the matter of the piloting of the automobile in hand.

Some Features of the Model 38 Overland

Ground clearance is a necessity in any automobile which is expected to serve under touring conditions, especially in a transcontinental tour, and in this model, the low point, which is at the center of the rear axle, is as shown in Fig. 2. This photograph was taken by the "staff photographer" of the AUTOMOBILE, in New York, before the car started on its run to the Pacific, and, in the photograph, to show the exact clearance, a rule was placed vertically at a point just behind the rear axle; this rule tells the story; the clearance is 10¾ inches at the lowest point, and, as designs go, this clearance is quite up to the most fitting requirement.

The I-section front axle is shown in Fig. 3 just at the knuckle, and the Elliott type of knucke is also clearly brought out. A further examination of the construction discloses a tight construction around the hub flanging F, with a packing joint P to exclude all foreign substances and retain grease. The knuckle K is a substantial drop forging, heat treated to bring out the desired kinetic qualities, and the bearing surfaces B1 and B2 are not only ample but the fitting is well executed. The knuckle-pin is locked by means of a nut which is castellated, and a grease cup G at the upper end serves to supply lubricant to the bearings. The wood of the wheel is second growth hickory of the first grade; bastard spokes are cast out, and the whole construction is such as to lend confidence to the user.

Rear Axle Is Designed to Withstand Service

Considering Fig. 2, which shows the rear axle very plainly, all that will be necessary for the time is to present Fig. 4 which is another view of the axle, taken at a point to bring out the construction of the axle and brakes with details of construction at this point. It has been the aim in taking these photographs to let the camera tell the story, and it is so well indicated that no further statement will be made at this time, unless to point out that the brakes are of large area and of proven worth; they will, of course, be given a good working test in this run.

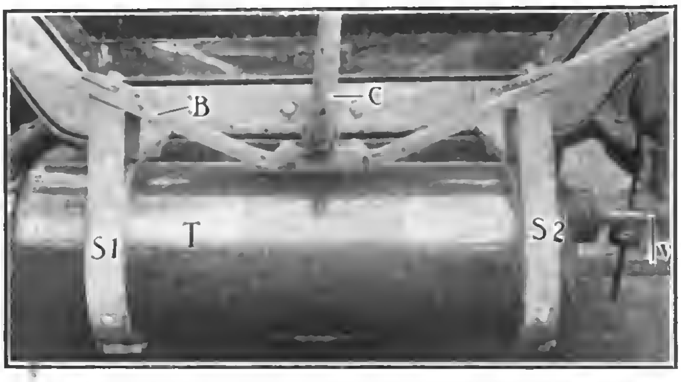


Fig. 5—Front view presenting method of holding the acetylene tank in a position which clears the starting crank

Special Disposition of the Lighting Equipment

Referring to Fig. 5, of the placing of the lighting tank T, the support B is so made and placed that the tank is below the starting crank C, and the tank is held in secure relation by the bands S1 and S2. This idea has the virtue of having the tank close to the lamps which receive the gas, (acetylene) and the

(*Continued on page 944.*)

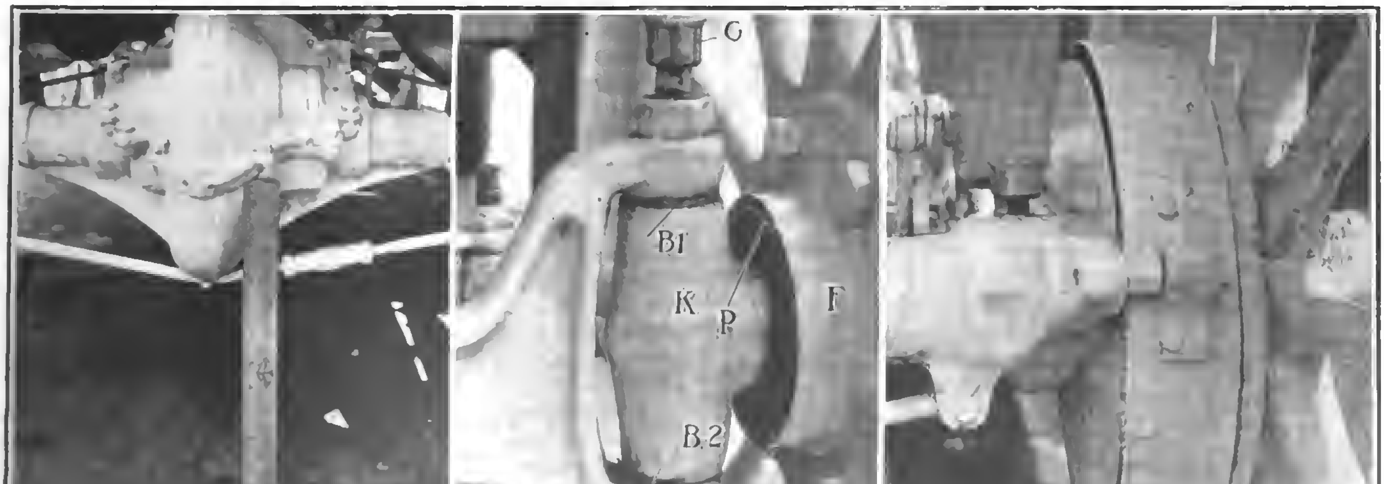
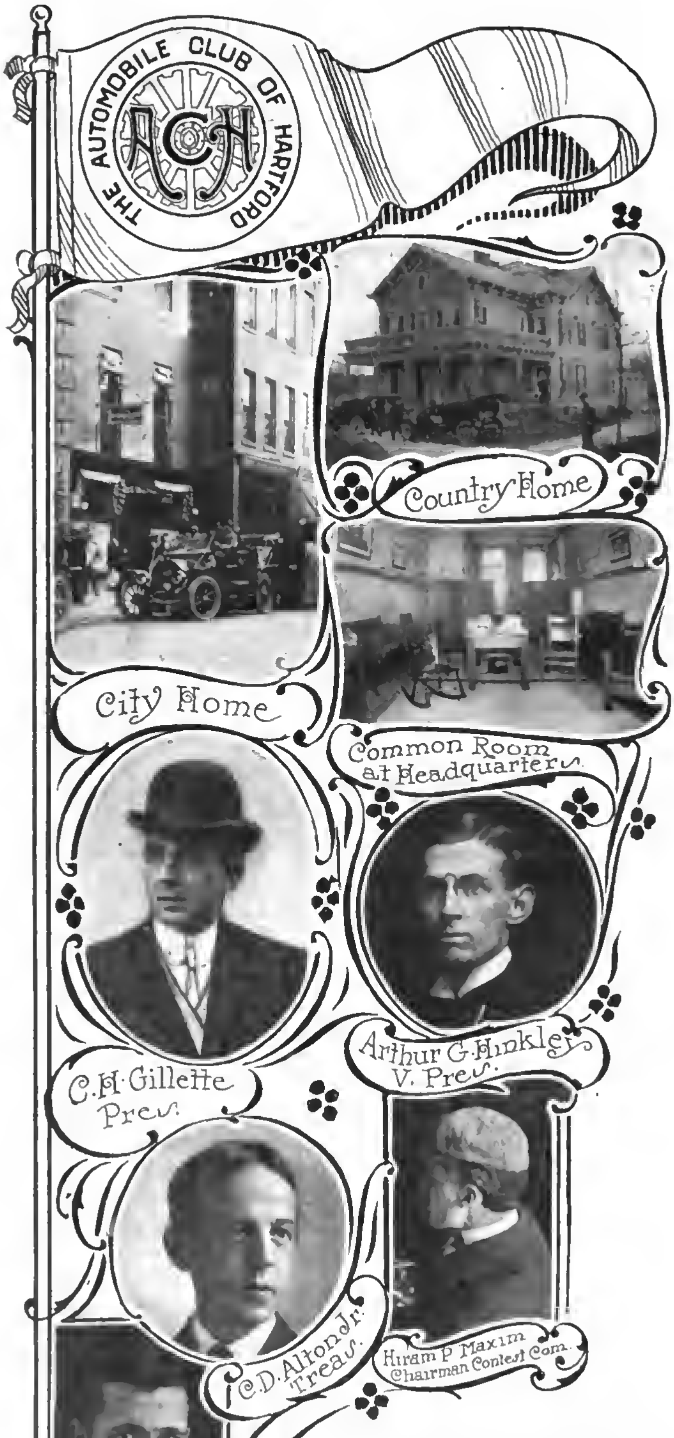


Fig. 2—Enlarged portion of live rear axle with a ruler placed vertically to show actual clearance between the ground and the car at the lowest point. **Fig. 3**—Photograph of I-section front axle, Elliott type of knuckle, and refinements of design and construction. **Fig. 4**—Photograph of rear axle, brake drum, and part of rear wheel showing external constricting band brake.



HARTFORD, CONNECTICUT, one of the first cities in the United States to take up the manufacture of the automobile, occupies a leading position in motordom. It has several big factories devoted to the production of automobiles and the Automobile Club of Hartford is one of the typical motor organizations of the country.

The importance of the automobile as a factor in the commercial life of the city and State is as well appreciated in Hartford as it is anywhere in the country and this appreciation is largely accountable for the work done by the automobile club.

It has overcome prejudice and modified hostility on the part of lawmakers by a nice observance of the rights of the public and, as a result, the use of the automobile and the rights of motorists are conceded by the public.

Connecticut has one of the most liberal automobile codes in the land. There is no law that says that a certain maximum speed shall be deemed *prima facie* evidence of recklessness and on the other hand, the motorists agreed in exchange for this reasonable provision, that the roads of the State shall never be used for racing.

This statute was urged by the State association, but the chief factor in that body always has been the Automobile Club of Hartford. The club is large, reckoned from any basis, having nearly 400 members. It is intensely active and has a hand in everything affecting motoring.

But its great mission is toward the sporting end of automobiling. Its annual reliability contest is one of the classics. It always attracts a representative entry list and it is conducted upon precise and technical lines so that when a car shows excellence in the contest, the excellence of the car itself is a long way on the road toward proven worth.

This year the big event, the All-Connecticut Reliability Contest, is scheduled to start May 19 and after covering about 80 per cent of the State, will finish May 21. The route is some 600 miles long. Rules of the A. A. A. will be strictly followed and will be administered by officials who have had much experience in that line of work. Chairman Butler of the A. A. A. Contest Board is an honorary officer of the run.

There will be seven classes under the rules as provided in the divisions of Class "A" and cups for the winners in each class have been offered.

Former runs of the club have proved successful to a notable degree and the entries this year foreshadow an unusually favorable contest.

The sporting history of the club includes a hill-climb in 1907 and endurance runs in 1908 and 1909, all of which were milestones in the record of automobile development.

In addition to the annual contest, the club engineers numerous runs during the season, of one day duration. These are mostly for club members and have proved to be an enjoyable feature of club life. This year the club is preparing a more comprehensive program and at least one tour of two days will be made, while half a dozen of the shorter and more informal events will be carded.

The contest this year will be held under the auspices of the Hartford club, but in conjunction with that organization, the clubs of Bridgeport, New Haven, Willimantic, Litchfield County, New Britain and Yale University will act co-ordinately and support the event in every way possible.

The Connecticut Automobile Association devotes itself largely to legislative problems and so the individual clubs are obliged to direct their activity toward other ends, so that the whole field may be adequately covered. Thus the matter of good roads is left largely in the hands of the various organizations about the state. The Hartford club, because of its central position and size and importance, is a leader in this particular. It also makes a specialty of defending its members who are subjected to persecution rather than prosecution for alleged infringements of the laws. While the State statute does not provide any specific speed limit, beyond which it is presumed that the motorist is not observing reasonable caution, nevertheless, there was formerly a pronounced disposition upon the part of certain peace officers to make it disagreeable for tourists. When arrests are made under unwarranted circumstances, the club takes up the battle of the individual and in every legal way tries to get justice for the alleged offender.

Within the membership of this organizaton has been formed the Aero Club of Hartford, and many of the most influential motorists have joined the enterprise. Instruction in the principles of aviation is a feature of their meetings and in the near future, a meet which will bring together several of the leading air navigators is being planned.

The Automobile Club was formed in 1904 with about fifty members. Like almost all of the senior automobile organizations of the country, it led a precarious sort of life for several years, but commencing in 1907, when it began to take part in the big sporting events of motordom, the club started to grow mightily. Its membership swelled to nearly 300 and quarters were taken in Allyn House. During the ensuing two years, more progress was recorded and the club leased a storeroom adjoining the hotel property and fitted it up as headquarters.

As power, influence and finances were piled up, the needs of further equipment became apparent and this Spring it was determined to secure a country house for the benefit of the members. After a careful search for available locations, the members have decided that the place shown in the accompanying illustration fills every requirement. The house is a large, old-fashioned country place, standing in a fine estate in the hills back of Hartford, just a comfortable distance from the city to afford a pleasant run. A restaurant, grill-room, sleeping quarters, and all other accommodations of a first-class country club will be installed as soon as a few formalities have been completed. It is intended to open the new house early this season.

The social life of the club is extensive and entertainments are frequently given. It is a distinct factor in the progress of Hartford and is highly regarded by motordom throughout the country.

The officers of the club always have been representative citizens. Hiram P. Maxim, son of Sir Hiram Maxim and one of the most advanced thinkers in mechanical lines, has served several times in executive posts. At present Mr. Maxim is chairman of the Contest Committee of the club and is a leader in the Aero Club of Hartford.

C. H. Gillette, who was identified with the first running of the Vanderbilt Cup race, is president. Mr. Gillette served as referee at the opening Daytona speed meet and was secretary of the A. A. A. for a period. A. G. Hinkley is vice-president. Mr. Hinkley is one of the leading automobilists of Connecticut and is an enthusiast on the subject of the future of the motor car. Philip E. Curtiss, a newspaper man, connected with the editorial staff of the Hartford Times, is secretary and C. D. Alton, Jr., is treasurer.

Messrs. Gillette and Curtiss also serve respectively as president and secretary of the Connecticut Automobile Association. W. T. Plimpton, with the title of assistant secretary, is in direct charge of the detail work of the organization.

The club is one of those solid bodies, founded upon a principle and seeing a definite object to attain. It is a sort of rallying point for motordom, and if it has a pre-eminent characteristic it is that of sturdiness and quiet strength.

Aviation Meet for Louisville

LOUISVILLE, May 16.—An aviation meet will be held at Churchill Downs, on Saturday and Sunday, June 18 and 19. Col. J. L. Gribble will manage the affair and in addition to the aeroplane flights there will be a series of automobile races, open to local drivers only. These races will be run for handsome loving cups and will comprise not only events for speed at various distances, but also trials for car control and other tests of driving skill, while special events for women drivers also will be arranged.

Glenn H. Curtiss, Charles F. Williard, "Bud" Mars, Horace B. Wilde and Carl Bates will bring their air craft to Louisville and take part in the events.

Names Atlantic City as Its Goal

At a recent meeting of the board of directors of the Binghampton Automobile Club it was decided to hold the annual run of the club from Binghamton to Atlantic City. The event will take place some time in June.

Coming Events in the Automobiling World

June 20-July 6...Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.

Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Feb. 13-25, 1911..Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill Climbs, Etc.

May 18-19........Norristown, Pa., Third Annual Endurance Run, Norristown to Scranton and Return.

May 19-21........Hartford, Conn., All-Connecticut Reliability Contest.

May 21-22........Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.

May 21-22........Track Race Meet, Memphis, Tenn., Homer C. George, Manager.

May 27, 28-30.....Indianapolis, Ind., Automobile Races, including Championship Events on Motor Speedway.

May 28...........White Plains, N. Y., Hill Climb under auspices of Amateur Automobile Contest Association.

May 30...........Fairfield, Conn., Hill Climb under auspices of the Bridgeport Automobile Dealer's Association.

May 30...........Oklahoma City, Okla., Reliability run under auspices of the "Daily Oklahoman."

May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill, Automobile Club of Bridgeport.

June 2...........New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.

June 4...........Worcester, Mass., Fourth Annual Hill-Climb, Dead Horse Hill.

June 6-14........Atlanta, Ga., Reliability Run to New York City, New York Herald and Atlanta Journal.

June 7...........New Haven, Conn., Hill-Climb up Shingle Hill, Yale University Automobile Club.

June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.

June 11..........Baltimore Hill-Climb of Automobile Club of Maryland.

June 14-15.......New York, Reliability Run of Motor Contest Association.

June 15..........Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, Through the Southwest.

June 16-22.......Albany Automobile Club, Albany, N. Y., Sixth Annual Tour to Atlantic City and Return.

June 25..........Port Jefferson, Long Island, N. Y., Hill Climbing Contest, Automobile Club of Port Jefferson.

July 4...........Indianapolis, Ind., Cobe Trophy Race. Held on Speedway Track, Chicago Automobile Club.

July 4...........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.

July 18-22.......Milwaukee, Reliability Run, Wisconsin State Automobile Association.

July 30..........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.

Aug. 3-5.........Galveston, Tex., Beach Races, Galveston Automobile Club.

Sept. 5..........Wildwood, Pa., Speedway, Labor Day Race Meet of North Wildwood A. C.

Sept. 17.........Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.

Sept.............Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.

Oct. 1...........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.

Oct. 8...........Philadelphia, Fairmount Park Race, Quaker City Motor Club.

Oct. 15..........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.

May 25...........“The American Cup,” Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.

May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.

May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.

June 2-8.........Prince Henry (German) Touring Competition.

June 13-18.......Scotland, Scottish Reliability Trials.

June 20..........French Voiturette Race.

June 21..........French Stock-Car Race.

June 22-July 5...Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.

June 27..........Speed Trials at Kiev, Russia.

THE AUTOMOBILE

Vol. XXII Thursday, May 19, 1910 No. 20

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

IF it is true that there will be upwards of 200,000 autoists added to the stream this year, a large number of them will have a garage problem to tackle, and of this number many will decide that they will put a private garage in their own back yard. It looks easy enough to do so if space affords, but a year's experience in an undertaking such as this will be sufficient to tell them in language which will equal the threadbare plainness of the Anglo-Saxon tongue that there is more in the problem than the mere housing of a car. There are many indications of the fact that it is better to pay $25 per month to the keeper of a public garage than to take advantage of the apparent utility of a private establishment, only to come home with the automobile off of a muddy road, roll it into the garage, and let the accumulations of the roadside form a crust over its delicately tinted surfaces. When the crust comes off next day the delicacy of the tint will take wings. The cost of service in a private garage plan must include the cost of refinishing the car, if, in the absence of a chauffeur, the owner says "manana" (to-morrow) everything will be made spick and span—to-morrow never comes.

⁂

GASOLINE, while it is as safe as any fuel can be, is the storehouse of energy in compacted form, and must be treated accordingly. It is not a safe procedure to construct a pit under an automobile in a garage and have the same so tightly made that it will serve as a pocket for accumulations of gasoline and air in proper proportion to make an explosive mixture. There was a time when it seemed to be necessary to crawl under automobiles to fix them, or better yet, to make an examination with a view to ascertaining why they would not run; as they are now made, referring to those which are worth having, it is not necessary to explore the under region, and a pit, if it is made at all, will be for one purpose only, i. e. to court an explosion.

⁂

BRIGHTON BEACH furnished a new version of the attitude of the autoing public in respect to racing; patronage was so profuse that the authorities in charge of the race were short on its welcome. At one time between seven and eight o'clock in the evening of the first night there were 750 automobiles, full of autoists who were anxious to pay the entrance fee and see the sights. The back yard of the race track was packed with automobiles; they came from near and afar, and there was never a moment during the whole time when they showed much of the impatience which they, by right, might have allowed to come to the surface, due to the lack of preparedness of the management of the event. The real answer to all of this lies in the fact that the weather was cold and the wind blew; the attendance on former occasions was moderate, and it was thought, perhaps, that there might be a comfortable attendance, but there was no inkling of the jam that followed. This opening track event, if it spells anything at all, rather goes to show that the autoing public is ready to support the industry, either in or out of school.

⁂

GLIDDENITES, now that the Pathfinder is home from its long jaunt, are gladdened with the joyful news; it tells of the extent of good roads, both in fact and in prospect; they are not so bad as some might have supposed, and of the attitude of the citizens of the Southwest, it is enough to say that they extended their accustomed welcome—the whole-hearted kind, penetrating in its characteristics, and lasting besides. There is a surprise awaiting the citizen who thinks that the States which are included in the path of the Glidden Tour are lacking in automobile interests. It has been shown elsewhere in this issue of THE AUTOMOBILE that the industry is well represented both in manufacturing and from a trade point of view; moreover, the number of automobiles now being used in these States are in full keeping with the general condition of the automobile trade in other parts of the country. It is claimed that the Glidden Tour will serve as a missionary band this year, and it will.

⁂

ARE automobiles now so well made and so simple that any woman can take one and run it without having to call upon a man to assist in cranking, or in doing any of the work that may have to be attended to in order to obtain the expected service on the road? This year an attempt will be made to prove that any properly designed automobile is up to this requirement, and even though the proof may be a little lacking in some respects, the fact remains that it will show great contrast considering the automobiles of even a few years ago; they even refused to bow to the wiles of a man of mechanical experience.

How Independents Will Fight A.L.A.M.

PLANS of the Association of Motor Car Manufacturers, the organization of independent makers formed in Detroit recently, are outlined with considerable detail in the following letter addressed to various independent automobile companies by Henry C. Walters, attorney for the association:

"Referring to the meeting of automobile manufacturers held on the 2d instant, pursuant to the call sent out by me at the request of the organization committee under date of April 25th: The meeting was held and was largely attended, as you will see from the notations on the side of this sheet. As no word was had from your company, I think it is not amiss to advise you in some detail of what was done, especially as the final meeting will be held at the Hotel Ponchartrain, Detroit, at 10.30 a. m., on Monday, the 16th instant. It is hoped that you will have a representative present authorized to act in the matter of joining the organization.

"I think it advisable to state to you that this association of companies has not been brought about through the efforts of a Mr. Russell, who has been sending out circulars from Indianapolis, announcing meetings which were not held. This statement is made for the purpose merely of conveying the information, and with all due respect to Mr. Russell. A number of inquiries as to his connection or non-connection have been made, and it is thought that you, too, may be interested.

"If the reason you are holding back from joining a defensive organization is because you have private assurances that you will not be disturbed, you may find something to interest you in the information which I now give you, that many of the companies against whom actions are now pending had applications for licenses before the association, which had not been acted upon, and which it seemed, from the inquiries made by the association, would be favorably disposed of; some of the other companies that have been sued were privately informed by those high up in authority in the A. L. A. M. that no action would be commenced against them.

"I learned these facts through personal conversation with officers of the companies now engaged in defending themselves against the actions instituted. My opinion is that the licensed association has its plan laid and knows now just what companies suits will be started against, and just what ones will not be molested. I do not think the fact of joining the association will result in the commencement of suits against the particular ones joining—even if their names are made known. I cannot do better, by way of informing you what has been done on the 2d instant, than to send you the following extract from one of the letters which I sent out on the 3d instant.

An association was formed to be known as the Association of Motor Car Manufacturers. The association is for the purpose, as expressed in the articles of agreement to be signed by each member, of the development and advancement of the automobile industry, the stimulation of legitimate competition, improvement of motor car construction by voluntary interchange of economic ideas relating thereto, and the mutual protection of its membership against illegal and oppressive action. Any person or corporation manufacturing motor cars, pleasure or commercial, and not operating under a license issued by the claimed owner or owners of the Selden Patent, is eligible to membership in the organization; the applications of those desiring to come in at a later period will be passed upon by the executive committee, if it is decided to admit others later. There seems to be a well defined opinion that those who stand aloof at this critical period in the automobile industry, so far as non-licensed companies are concerned, should not be taken in afterwards. I am not prepared to say what will be the ultimate decision in this regard. The affairs of the association will be managed by an executive committee of five persons, which committee will be elected or appointed by a general governing body composed of one member or trustee or representative from each manufacturer in the association. The membership or affiliation fee is $500. The annual dues will be not less than one-fifth of one per cent of the retail list price, nor more than one-half of one per cent, of the total number of cars manufactured and sold during the current year; the dues are to be called in by the executive committee as the necessities of the association seem to require. Some difficulty was encountered in the matter of fixing amounts to be paid in by the members of the organization, for the reason that it is not known just how much will be needed. The initial object of the association is that of defending against present and future actions instituted by the A. L. A. M. It was thought that a number of the best patent lawyers and two or three equity lawyers should be retained by the organization; they will need the assistance of mechanical experts of the highest type; this, together with the taking of testimony on behalf of the complainants and the defendants, about the country, will be rather expensive. A wholehearted, instead of a half-hearted, defence must be made of every action commenced, and the penny wise and pound foolish method must be relegated to the rear. These considerations resulted in the fixing of the minimum and the maximum—the understanding being, of course, that only such monies will be called for by the governing committee as are actually needed. The governing committee will have power to increase the annual dues by a majority vote. Twenty-two companies were represented at the meeting, some companies having several representatives and almost all the companies having more than one representative present. A number of letters were received explaining the absence of representation and expressing willingness to join the organization. Almost all the companies represented actually signed, or agreed to sign the articles of agreement; some of those present stated that they had to take the subject up with their boards of directors before signing, but each of such persons said that they had no doubt at all but that their boards would take favorable action. The meeting was adjourned until Monday the 16th instant, at 10.30 a.m., second floor of the Hotel Ponchartrain, Detroit, Mich., at which time it is expected that one duly accredited trustee or representative will be present from each company in the organization; more than one person may come and may take part in the meeting, though each company will have but one vote. The principal object of this meeting is the election of the executive committee. I have given you a full résumé of the articles of agreement, to the end that you may present the matter to your board for its consideration. If you decide to join the association wire me at once to that effect, and I will call upon you with the original agreement for your signature. It was definitely decided not to send out over the country copies of the agreement nor to publish names of the membership. It will undoubtedly interest you to know that if Judge Hough of the Second Circuit sitting at New York declines to suspend the operation of the injunction, in the Ford case, pending the appeal the A. L. A. M. will likely file a batch of additional suits and apply for preliminary injunctions based on the action of Judge Hough. His action will not be binding on Circuit Judges in other circuits, but it will have a strong persuasive effect on account of the comity existing between the different circuits. It can be urged with great force, in support of these applications, that a long and expensive trial has been had, with many eminent counsel engaged on both sides, and that since the patent has been sustained by Judge Hough so strong a presumption exists in favor of its validity that preliminary injunctions should issue forthwith. The present outlook is that a decree in the Ford case will be entered the latter part of this month or early in June; upon the entering of that decree, the question of the suspension or non-suspension of that injunction will at once arise. If you will be so kind as to let me hear from you at the earliest possible date, I will see that the original agreement is turned over to you for signature, if you wish to join us. The letter gives the entire substance of the agreement, with the exception of the preamble, which merely sets forth the reasons for the formation of the association. The present members of the association hope that your company will affiliate with them. Number of companies represented at meeting of May 2nd—22. Number of companies unable to send representatives but expressing by letter their willingness to join—10. Number of companies declining to join—1. Number of companies invited to attend on May 2nd——68.

DETROIT, MICH., May 18.—A special representative of THE AUTOMOBILE called upon Henry E. Walters, who is the spirit in the move which is being made to organize the independent makers of automobiles, and, while it is admitted that the organization is now about completed, Mr. Walters declined to state particulars in relation to the same. The regular correspondent of THE AUTOMOBILE, in a special wire in relation to the same matter, wired in as follows: "Organization of Association of Motor Car Manufacturers perfected here Monday and officers elected. Headquarters to be in Detroit. Henry C. Walters, attorney and spokesman, will give no further information."

Rain Mars Denver Race Meet

DENVER, May 18.—Track records were shattered during the two-day meet held here Friday and Saturday, and despite various kinds of weather, the races were a success. In the five-mile race for cars valued at $1250 and less an Overland defeated a Warren-Detroit in 6.20.

The five-mile handicap was won by the Darracq (Kerscher) from scratch in 5:11:80, as was also the Free-For-All handicap for the Governor Shafroth cup, three miles in 3 minutes flat. In this contest the Overland (Ballit) was second and the Warren-Detroit (Hough) was third.

The Benz (Oldfield) in the mile time trials made 54.1 the first day of the meet and reduced the mark to 53.80 yesterday. The Darracq (Kerscher) made the mile in 57.

Vogue of the Automobile in the South

MEASURED by the space of only two years, a revolution, or rather an evolution, of road conditions in the South has occurred. The good highways of that section of the land on a basis of two years ago must be multiplied by ten to reach a figure anything like the present status.

Of course, the whole evolutionary movement is based upon the constantly growing use of the automobile. In fact, the South has adopted the motor car as its own and the vogue of the automobile has swept through Dixie like a prairie fire on the Nebraska steppes.

For instance out of Jackson, Tenn., a town of about 20,000, there are 14 of the finest stone roads the hand of man can produce—most of them of considerable length. Rome, Ga., is the center of a spider line web of improved roads and so insistent are the residents of this county that these roads shall be continued that they recently formed a delegation to wait upon the citizens and officials of a procrastinating neighboring county and protest against their neglect to improve the highways.

Up in the famous Blue Grass country, around Davidson County, Tenn., the roads look like asphalt pavements, newly laid.

At this time in Brownsville, Tennesseeans from all over the State are gathering for the purpose of providing ways and means for the pushing of this good road movement as it never before has been forced.

In Atlanta the work of one man tells more than aught else, that is, the work of Major John S. Cohen, editor of the Atlanta *Journal* and father of the Atlanta-New York tours.

Major Cohen is following up this great work of road building in the hope that within a few years he will see the materialization of the dream of his life—a fine highway from New York to Atlanta.

This, then, is the prime motive of the New York-Atlanta tour. It is a good roads tour and it is having a wonderful effect upon the citizens of the country adjacent to the route of the tour as laid out last year. Even to-day it is conceded to be the best 1,000 miles of continuous roadway in this country. Every day entries are coming in to the offices of Major Cohen so that it will not be surprising if when the caravan starts North June 6, there will be close to 100 cars in the line.

In Decatur County, Tenn., the improvement of the roads was halted by a lack of funds—so a corporation was formed by men of means and the roads were built by this corporation upon these conditions: Every five miles is blocked off by a toll gate to pass which costs nine cents. When the corporation is reimbursed, then the road shall be free or the county may pay off the debt and destroy the toll gates at any time.

One important phase of the southern road situation, a phase which makes the upkeep a minor problem comparatively—is the use of convict labor.

In most of the States convicts are kept constantly on the road-repair gangs and this naturally tends to keep the roads in finest condition.

A vigorous fight is being made throughout the South against the non-progressive land owner, who is balking against the improvement of the roads, because of the immediate expense.

The automobile has done this service for that section in the matter of road improvement.

Where formerly one or two bales of cotton formed a big load for wagons, now five and six bales are easily handled over the perfected roads. Not only that, but the truck is rapidly coming to be an integral part of the commercial life of this country and the day when the entire farm product shall be hauled in by this means is not far distant.

With the increasing popularity of the cars themselves, it was only natural that the manufacturing phase of the situation should receive considerable attention. Eight Southern concerns have been formed to produce cars, of which five are actually turning out completed machines.

The following items of current news indicate the breadth of the interest taken in the South with regard to the automobile:

RICHMOND, VA., May 16—Ending in a sprint that could hardly have been more spectacular, the *Times-Dispatch* endurance run was concluded in this city, two hours ahead of schedule. A Hudson, Chalmers, Reo, Buick, Rambler and a Stevens-Duryea finished with clean scores and were named as winners of their several classes. Thirty-three cars competed and the affair proved to be a big success in every way.

ATLANTA, GA., May 16—A Southern automobile company, backed by men worth many millions, but capitalized at $200,000, as a starter, all of which will be paid in before the first car is on the streets; and a company that will make practically all of its parts, save bodies and wheels, has been launched in Atlanta.

This company is called the Primo Motor Company.

The motors will be turned out by the Van Winkle Gin and Motor Company, which has a million dollar plant in Atlanta, another one almost equally large in Gulfport, Miss., and which sends cotton gins 'round the world. The building in which will be made the Primo motor is located on the Van Winkle property, on the Southern and Western and Atlantic railroad lines and it is already nearly completed. The building and the machinery cost about $50,000. The assembling room will be built near the motor factory and will be a building so designed as to allow 200 or 300 cars to be handled a year. Application for a Selden license will be made.

The first machine turned out will be a roadster. It will have 110-inch wheel base, 36-inch wheels, a 4-cylinder engine and a horsepower of 25-30.

This car will be sold for $1,250. Later on a touring car will be added to the string and this will sell for $1,400.

The Primo line will make a special bid for the Southern trade because of its option of standard and wide treads, because of high power, strong frame and high wheels.

The first demonstrator will leave the Van Winkle works in 30 days and regular deliveries are being promised for 90 days. These will be the 1911 models and about 200 will be made.

The officers of the company are E. Van Winkle, president; J. F. Eskew, vice-president; W. O. Field, secretary; Ed. A. Cerf, treasurer; J. J. Murphy, fiscal agent; Henry S. Miles, Ed. M. Pearce, directors.

ATLANTA, GA., May 16—Despite the fact that the spring races of the Atlanta Speedway were far from the financial success that the promotors desired, the Atlanta Automobile Association is going right forward with plans for a meeting next fall.

Though the track, at present, holds more than its share of the American speedway records, an attempt will doubtless be made before fall to add considerably to its speed possibilities.

The chief weakness in the track is the fact that the turns are not banked high enough for fast moving cars.

While the meet was in progress the project was discussed of making the turns out of timber, like the Los Angeles track.

An effort will be made to change the dates assigned to Atlanta for the fall meeting. The present dates awarded by the A. A. A. are Oct. 17, 20, 21 and 22.

The program of the fall meeting will contain fewer long races than any of the others and more events for high-powered cars than ever before.

The prospects for general success is flattering as interest is at a high pitch with regard to the meeting. The announced policy of the management is expected to bring a flood of entries.

News Notes from the Quaker City

PHILADELPHIA, May 16—State Senator McNichol, in an effort to raise money to carry on this municipality, whose financial affairs are somewhat tangled, sees a chance to add possibly $300,000 a year to the exchequer. He proposes to introduce a bill into the next Legislature providing for the taxing of all automobile owners, the money to be returned to the counties from which it is derived.

The Senator thinks every man owning a car costing $1,500 or less, should be assessed at least $15 per annum; owners of cars listed at from $1,500 to $3,000 should pay $20 and all over the last named amount $25 per year.

"Such a law," says the Senator, "would be of material assistance to the counties in maintaining public roadways, and no class of drivers should be more interested in keeping up the highways or more willing to bear their fair share of the expenses of maintenance than automobilists."

Naturally motor car owners all over the State fail to enthuse over the Senator's scheme; but he's going to introduce the bill next Winter, just the same. J. A. Wister, president of the Philadelphia Automobile Trade Association, thinks motor car owners are already shouldering their fair proportion of such expense.

"The license tax," he says, "already nets the State from $5 to $15 per car, according to the horsepower, in addition to which automobile dealers pay a mercantile tax, just the same as any other business men."

The first step in the promotion of the annual 200-mile Fairmount Park race was taken last Thursday when the Quaker City Motor Club was granted permission to use the park roads for that purpose by the Fairmount Park Commissioners. The same rules that governed last October's successful race will obtain next Fall. The Department of Public Safety will be asked to supervise the police arrangements, and the net proceeds from the sale of grandstand seats and parking spaces and from other sources—they amounted to upwards of $8,000 last year—will be donated to the public charity or charities named by the Department of Public Health and Charities.

Last year's unprecedented success made the work of securing the necessary permission very easy for the club officials—the commissioners were a unit in declaring themselves in favor of it. All hands seem to recognize the prestige the race gives Philadelphia.

Entry blanks are out for the annual Spring race meet of the Quakers at Point Breeze track, Saturday, June 4. Seven events will be on the program, including a 50-mile race open to the fastest cars in the country.

The Quaker City is to have a motordrome. The Philadelphia Motordrome Association, with a capital of $2,000,000, has been incorporated under New Jersey laws, and will build a two-mile track at Clementon, N. J., about 12 miles from the City Hall. The plans contemplate an oval of solid concrete, surfaced with champed vitrified brick, with an immense grandstand capable of seating 25,000 people, and big "bleachers" with a capacity of 30,000, garages, a big fireproof hotel, an administration building, two club houses—one for auto enthusiasts, the other for sky racers—a high-power electric plant and other accessories are a few of the adjuncts of the proposed plant.

Among those interested in the project are A. C. Patterson, president Excelsior Trust Company of Philadelphia; H. S. Reed, assistant treasurer Union Trust Company, Philadelphia; Louis Kuehnle, president Marine Trust Company, Atlantic City; M. R. Margerum, secretary Interstate Fair, Trenton; M. C. P. Parker, Harry J. De Bear, E. L. Bixby, C. E. Folmer, Frank G. Cassler, W. H. Woodward and George H. Robertson, the famous racing man, under whose supervision the track will be built. Milligan & Weber are the architects, and S. Boyer Davis, attorney of the Automobile Club of Philadelphia, and Weaver & Drake, are the counsel of the association.

The annual roadability run of Philadelphia Premier owners will be held on Saturday, June 11, with Cape May, last year's objective point, as the destination. The route selected this year will include many of the roads traversed by the recent successful run of the Motor Club of Harrisburg on the second day—May's Landing, Vineland and Millville being among the points on the route. The Harrisburg run proved such an object lesson to the road authorities in South Jersey that they are hastening to put the few bad stretches in shape before the Premier run.

Many brush agents, sub-agents, and owners in this section drove to Reading last Saturday to partake of the hospitality of the G. M. Britton Company, agents for the car in that section. A banquet at the Mansion House was the chief feature of the entertainment.

G. Hilton Gantert, who handles the Stearns here, has just acquired the sales rights in Philadelphia and adjacent territory for the Ohio car, a Cincinnati product.

News from South Bend and Vicinity

Work on the construction of the new addition to the Widaman garage at Warsaw, Ind., has been commenced, and the building will be rushed as rapidly as possible. The new addition will be 50 feet long and 60 feet wide and two stories high. The addition which will be when completed one of the substantial and artistic buildings of Warsaw will comprise a show room for new automobiles, about 50 feet square, and an office on the ground floor. The second floor will be used as a workshop, an elevator being used to lift the machines to this floor.

The electrical department of the Wood Electric and Manufacturing Company of South Bend, which was sold last January to F. G. Rapp, of Fort Wayne, is being moved to Fort Wayne. The department was disposed of by the Wood company in order to make room for the increase in the business of manufacture of automobile engines. The Wood company began the manufacture of automobile engines a few years ago and its business has increased to such proportions there was not sufficient space for the growing electrical department; by the disposal of this the floor space has been increased 25 per cent. W. F. Wood, head of the concern, stated the company is receiving more orders for engines than can be filled.

Motoring Lively in Winnipeg

WINNIPEG, MAN., May 16—One of the most notable features in connection with the automobile trade in Western Canada this spring is the preparation by the Brush Canadian and the Canadian Overland company to undertake the assembling or manufacture of their cars in this country. Work has been commenced on a large factory at Regina, Sask., which will be rushed to completion.

The program for the automobile race meeting here in July has been finally drafted and decided upon. It will consist of six events, including one for the motor cycles, as follows:

Class A.—Cars not exceeding piston displacement of 160 cubic inches. Class B.—Cars not exceeding piston displacement of 230 cubic inches. Class C.—Cars not exceeding piston displacement of 300 cubic inches. Class D.—Cars not exceeding piston displacement of 450 cubic inches. Class E.—Commercial cars, ope[illegible] Class F.—Motorcycles, open.

Parry C[illegible]

At the recent Kan[illegible] first in its class, an[illegible] proved faster than[illegible]

St. Louis News of the Week

ST. LOUIS, May 17—The Major Motor Company is one of the newest arrivals in the St. Louis field. The company has leased the building at 1512 Locust street and is installing one of the most handsome garages and display rooms in the city. The Major company has the agency for St. Louis and most of Missouri, also a part of Illinois, for the Pennsylvania Company of Bryn Mawr, and the Herreshoff Motor Car Company of Detroit.

The St. Louis Automobile Club has sent out entry blanks for the one-day reliability run it is to give June 4 to every car owner in St. Louis. The run is to be for strictly amateur drivers and is to cover the most beautiful parts of St. Louis and Jefferson counties. James Hagerman, Jr., has donated a cup for touring cars and Edward J. Walsh a cup for roadsters. The entries will close May 31. The run is to start at 8 a. m., from in front of the club's headquarters in the Planters Hotel. It is open to stock cars only. It is expected that at least 100 cars will enter the run.

The Buick car "Red Wing," the official pathfinder for the St. Louis Manufacturers' and Dealers' Association, which started out Monday to chart the course of the three days' reliability run to be given June 28, 29 and 30, has been meeting with a rousing reception all along the line from good road enthusiasts. The car is driven by Frank Delaney. F. L. Robertson is another Buick representative on the trip. J. F. Foland represents the cup donors and Ralph B. Campbell the Manufacturers' and Dealers' Association. Mr. Campbell is charting the route and will make representations to the contest committee. The pathfinder car, it is expected, will have completed its trip by Saturday night. However, it may not return to St. Louis before Sunday. It has been decided that cars may be entered in the contest only by members of the association, but non-contesting cars will be welcomed in the run to any number.

City Comptroller Taussig has figured out that two automobiles, at a cost of $2,500 each, will save the city of St. Louis $14,400 a year, and, consequently, has ordered two cars which will take the places of sixteen men hitherto employed as street inspectors. By this means, Mr. Taussig declares the annual increase in taxes for the maintenance of the city will be greatly reduced. Mr. Taussig hit upon the automobile as a means of economizing when he looked over the long list of street inspectors on the municipal pay-roll. Upon inquiring why so many were needed it was explained that the men had to make their visits by street car and that, owing to the number of stops made by the trolley cars, and their inability to reach the points the inspectors have to visit, such a great number had become necessary.

Mercer Car on Transcontinental Run

Early Monday morning a 30-horsepower Mercer car left New York on its arduous trip from coast to coast with Los Angeles as its objective point. The car is in charge of C. H. Bigelow, a well-known western pilot, who expects to set a new world's record for the distance.

Aside from the missionary road work, Mr. Bigelow intends to lower the time record from New York to the coast, of 362 hours Mr. Bigelow will travel but twelve or fourteen hours daily and will drive the car as far as New Mexico, where he will be met by Harold Hanshue, who will run the remaining distance of 800 miles. The distance for the entire trip of the Transcontinental Endurability Run is approximately 3,000 miles.

Will Tour to Indianapolis Races

COLUMBUS, O., May 16—Entry blanks for the reliability contest to be run under the auspices of the Columbus Automobile Club from Columbus to Indianapolis have been completed by the contest committee, of which Arthur M. Crumrine is secretary.

The run will start Friday morning, May 27 and the first day's trip will be to Richmond, Ind., where the night will be spent.

The second day's journey will bring the party to Indianapolis, where the races on the motor speedway will be attended. The return trip will be made in one day and the departure will be June 1. Already two dozen owners have entered their cars in the contest, which will be conducted under the rules of the A. A. A. It is expected that 40 cars will be in the contest.

ork City, of the Mercer Car, Which Will Cross the Continent to Los Angeles

Convict Labor for Michigan Roads

GRAND RAPIDS, MICH., May 16—With about 100 delegates from various portions of the State present, the third annual convention of the Michigan State Good Roads Association was held in this city May 12. The following officers were elected:

President, Philip T. Colgrove, Hastings; vice-president, N. P. Hull (master of the State grange) Diamondale; secretary and treasurer, Thomas M. Sattler, Jackson; former presidents William W. Todd, of Jackson, and Horatio S. Earle, of Detroit, will act with the officers as an executive committee.

The chief subject discussed at the meeting was the bringing about of a better system of highways without burdening the taxpayer with unreasonable taxes. The solution decided upon was the employment of convict labor on the highways.

In Michigan there are vast deposits of trap rock, one of the best of materials for the construction of highways. This rock, it was advocated, might be crushed through the use of labor from the penitentiaries and used to good advantage in the construction of new roads.

In his address, Mr. Todd advocated the establishment of road signs. He favored national aid in the construction of roads. Governor Fred M. Warner told of the growth of the good roads movement in the State, and Townsend A. Ely, state highway commissioner, advocated the use of convict labor. Robert H. Davis of the Detroit Motor Club pledged the aid of the automobilists of the State to the good roads cause and suggested a joint convention of the good roads association, the State grange and the automobile clubs to consider the matter.

At Holland City the ordinance regulating the speed of automobiles at eight miles an hour in the business district and fifteen miles an hour in the residence district has been declared invalid, the new Michigan statute superseding it.

G. A. Horner, general manager of the Rapid Motor Vehicle company, at Pontiac, is authority for the statement that, because of the lack of residences for workmen, the company has been forced to abandon many plans for improving and enlarging its plant. He says that the company needs 1,300 more men to handle its work.

At a meeting of the Hayes-Ionia Auto Body company, the following officers were elected: President, H. J. Hayes; vice-president, T. B. Preston; secretary, W. Q. Loomis; treasurer, W. B. Heath. The directors are F. W. Green, W. B. Heath, T. B. Preston, and W. J. Loomis of Ionia, H. J. Hatch and H. H. Smith of Detroit, and J. N. Willis of Toledo, Ohio. The capital is $150,000, of which $80,000 is preferred stock and $70,000 is common.

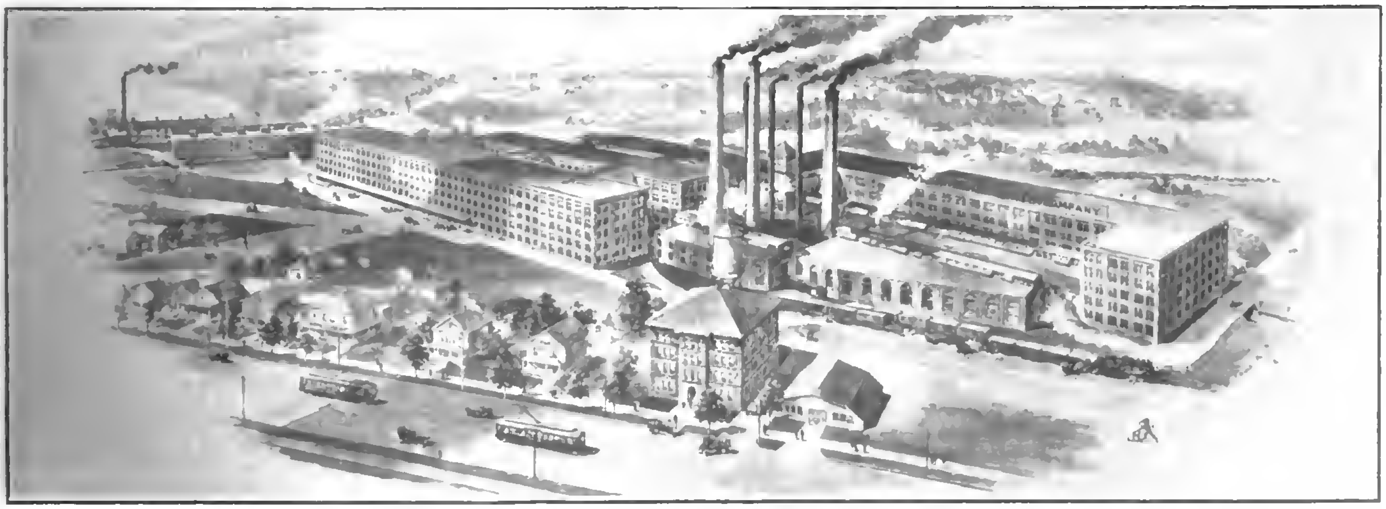
Motor Notes from Hoosierdom

INDIANAPOLIS, May 16—A three days' trade extension trip in motor cars will be made by the Indianapolis Trade Association, starting from Indianapolis May 31 and visiting a number of Indiana cities. The purpose of the trip will be to interest merchants in the cities visited in the products of Indianapolis factories and merchandise of wholesale and jobbing concerns of this city.

There is considerable doubt as to whether the American Motor Car Company, now in Indianapolis, will move its plant to Lafayette, as business men of the latter city and owners of the factory have been unable to agree on terms. The company, it is understood, has asked for a plant and equipment to cost $125,000 and a working capital of $100,000. Lafayette bankers, however, insist that with $125,000 invested in the plant, it would be impossible to advance more than $60,000 for working capital. They have suggested that the company modify its factory plans so that $100,000 working capital will be available, but so far these terms have not been accepted.

The newly organized Indianapolis Auto and Aero Club which has more than 200 members and is striving toward the 1,000 membership mark, is planning to place guide posts on all roads leading out of Indianapolis. These posts will be nine feet high and of iron. They will be placed half way of the route to Chicago, and also on all other highways leading out of Indianapolis. The campaign for membership is being carried on in every section of Indiana.

Visitors to the Indianapolis Motor Speedway in Indianapolis will see a new, or additional scoring system this year. Three huge scoring boards are to be erected, so that the score can be seen from all points of the course. Each board will be in charge of three men and will have three sections, each section being able to keep the time of ten cars.



Enormous Factory of the Goodyear Tire & Rubber Company at Akron, Ohio, Devoted Entirely to the Manufacture of Goodyear Tires

Glidden Pathfinder Completes Its Strenuous Task

(*Continued from page 911*)

There is only one reason for delaying any of the improvements which are to aid in bringing about the more extended use of the automobile, and that is represented in the time it takes in overcoming the inertia of the citizen who thinks he knows, but who is willing to admit that his knowledge is in the shape of a child-like inspiration; of actual experience he lays claim to very little, and of interest, it is secondary.

CHICAGO, May 16—Considerable of a stir was caused in Chicago Friday by the arrival of the Glidden pathfinder which marked the completion of the 1910 trail blazing expedition, which ran through thirteen states and on which journey the Chalmers car, in 30 days, covered 2,966 miles.

Not only did the Chicago Motor Club furnish an escort from the Mississippi river but it also showed its enthusiasm by tendering a banquet at the Chicago Athletic Association, which was one of the best motoring dinners ever given in this city.

Chairman Butler of the contest board of the A. A. A. was present, stopping off here on his way to Indianapolis and Detroit in search of Glidden entries.

Following the arrival of the pathfinding party there was a conference which resulted in the change of the date of starting from June 14 to June 15 because of squeezing in an extra day between Dallas and Oklahoma City. The Sunday stops will be at Hot Springs and Kansas City.

In addition to the nineteen entries already made the chairman announced that before leaving New York, he had been assured by W. C. Durant of the General Motors Company, that two Buicks and two Oaklands would enter. Mr. Butler had been informed that the entries of three Cartercars had been sent in, two in the Chicago trophy and the other in the Glidden.

Banquet Given the Homecoming Glidden Pathfinding Car at Chicago by the Chicago Motor Club

What the Glidden Pathfinder Encountered

CHICAGO, May 14—With the arrival of Dai H. Lewis, official pathfinder of the 1910 Glidden tour, and E. L. Ferguson, special representative of the American Automobile Association, in the Chalmers car here on Friday noon, May 13, the official laying out of this year's route which will be the longest in the history of the tour was completed, the speedometers showing a total of 2,851 miles for the cars which will contend in this year's American touring classic. As THE AUTOMOBILE has been in the habit of presenting an analytic review of the route in previous tours, the same policy is adhered to this season, and in the following paragraphs the general characteristics of the route, as given by Messrs. Ferguson and Lewis, are herewith printed for the general benefit of those manufacturers who have entered this year.

As mentioned in these columns last week, this year's tour embraces territory in thirteen States, seven of which have never before had a Glidden tour enter their confines. While thirteen States make a big total, yet the amount of traveling done in Alabama, Ohio, Mississippi and Missouri is so slight as to scarcely merit mention. On the other hand Kentucky, Tennessee, Arkansas, Oklahoma, Kansas, Iowa, and Illinois are crossed from side to side, whereas Texas and Nebraska are invaded to a slight extent. The average length of each day's run for this year is 198 miles, as compared with 178 last season. Although each daily trip this year will practically be 1 hour longer than last year, yet the pace will remain the same, namely 20 miles per hour for the large cars, 18 for cars listing from $800 to $1,600, and 16 miles an hour for those selling below $800. In spite of this high daily mileage, there are only five days on which the schedule exceeds the 200-mile mark and these trips are over the good-road territory beginning with Texarkana and ending at Davenport, the routes being: Texarkana to Dallas, 217 miles; Dallas to Lawton, 200 miles; Oklahoma to Wichita, 216 miles; Wichita to Kansas City, 234 miles, Kansas City to Omaha, 242 miles, and Des Moines to Davenport, 219 miles.

In contrast with these long runs are several short ones, namely, Cincinnati to Louisville, 162 miles, Nashville to Sheffield, 119 miles, Hot Springs to Texarkana, 131 miles and a Sunday morning run of 60 miles from Little Rock to Hot Springs. E. L. Ferguson, who made a careful comparison of the route with that of last year, asserts that it will be an easier one on cars in that there is not that long stretch of trail over the plains which was encountered last year through western Nebraska, Colorado, and western Kansas. There are, however, several physical conditions different from those experienced in any previous tours. One of the most noteworthy of these is the creek situation encountered in the Nashville vicinity, and also in the region of Hot Springs. Before entering Nashville and after leaving the city, the roadway is crossed by a series of unbridged creeks, which in dry weather are never more than 3 or 4 inches deep, but after rain of a day or a day and a half these become swollen so that it is impossible for a car to cross them.

The first creek begins 50 miles north of Nashville, and in all there are from 40 to 50 of these within a radius of 50 miles of the city on the route traversed. Should a heavy rain precede the arrival of the cars in this district it will mean a delay of, perhaps, a day before the creeks subside, because by actual measurement it was noticed that they fall at a rate of 3 inches to the hour. These creeks are from 3 to 8 miles apart. The bottoms are soft soil. The creeks in Hot Springs and vicinity are considerably different; these streams range from 2 to 10 feet in width and have clear water with gravel beds. They are close together, many of them not being one-third mile apart. Authorities in Hot Springs and Little Rock are arranging to bridge a lot of these. The Hot Springs Motor Club has raised $1,000 for the work and has influenced the Little Rock and other clubs to donate $1,500 for the work, so that by the time the tour passes these culverts will be bridged over many of the 30 streams.

Another particular novelty that will be encountered this year is the ferry situation, as on three occasions the contesting cars will have to be ferried across large rivers. The first ferry is at Helena on the Mississippi river. The river at this point is very wide and the cars will be transported on large flat-top lumber barges which barges are 150 feet long and 30 feet wide, offering accommodation for thirty cars on each. These barges will be moored on the east bank of the river, and after all of the cars in the tour are loaded they will all be transported across the river together. At this point the levee, or artificial bank on the east side of the Mississippi is 15 feet high, and the Helena authorities will have openings cut through so that no difficulty will be encountered in loading the cars.

The second ferry is at Clarendon, Ark., where the White river is crossed. This is the scene of the famous pearl fisheries. The river is but one-quarter mile wide and at present the only crossing facility is a ferry which will carry three cars. The Helena people are coming to the rescue and expect to float one or two of the large lumber barges from Helena down the Mississippi and up the White river, a distance of 200 miles, so that the ferry problem at Clarendon will be favorably solved.

The third ferry is at Fulton, Ark., where the Red River is crossed. Fulton is but 20 miles out of Texarkana. As the river is but one-quarter mile wide, the one ferry with accommodation for six cars will prove adequate, as it requires but four minutes to make a round trip of the ferry.

In a progressive review of the general road conditions, beginning with Kentucky, it is sufficient to say that all of the roads in this State are macadam or pike as the natives term them, and the run across the State can be made on schedule, whether rain or shine. It was expected that the trip across Kentucky would embrace the famous Blue Grass country, but only the margin of it is touched upon, and that in the Louisville vicinity which is a noon stop for the first day. A 90-mile circuit through the heart of this Blue Grass territory was contemplated but it was eliminated.

The run across Tennessee will not prove so pleasant a trip, the creeks already spoken of being one of the conditions. In this creek territory, however, the roads are of gravel and there will be no trouble in maintaining schedules. Nashville has to date proven rather lukewarm on the improvement of roads, but it is hoped that in the next month some enterprise will be shown. It is impossible to predict what the nature of these roads will be like in June because there had been a cloud burst when the pathfinder passed through, and it was delayed more than a day in some places. Generally speaking, the Tennessee roads are not comparable with those in Kentucky. South of Nashville and extending nearly to Columbia is a particularly bad stretch, and between Columbia and Sheffield a second bad stretch will be met.

The fourth day of the tour, from Sheffield to Memphis, will offer some difficulties through the wooded territory, but the last 22 miles out of Memphis is one of the best macadam boulevards in the South. The spirit of touring is not developed in Memphis to the extent it should be, and while there are miles of good road in Shelby county, in which the city is located, it is stated there are not over three motorists in the city who have taken a 100-mile tour in the outlying district. Memphis as a city is growing steadily, and it is expected that once the touring spirit is developed the good roads cause will be greatly advanced. The 4-hour run through the stumpy region on this day's tour will be a good test of cars.

The run from Helena to Little Rock begins through the Buckshot land, which is a level territory similar to the gumbo regions of Iowa. For three hours the tourists will pass through the rice country, where at that season the plants will just be emerging through the top of the water. Once this rice country is passed, the cars will have a three-quarter mile climb of 6 per cent. grade which is on to the tail end of the Ozark mountains, where they are tapering off to the level land. In all there will be two or three of such ascents, none of which will offer any difficulty. Once up these grades it is practically easy going to Little Rock. This territory offers an excellent car market, the pathfinders reporting many towns along the route in which five cars were owned in 1909 and already forty-two or more have been sold up to date.

The Monday run from Hot Springs to Arkadelphia will be one of the hardest days on the trip. Originally it was to be a trip of 191 miles, but owing to the 60-mile run from Little Rock to Hot Springs being made on Sunday, the Monday trip will be reduced to 131 miles. Of these remaining 131 miles 80 are particularly hilly, these hills ranging from one-quarter to one-eighth mile in length and some with grades as high as 20 per cent. This is one of the poorest selling sections of the trip, the country being wooded nearly all of the way. Once Arkadelphia is passed the troubles of the tour are over, so far as roads are concerned, the remainder of the run to Chicago being through continuous agricultural territory. To Texarkana the road is level, and through a cotton and corn country.

At Texarkana, which is on the State line between Arkansas and Texas, the State line passes through the middle of the main street, so that to satisfy the natives half of the cars will be parked on the Arkansas side of the line and the other half on the Texas side. For some miles out of Texarkana some stumps will be encountered on the road, but after Paris is passed, it is nothing but a perfectly level road to Dallas. Pathfinder Lewis reports that the boulevard leading 25 miles into Dallas is one of the most perfect roads encountered. From Dallas to Fort Worth, 32 miles, is a boulevard through corn and cotton country.

From a standpoint of the products of the country the tourists will be treated to a variety of conditions. Through Kentucky the tobacco and stock-raising territory will be seen; in Tennessee the leading products are corn and tobacco; across Arkansas the rice territory will offer particular interest; in Texas cotton and corn are the leading products; and from this point north the tourists will be continually in the great grain-producing center of the country.

A commendable feature of the tour this year will be a half hour noon stop each day at which time the members of the tour will have an opportunity of meeting the people en route, and those manufacturers who accompany the tour will have an opportunity of studying local conditions. The following noon stops will be made: First day, Lexington, second day, Bowling Green, third day, Columbia, fourth day, Corinth, fifth day, Clarendon, sixth day, Arkadelphia, seventh day, Paris, eighth day, Terrell, ninth day, El Reno and Chickasha, tenth day, Enid, eleventh day, Emporia, twelfth day, Marysville, thirteenth day, Guthrie Center, fourteenth day, Cedar Rapids and last day, Rochelle.

Of Interest to Wisconsin Motordom

MILWAUKEE, May 16—Motions to dismiss the suit of the Velie Motor Vehicle Co. of Moline, Ill., have been filed in the circuit court at Milwaukee in behalf of twenty-six of the fifty-five A. L. A. M. concerns made defendants in the action to recover $500,000 damages on charges of conspiracy in restraint of trade and to ruin the plaintiff company. The twenty-six defendants contend that the action was not brought in the proper manner and that service of summons was faulty. All of the defendants making the motion to dismiss the suit are not legally represented in Wisconsin. Service was made on agents representing their products in Milwaukee, when under the law, service must be made personally. The motion was filed by Quarles, Spence & Quarles, attorneys, Milwaukee. Arguments will be heard by Judge W. J. Turner on May 21 at Milwaukee.

Quarles, Spence & Quarles are now preparing briefs for the remaining companies and these will be filed in two or three weeks' time. The natvre of the answers is not known and no information on this point will be permitted to escape before the day of filing the papers.

For 1911 the Kissel company plans to build an electric car and a line of motor trucks and delivery wagons, in addition to the line of gasoline pleasure cars now built in eleven models.

The only information given out regarding the new Kissel electric is that it will be produced in large quantities for next year and will be a shaft-drive car.

The ranks of the Wisconsin State Automobile Association, have been strengthened by the addition of another club, the Oakfield Automobile Club. This organization is composed of owners at Oakfield, South Byron and Brownsville in Fond du Lac County, Wis. The club has twenty-two charter members. The officers are: President, Dr. C. H. Moore; vice-president, W. C. Ehrhardt; second vice-president, Henry McCarty; secretary, W. E. Bristol; treasurer, George Hansen. It was decided to hold meetings each month. Good roads and checking of law violations are two important aims of the club.

Charles L. McIntosh, of Milwaukee, Wis., president of the Pierce Motor Co., of Racine, Wis., and other corporations, who died at Naples, Italy, recently, left an estate valued at $300,000. The bulk of estate is put in trust for the children and their issue. The will was filed at Milwaukee on May 13.

The Wisconsin Automobile Radiator Co. has been incorporated by Milwaukee capital with a stock of $50,000. The incorporators are: H. Gerhard Aussen, S. S. Land and Arthur Zancing.

The Mitchell-Lewis Motor Co. of Racine, Wis.. made a shipment of two Mitchells to Antwerp, Belgium, one day last week. Foreign shipments are now almost a daily occurrence.

Arthur N. McGeoch is building a fine private garage at West Allis. The building is 58 by 24 feet in dimensions set in a miniature park, part of the McGeoch estate. The building will be of concrete, ornamentally designed.

The State of Wisconsin has started another suit to test the constitutionality of the oil inspecion law, by making Thomas B. Jeffery & Co., of Kenosha, Wis., and individual officers of the corporation defendants. Chief Oil Inspector is trying to collect fees for testing 686 barrels of gasoline purchased by the Rambler concern for its own use. Experts for the company declared the tests to be valueless.

Fine Trophy for Wisconsin Tour

MILWAUKEE, May 16—The accompanying cut shows the beautiful silver trophy donated by Charles F. Pfister, proprietor of The Milwaukee *Sentinel*, to the Wisconsin State Automobile Association. The cup will be awarded to the winner of an annual reliability tour, and will be held by him until the succeeding year. It is a permanent or perpetual trophy. It is known as the "Milwaukee Sentinel Trophy."

The cup stands twenty-four inches high and is eighteen inches wide at its greatest breadth. It is of solid silver, the bell being finished in gold. Beyond the usual lettering of the inscription, there is no engraving on the cup, all figures being done in high bas-relief. The cost was more than $600.


"Sentinel" Trophy for Milwaukee Run

The Rambler has been selected as official pathfinder for the tour.

Matthew C. Moore, president of the Wisconsin State A. A.. who was appointed official pathfinder, will leave Milwaukee May 18 or 19 and will attempt to make the trip in schedule time of five days. The tour will start July 18 and end in the evening of July 23. The A. A. A. has sanctioned the tour.

George A. West, believes that more than seventy-five cars will be nominated.

State Association in Tennessee

NASHVILLE, May 16—President H. S. Probasco, of the Chattanooga Automobile Club, the oldest organization of the kind in the State, has been authorized to take up with other cities of the State the question of organizing a State Club. Delegates will be sent to some one of the cities at a date to be named later and the club will be launched for the purpose of cementing the automobile interests.

The Nashville Automobile Club will meet this week and finish its organization. It is the wish of the local club to co-operate with counties in Tennessee and Kentucky to improve the highway along the route of the Glidden Tour.

Maryland Hill Climb June 11

BALTIMORE, MD., May 16—It was decided at the meeting of the Automobile Club of Maryland that the date for the hill climbing contest will be June 11. Chairman Joel Nassauer announced that the Belvidere Hill, extending from Roland avenue to the Falls road, had been selected for the event. This is one of the steepest hills in this vicinity outside the city limits and was used two years ago when a successful hill climb was given under the club auspices. There will be ten events. The official entry blanks were posted last Friday.

"Little" Glidden Pathfinders

MINNEAPOLIS, May 16—The pathfinder car of the "Little" Glidden tour, for the St. Paul *Dispatch* trophy, left St. Paul Saturday afternoon. The car is an E-M-F "30" and was driven by T. M. Skeggs. From St. Paul the road was to Northfield. to Faribault, 25 miles and from Faribault to the first stopping point, Owatonna. 34 miles farther.

Trucks Will Climb Dead Horse

COMMERCIAL cars and trucks will have a chance to show their paces in the line of hill climbing when the Worcester Automobile Club conducts its contest on Dead Horse Hill, June 4. Twenty events are on the program and one of them is solely for the commercial vehicles.

The full list of events is as follows:

Class "A."—Open to any gasoline motor car (other than motor cars with solid tires, wheels 36 inches in diameter and over) which complies with the definition "stock car," this class to be run in the following divisions:

1A. $4,000 and over.
2A. $3,001 to $4,000.
3A. $2,001 to $3,000.
4A. $1,601 to $2,000.
5A. $1,201 to $1,600.
6A. $801 to $1,200.
7A. $800 and under.
8. Open to all makes of motor cycles.
9. Free for All. Open to cars of all types and motive power.
10. Amateur Event. Owners to drive. Worcester County Championship for trophy to be won 3 times in succession.

Class "B."—Open to any chassis of a gasoline car which is in accordance with the definition of a "stock chassis"; to be governed by the following table of piston displacement and minimum chassis weights:

	Piston Displacement in Cubic Inches.	Minimum Weight in Pounds.
11B.	160 and under	1,100
12B.	161 to 230	1,400
13B.	231 to 300	1,700
14B.	301 to 450	2,000
15B.	451 to 600	2,300
16B.	601 to 750	2,500

17. Open to commercial cars and trucks. Details to be an announced later.
18. Free for all gasoline stock cars only.
19. Record of hill.
20. Amateur Event. Gasoline cars only; no limitation as to territory.

J. P. Coghlin, chairman of the hill climb committee, will be in charge of the event. Fred J. Wagner will wield the starter's flag. Prof. D. L. Gallup, of the Worcester Polytechnic Institute, will have charge of the timing.

Many Enter Norristown Run

NORRISTOWN, PA., May 17—With thirty entries in the various manufacturers' classes and a total entry list of fifty-five automobiles in the reliability run of the Norristown Automobile Club which starts tomorrow on a two-day tour to Scranton and return, will be an event of notable size.

The itinerary of the first day will be 150.8 miles. The night stop will be at the Hotel Jermyn, at Scranton, and the return trip will be 175.8 miles. The technical requirements of the tour are severe and the course is specially adapted to give the cars a thorough test. The entry list includes:

Class A—Touring cars, valued at $2.001 and over:—	
Pullman	Selden
Franklin	Matheson
Pullman	Kline

Class B—Touring cars, valued at $2,000 and under:—	
Regal-Detroit	Inter-State
Inter-State	Enger
Regal-Detroit	E-M-F
Maxwell.	Kline

Class C—Runabouts valued at $2,001 and over:—	
Alco	Jackson
Palmer-Singer	Buick
Knox	Premier

Class D—Runabouts, valued at $2,000 and under:—	
Warren-Detroit	Mitchell
Ford	Overland
Ford	Parry

Georgia Car Wins Hill Climb

DUBLIN, GA., May 16.—The automobile hill-climbing contest was won by a White Star, a Georgia-made car. The contest took place at Turkey Creek hill, one of the hardest in Laurens county to climb, and was made from a flying start on the last bridge on the western side of the creek. C. W. Brantley and Frank N. Watkins were the official timekeepers. The winner was driven by Charles Eberlein. Following are the records: Buick, R. L. Miller, 37 sec.; White, Marshall, 37 sec.; Ohio, Sam Bashinski, 40 sec.; E.M.F., Marshall, 42 sec.

Continental Tires on Winners

One of the interesting places at the recent 24-hour race at Brighton Beach was the camp of the Continental tire outfit. The winning Simplex car and the Stearns that finished second, both used these tires, the former traveling fifteen hours on one of its set. Changes were made with the demountable rim in some instances in less than a minute.

The Selden car, equipped wih the Continental heavy, flat tread, experienced no tire trouble throughout the race to one of its set.

Isotta Won Coast Road Race

COALINGA, CAL., May 9, Special Telegram—In a field of eight an Isotta won the 105-mile road race here to-day by a lead of about 30 miles over the second car. The Isotta, Marquise driving, negotiated the distance in 2 hours, 15 minutes and 6 seconds. A Buick finished second and a Regal third. When the Isotta finished, after having lapped every other car in the race once and sometimes twice, Buick 16, driven by Nikrent, which was second had two laps, or 30 miles yet to do. The distance of each lap in this race was about 15 miles over rough roads. The entries included the Pope-Hartford, Elmore, Isotta, Regal, Winton, two Buicks and a Mitchell. On the preceding day a Winton six, Free driving and starting seventh in a field of eight, won the Fresno-Coalinga road race in 1 hour, 11 minutes. 43 seconds, clipping 13 minutes off the record held by the Buick. The distance between the towns was 64 miles. Murray in a Buick blinded by the dust crashed into the rear end of a touring car. The car was wrecked but he escaped with bruises about the head.

Pullman Makes Good on Road

The showing of the Pullman model K entry in the recent Harrisburg run to Atlantic City, which made a clean score in Class A and which will get the chief trophy in that class, has been gratifying to the manufacturers. The run was accomplished in rain during two days and road conditions were such that the stability of the contestants received a thorough test.

Continental Tire Camp at Recent Brighton Beach 24-Hour Race

Characteristics of Model 38 Overland

(*Continued from page* 931.)

valve V is ready at hand when it is desired to light up. There are many other points of interest which might be brought out, which will be reserved for some more propitious time, but it will be in order to state the main dimensions of Model 38 before concluding this effort.

The car sells for $1,000, and has a motor which is rated at 30 horsepower. The cylinders, of which there are four, have a bore of 3¼, and a stroke of 4½ inches. The motor is water-cooled, works 4-cycle, has a celluloid type radiator, no water pump, and the individual cylinder construction, together with other notable features of design, rather leads to the conclusion that the expertness of the driver is in small demand. Ignition is effected by magneto; a coil and battery auxiliary will serve during cranking, and should some other occasion arise. Ordinarily, this model is fitted out as a runabout, but for this occasion it was necessary to make provision for the long trip, and Fig. 1 shows how this matter was attended to. Quite a little storage room for tools and "togs" was provided in a simple and secure manner.

With all the eclat of a social function, Miss Blanche Stuart Scott in her Overland 38 commenced her long tour from New York to San Francisco Monday afternoon. Miss Scott undertakes the trip without male help of any sort and is accompanied by a girl friend only. The trim car, white-painted and bearing the sign "The Girl, the Car, and the Wide World," attracted a vast amount of attention in the preliminary run and Miss Scott was called upon to acknowledge numerous greetings.

The tour is unusual in that it is the first of its kind ever undertaken by a woman. She is brim full of enthusiasm and confidence and the anticipation of any big obstacles is apparently far away from her thoughts.

Miss Scott was tendered a luncheon at the Hotel Claremont before the official commencement of the trip. The guests included representatives of the press and the Overland company and everybody joined in wishing the voyager good luck and a pleasant trip. About 3 o'clock, the young woman cranked her motor and stepping into the car with her friend, turned its radiator northward. Waving goodbye to the assembly, she was off on the first leg of the tour that may take months to finish.

There is to be no definite itinerary or time limit. The fair driver can be as leisurely as she pleases; the only condition involved in the trip being that she shall receive no assistance from male persons along the way in the shape of repair work.

Her first objective point is to be Albany and from thence her course will be westward along the South shore of Lake Erie. Between here and Chicago five automobile clubs are preparing to receive the tourists and entertainments at numerous country clubs by the women of half a dozen cities are being arranged.

In reply to the good wishes expressed by the guests at luncheon, Miss Scott said: "It's starting in a pleasure jaunt but we are going through."

Metropolitan Automobile Guide Is Progressing

The growing demand for specific touring information for the use of those owning or operating cars in the neighborhood of New York City has induced the Automobile Blue Book Publishing Company, 231 West 39th Street, New York City, to bring out a second edition of the well-known metropolitan automobile guide. The new volume will be brought up to date in every particular, and last week the three Blue Book cars, Nos. 1, 2 and 3 started out in different directions to prepare route matter for the new book. The book will be limited to one and two-day trips around New York City trips that can be enjoyed on a Saturday and Sunday run. In every case possible every trip will have the return route by other roads than those taken on the trip out, and particular effort will be made to describe routes that will make the various trips real outings. The new book will be gotten up in the usual high-class Blue Book style.

A. L. A. M. Tire Committee to Meet

One result of the big meeting of the A. L. A. M. earlier this month has been the calling of a meeting of the tire committee of that organization for May 24. At this meeting the tire committee will consider general and detailed plans for avoiding difficulty arising out of the present state of the crude rubber market as it applies to the problem of tires for 1911.

The attitude of the manufacturers as expressed at the meeting was amicable toward the rubber men and it was freely predicted after adjournment that a working basis would be found upon which both factors would be able to work.

Three More in United States Motor Company

Another series of mergers has developed this week, affecting the United States Motor Company. The Gray Motor Company, of Detroit, makers of marine and stationary engines, the Brush Runabout Company and the Briscoe Manufacturing Company, both of Detroit, have been added to the United States Motor Company.

Worcester Show Attracts Entries

WORCESTER, MASS., May 16—Thirteen automobile entries have been received for the Horse, Auto and Motorcycle Show to be held at the Sturbridge fair grounds, Saturday, May 21, under the auspices of Southbridge and Worcester autoists and horsemen. It is the intention of the committee in charge of the show to run several automobile races over the broad half mile track of the fair grounds, providing contestants can be entered before next Thursday night.

Among the entries so far received. the following makes are represented: Franklin, Buick, Overland, Matheson, Chalmers, Knox, E-M-F "30," Ford, Flanders, Peerless, Hudson. and several others.

Southern Interest Keyed Up

NASHVILLE, TENN., April 25—Increased interest in automobiling, the formation of more auto clubs, and the recent visit of the official pathfinder of the Glidden Tour have aroused interest throughout Tennessee in good roads and the various sections are bestirring themselves looking to material improvement in the roads of the State.

Fast Time on Cheyenne Speedway

CHEYENNE, May 16—Fast work was done on the 4-mile circular speedway at the meet last week when Oldfield with a Benz car went a half mile in 17 seconds and the full mile in 36 seconds. The Knox, Darracq and a number of local cars competed. The course is so large that a mile straightaway is possible.

Joins Staff of MacManus-Kelley

Charles E. Jones, advertising expert, who has been identified with Chicago and New York agencies for several years has been added to the staff of the MacManus-Kelley Company, Detroit. Mr. Jones will engage in the automobile advertising section of the concern's activities.

Official Report of Around New Jersey Run

The labors of the checkers of the Around New Jersey Reliability Run are completed and the report is to stand as here given. There are so many perfect scores that, as W. J. Morgan puts it, the one gold medal for the first prize will not go around, and it is suggested that the tie be disposed of by "drawing." If the matter is disposed of in this way, the remaining perfect score cars will be given replica medals. The second and third prizes are in the form of silver and bronze medals respectively. The Motor Contest Association states that the run, taking it on the whole, was a huge success.

Car	Driver	Score	Penalties Imposed For
	CLASS 1A, $800 AND UNDER		
Hupmobile	R. E. Gillam	Perfect	
Hupmobile	Elmer A. Cutting	9	Oil & Water Replenishment
	CLASS 3A, $1,201 TO $1,600		
Regal	W. H. Bowers	Perfect	
Overland	Geo. L. Reiss	Perfect	
Maxwell	W. Mulstay	1	Stalled motor
Buick	W. C. Davenport	191	Broken spring & w't'r r'pl'nishm't
Cole "30"	F. Warmington	1,000	Out—Accident
	CLASS 4A, $1,601 TO $2,000		
Pierce-Racine	Lewis Strang	Perfect	
Auburn	Herbert F. Earl	Perfect	
Franklin	Paul Harvey	Perfect	
Chalmers	Joseph Bell	Perfect	
Koehler	J. L. Bryer	1,000	Out—Accident
Marion	Wm. F. Bradley	Perfect	
Cadillac	N. L. Lichtenberg	Perfect	
Cadillac	L. R. Burne	Perfect	
Midland	Leo Anderson	Perfect	
Maxwell	Chas. Schaeffer	3	Gasoline r'pl'm't
Brush	Phil Hines	1	Closing pet cock on drip'ng carb.
	CLASS 5A, $2,001 TO $3,000		
Stoddard-Dayton	Richard Newton	Perfect	
National	W. C. Poertner	Perfect	
Mitchell	O. R. Delamater	Perfect	
Mora	Chas. Hinman	Perfect	
Glide	W. H. Foltz		Disqual. at start
Mercer	Joe Trepon	Perfect	
	CLASS 6A, $3,001 TO $4,000		
Franklin	Chas. F. Fox,	Perfect	
Welch-Detroit	Robt. M. Flagg	2	Sticking valve
Croxton-Keeton	Wm. C. Spenny	21	Dirt in Carbur.
Matheson	Neil Whalen	Perfect	
Haynes	W. Shuttleworth	1,051	Br'k'n clutch fin.
	CLASS 7A, $4,001 AND OVER		
Zust	Jos. Kingsland	41	Carbureter adj.
Zust	V. P. Pisani	Perfect	

Orphans' Day Promises Well

Fifty Pierce-Arrows, fifty Chalmers and fifty Buicks have been definitely donated so far to the Orphans' Day committee for use in the parade of the children to Coney Island. These cars will move in divisions freighted down with joyful kiddies as part of the procession which will stretch from the City Hall to Herald Square. Another division is being formed to consist exclusively of Packard cars, but all details are not complete. The total number of cars donated to date is 182, but that number will be vastly augmented before the event is held. It is planned to accommodate all the 4,000 orphans who have made application and in the event of success, the occasion will be the greatest in the history of the Orphan Day movement.

With characteristic energy, the Long Island Automobile Club is working to make Orphans' Day the biggest success ever scored by that club. Personal appeals to car owners have been sent out by the officers of the club and returns so far have been gratifying. The outing has been set for June 7 and will include a trip to Coney Island, luncheon and informal feasting for the children and a good time in the show place.

Warren Motor Company Dines

DETROIT, May 9.—Officers of the Warren Motor Car Co. were hosts at an informal banquet in the Tuller Hotel, Friday night, the guests being the department heads. General Manager Bayerline presided as toastmaster.

One-minute speeches were made by secretary Allen, superintendent Bollinger, sales manager Wilson, chief engineer W. H. Radford, and forman J. Mohardt and others.

Twenty-one in Connecticut Run

HARTFORD, May 17—Twenty-one cars have been entered for the three-day, 600-mile reliability run of the Automobile Club of Hartford, which starts Thursday.

The first day's run will be through Litchfield county as far as the New York and Massachusetts state lines. The first leg extends as far south as New Milford.

The second leg is through the southwestern section of the state as far as Stamford, while the third day will be given up to the territory east of the Connecticut River. The following entries have been received:

No. 1—Chalmers-Detroit, Carl H. Page & Co., New York, Class 3.
No. 2—Chalmers-Detroit, Carl H. Page & Co., New York, Class 5.
No. 3—Franklin, S. C. Hutchins, Hartford, Class 4.
No. 4—Regal, Regal-Detroit Auto Co., New York, Class 4.
No. 5—Cartercar, W. S. Williamson, New York City, Class 2.
No. 6—Cartercar, W. S. Williamson, New York City, Class 3.
No. 7—Corbin, Corbin Motor Vehicle Corporation, New Britain, Class 5.
No. 8—National, Fred T. Reid, Hartford, Class 5.
No. 9—Jackson, Kilby & Barrett Auto Sales Co., Hartford, Class 3.
No. 10—Franklin, H. H. Franklin Manufacturing Co., Syracuse, N. Y., Class 6.
No. 11—National, Portner Motor Car Co., New York, Class 5.
No. 12—Reo, N. B. Whitfield, New Haven, Class 3.
No. 14—Auburn, La Due Carmer Motor Co., New York, Class 4.
No. 15—Speedwell, Rantz Motor Car Co., Bridgeport, Class 5.
No. 16—Columbia, Columbia Motor Car Co., Hartford, Class 5.
No. 17—Interstate, Holcomb Co., New Haven, Class 4.
No. 18—Franklin, Holcomb Co., New Haven, Class 5.
No. 19—Pierce-Racine, Volney J. Jacobs, Boston, Class 4.
No. 20—Lexington, Nock Auto Co., Inc., Providence, R. I., Willis H. Brew, Class 5.
No. 21—Tiley, C. B., Tiley, Essex, Class 5A.
No. 22—Overland, Fairfield Auto Co., Bridgeport, Class 2A.

Touring Around United States Borders

About a month ago an automobile made by the Inter-State Automobile Company of Muncie, Ind., left the factory on a tour of 25,000 miles all around the borders of the United States. C. L. Welch is driving the car and so far as he has progressed, the trip has been most trying.

The plan was to cross the mountains to Vancouver, B. C., and then proceed to San Francisco and on to Los Angeles. Then strike back into the mountains again and traversing the desert country and the Southern states to the Atlantic seaboard. Following the coast line and back to New York, make the comparatively easy run back to Muncie.

Motor News Makes Its Debut

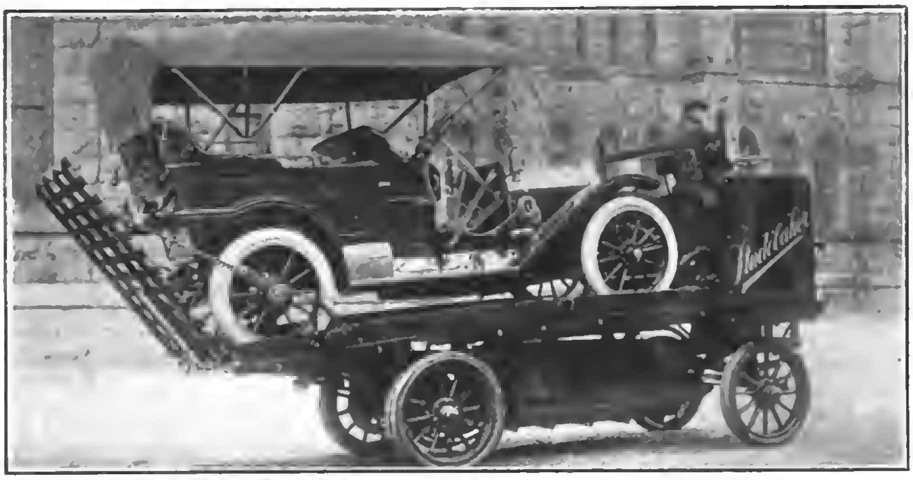
A new automobile publication, *The Motor News*, house organ of the Premier Motor Mfg. Co., has made its appearance. It is a monthly and in size approximates the style of a daily newspaper. The paper is heavy and highly sized, so that cuts make an excellent impression. The material used in the first issue is largely taken from the daily press special articles and is well edited and put together.

Ohio Senator Feels Law's Power

COLUMBUS, O., Apr. 25—The arrest of State Senator Baker of Cincinnati by a Columbus policeman on the charge of operating his motor car without displaying the necessary lights caused quite a stir. According to the state constitution a member of the legislature can not be arrested while the legislature is in session except for treason, a felony or disturbing the peace. The police prosecutor refused to file an affidavit and the case never came to trial.

Federal Registration Progress

WASHINGTON, May 9—Prospects for the passage of the federal registration bill are said to be bright. The petition of Chicago motorists, was presented to the Committee on Interstate and Foreign Commerce this week.



An example of the utility of the modern big truck. Studebaker five-ton truck hauling Studebaker touring car through the streets of New York

In the Realm of the Makers

Cleveland Automobile Spring Company, of Cleveland, O., was incorporated with a capital stock of $2,000 to manufacture motor car springs.

Akron Inner Tube Company, which will manufacture inner tubes exclusively, is erecting a factory. The preliminary capital of the concern is $10,000.

M. D. Coate, Cleveland Ford manager, reports that there will be a convention of Ford dealers of northern Ohio in Youngstown, Tuesday, May 10.

The Fry Manufacturing Company, a concern organized to control the manufacture and sale of the Fry plug, is located at 1779 Broadway, New York City.

The Miller Rubber Company, of Akron, O., has increased its capital stock from $250,000 to $500,000. The company has doubled its capacity during the past year.

The Brown Auto Carriage Company, builders of special bodies for any automobile, moved to new quarters at Thirty-second street and Superior avenue, Cleveland.

The Baker Motor Vehicle Company has moved into its handsome new building in Cleveland, Ohio, situated in the most fashionable and exclusive part of Euclid avenue.

The Sandusky Auto Parts and Motor Truck Company, of Sandusky, O., has been incorporated with a capital of $15,000 to manufacture parts of automobiles, and especially motor trucks.

The Reliance Motor Truck Company, Owosso, Mich., has purchased the land on which to build additional shops, 750 feet long and two stories high, for the manufacture of truck bodies.

The Dayton Rubber Manufacturing Company has decided to increase its capital stock from $150,000 to $500,000 in order to provide for enlarged and augmented facilities for manufacture.

The Cass Motor Company, manufacturing the Cass power truck, will locate in Port Huron, Mich. The concern will occupy the old Grand Trunk shops and employ upward of 6000 men.

Plans are now in the hands of Lansing architects for more buildings at the Reo Motor Car Company's plant, on Washington street south, and it is probable that the work will be begun this summer.

The Monitor Automobile Works have removed from Chicago to Janesville, Wis. The new plant has a floor space of 75,000 square feet, which is a material increase over what was formerly occupied.

The new plant of the Auto Wheel Company at Lansing, Mich., is nearing the stage when machinery can be set in motion. It is expected that the company will be ready for business in about a month.

Work is progressing on the addition of the Buckeye Wheel Company's plant at Galion, Ohio. The new building will be used to house the department devoted to the making of automobile wheels.

The Whitney Manufacturing Company plans for immediate construction of a five-story addition to the present big plant in Hartford, which is to be completed and ready for occupancy by October 1.

Biddle & Smart Company, Amesbury, Mass., are erecting a large addition to their present plant. It will be completed July 1 and will be equipped with machinery for the manufacture of wood and metal bodies.

The Archer Automobile Association announces that it is about ready to place on the market a roadster, four-cylinder, two-cycle, thirty-horsepower, light-weight car. The company's headquarters are at Burlington, Vt.

The Standard Specialty Company, of Cleveland, was incorporated with a capital of $10,000 to manufacture automobile accessories by Harry Dolitz, Cornelius Sheehan, Leo J. Kellosky, Charles M. Robertson and Louis M. Kleinhenz.

The Lowell Auto Body Company has begun the manufacture of automobile bodies in its new plant recently erected in Lansing. The new factory is a substantial two-story brick structure and is equipped with the latest patterns of machinery.

Mcre automobiles were sold in the United States during the thirty-one days of the month of March than in any corresponding period in the history of the automobile industry, according to reports received from many factories now working overtime.

Ionia Wagon Company, which went into the hands of a receiver some time ago, has been sold to the Hayes Ionia Auto Body Company for $70,000. The company already has machinery on the ground, and this will be installed at once. The company has a successful plant at Detroit.

The Universal Tire Protector Co., Angola, Ind., has been reorganized with a capital stock of $30,000 fully paid, the officers being S. C. Wolfe, president; E. S. Croxton, vice-president; J. R. Nyce, secretary, and W. W. Love, treasurer. Mr. Croxton is vice-president of the First National Bank of Angola.

Crowds at Minot's First Show

MINOT, N. D., May 16—The first automobile show ever held in the city has proved surprisingly successful. The show closed last week after enjoying patronage that was satisfactory to the management. The exhibit contained several varieties of well-known cars and quite a large display of parts and accessories. The exhibitors were mostly local agencies and included the following: J. F. Koppin, Minot; C. Foss, Minot; Scofield & Robinson, Minot; Dr. R. W. Pence, Minot; D. Dorman, Minot; More Bros., Fargo and Wimbledon; Abbott-Detroit Motor Car Agency, Minot; Jacobson Implement Company, Minot; Motor Inn Company, Minot, and A. Belzer, Minot. The enterprise had the support of the Minot Commercial Club.

W. C. Durant, of General Motors Company, New York

The Connecticut Shock Absorber Company, of Meriden, Conn., has purchased the tools, dies and stock of the Sager Shock Absorber Company. The former concern announces that the reason for the retirement of the Sager company is that its device was an infringement of the patents held by them.

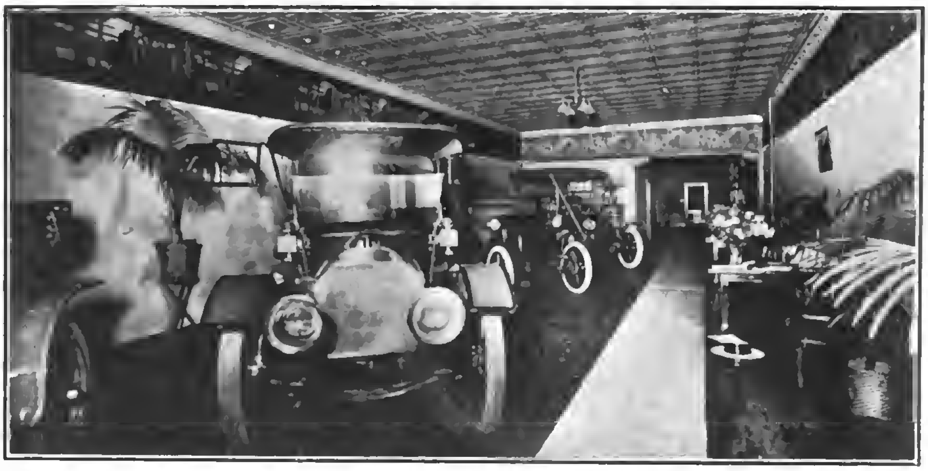
Harry W. Cleveland, of Fond du Lac, Wis., has completed his first full-sized model of a new pleasure car, "The Oriole," which is entirely successful; it will be manufactured by the Giddings & Lewis Manufacturing Company, of Fond du Lac. Cleveland is a son of C. E. Cleveland, president of the big machinery concern.

With new officers and a thorough housecleaning, the reorganized Berkshire Auto Car Company of Pittsfield, Mass., is entering the field with energy. It is planned to develop the undertaking to its highest point and to widen the market for the product. James Addison is president and treasurer; Stuart Clapp, vice-president, and E. B. Belcher, construction engineer.

The annual meeting and election of the Hartford Rubber Works Mutual Benefit Association resulted as follows: President, C. B. Whittlesey; vice-president, George Holloway; secretary, A. Elmer; treasurer, E. Fothergill. During the past three years there has been paid out in benefits to members $5,000 in cases of sickness and death. The association has a membership of 500.

A consolidation of the Standard Gauge Steel Company and the Standard Connecting Rod Company, of Beaver Falls, Pa., has been effected. The new corporation will be known as the Standard Gauge Steel Company. By the merger facilities will be improved and capacity increased. The full lines made by each of the companies interested will be continued and others under consideration added. The management will be practically the same as it has been in both corporations.

A. L. Riker, chief engineer, Locomobile Company of America



New salesroom of the Cook & Stoddard Company, at Washington, D. C., dealers in Pierce-Arrow cars, opened the first of April

The Vivax Storage Battery Company, 2228 Michigan Boulevard, Chicago, has succeeded to the manufacture of the DurO line of storage batteries for automobile ignition and lighting. W. R. Gibbs, for years the president and general manager of the DurO battery, has decided to make his home in the East.

The New Departure Manufacturing Company, of Bristol, Conn., is making additions to the big plant, which will afford an increase in floor space of 32,000 square feet. The foundations have also been laid for additional gas-engine equipment. Gas engines have been used by the company for power purposes for some time with good results.

An addition to the Moon Motor Car Company factory is now being built for the accommodation of the increased number of cars in the testing stage. The test cars, while undergoing their road test preparatory to the 200-mile perfect score run, which each must take before it is sent to the paint shop, will be housed in the new department, to be known as the test-car garage. The garage will be large enough to accommodate thirty to forty cars. It is being built in the quadrangle formed by the three wings of the big plant and a high fence topped with barbed wire. The new department will be ready for occupancy in April.

Among the Various Agencies

F. T. Reed has taken the Hartford agency for the National.

The Pierce-Arrow has been taken on by the Savannah Motor Car Company.

W. B. Worley, of Jacksonville, Fla., has secured the State agency for the Hupmobile.

The Republic Tire Agency in Buffalo has moved from 46 West Chippewa street to 908 Main street.

A Boston agency for Rauch & Lang electrics has been opened by H. C. & C. D. Castle, who handle the Lozier car.

The Savannah Taxicab Company has been appointed representative for the "Empire 20" and the "Page-Detroit."

McPherson & Waterbury, Plattsburg, N. Y., manager of the New Garage, have been given the agency for the Cole "30."

Hugh Miller has taken the agency in Cleveland for the Palmer & Singer line and opened headquarters at 6506 Euclid avenue.

O. S. Johnson has been appointed to succeed R. H. Gillis as manager of the Buffalo agency of the Hartford Rubber Works Company.

The Alden Sampson Manufacturing Company announces the removal of its sales office to 102 West Forty-sixth street, New York.

John W. Frey has opened a store at 698-700 Main street, Buffalo, with a complete line of supplies for motor cars, motorcycles and motor boats.

S. R. Bailey & Company, Amesbury, Mass., manufacturers of the Bailey electric car, opened a branch at 1024 Boylston street, Boston, Mass.

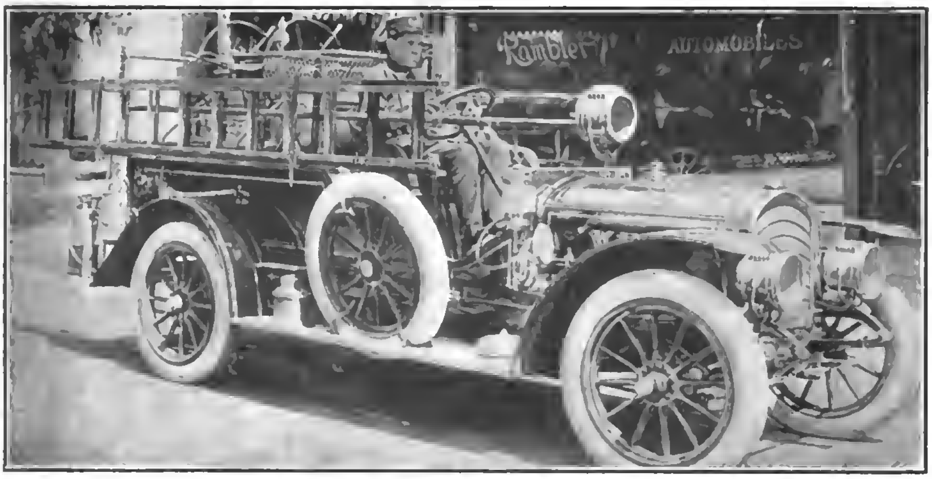
Joseph H. Greenwald, Cleveland agent for Harmon and Moon cars, has just occupied new and larger quarters at 6504 Euclid avenue, Cleveland.

The Foss-Hughes Motor Car Company, agent in Baltimore for the Pierce-Arrow, moved to handsome new quarters, 810 North Charles street.

The Locomobile Agency at Savannah has been given to Carter, Logan & Bro. They have taken it on for several states. A carload of them have been received.

The Parkersburg Motor Car Company, manager, William Caskey, is taking over the business formerly conducted by the Mead Motor Company, on Juliana street.

The Cole car is now located at 289 Berkeley street, near Boylston street, in Boston, the G. E. & H. J. Habich Company having leased salesrooms last week.



The use of motor trucks for various purpose s is growing rapidly on the Western coast. New Rambler chemical delivered to city of Whittier, Cal.

Speedwell Automobile Company, of Pittsburgh, formerly at 5986 Centre avenue, has moved to 5922-5924 Bond street, East End, where it has more than doubled the show room.

H. Heller, of Youngstown, has been appointed Empire and Clark agent for that territory. The Vail Motor Sales Company, of Cleveland, made the arrangements last week.

Oakley Bean has secured the Elmore agency for Jefferson, Clearfield, Indiana, Armstrong and Clarion counties, Pennsylvania, and will have his headquarters at Punxsutawney, Pa.

J. H. Greenwald, agent for the Moon and Marmon cars in Cleveland, has moved his line into a new salesroom and garage. The show room is 140 by 35 feet. Their repair department is almost twice as large.

The Major Motor Car Company, of St. Louis, has obtained the agencies for the Pennsylvania car and the Herreshoff car, and has leased the garage at 1512-1514 Locust street. The garage has been thoroughly remodeled.

H. M. Adams, sales manager of the Royal Tourist Car Company, has appointed the American garage, of Indianapolis, agent for the Royal Tourist line in that city. Demonstrating cars have already been shipped.

Thomas M. Brown, Wilmington, Del., has been given the agency for the Cole "30" for New Castle County, and certain selling rights for the State of Delaware and eastern Maryland, by the Colt-Stratton Company, of New York.

G. E. Lutsey has been re-elected president of the New London (Wis.) Automobile Company. All other officers were re-elected at the annual meeting. It was decided to continue the agency for the Buick and do a general motor livery business.

A. M. Llano has secured the agency for the Petrel car in New York and Long Island and will shortly open salesrooms on Broadway. He has sublet the Brooklyn and Long Island agencies to W. Laubendorf and E. Engrlage.

The Martell Motor Car Company, of which Albert A. Martell is manager, has taken the Eastern Massachusetts agency for the Firestone-Columbus, with temporary headquarters at 3368 Washington street, where he has a big garage.

Ford agents of Ohio held a big convention at Youngstown, O., Tuesday. The meeting was presided over by M. D. Coate, Ohio branch manager of the Ford Motor Company. A street parade of one hundred Ford cars was held.

The Langan and Taylor Storage and Moving Company has installed an automobile department at Garrison avenue and Olive street. The company will act as agent for the Ford, Buick, Speedwell, Apperson, Anhut Six, Cartercar, and other makes.

H. D. Van Brunt, manager of the Buffalo Regal Auto Co., has placed the Regal in two new agencies in western New York. The Genesee Motor Vehicle Co. will handle the car in Rochester, and the W. B. Preston Motor Car Company in Lockport. A recent addition to the force of the Buffalo Regal Auto Company is J. S. Hodge, formerly with the manager of the Buffalo agency when the latter was territory superintendent in western New York for the Olds Motor Company.

Doings of the Garage World

Harry Mitchell and others connected with the Tri-State Garage Company at Uniontown, Pa., have bought from Frank Lewellyn, his garage at 76 East Fayette street, and will use it as an addition to their own plant. Mr. Lewellyn had the agency for the E.-M.-F. car.

C. E. Watson, a well-known engineer of the National Tube Co., is preparing to open an automobile garage in the Leppig Building, Walnut street, McKeesport, Pa. He will handle the Overland and Marmon, and will also carry a full line of accessories.

Stoll Brothers, Mount Pulaski, Ill., are erecting a three-story brick building, the first floor to be used as a garage, the second floor as a display and sales room and the third floor as a public hall.

Work on the construction of the addition to the Widaman garage in Warsaw, Ind., has been commenced. The addition will be 50 feet long and 60 feet wide and two stories high. The second floor will be used as a workshop.

The Franklin Automobile Co. has taken a 15-year lease at 1114 and 1116 Race street, Cincinnati. A two-story and basement concrete and fireproof garage is to be ready for occupancy in a short time. The lot is 38 by 110 feet. The lease involves a rental of about $50,000 for the term, including the fixed charges.

The Saurer truck, eastern branch, has closed a lease on a new six-story and basement fireproof building 50 by 100 at 411-413 West Fifty-fifth street, New York. This building will be devoted entirely to shops, stock, storage and garaging. The main office, however, will still remain at 1876 Broadway.

Brief Personal Mention

Fred Kamp, formerly with O. N. Beebe, of Hartford, has accepted a position with Frederick A. Smith & Company, 1777 Broadway, New York.

H. H. Leckler, for sometime past a salesman for the F. B. Stearns Company, at Cleveland, has joined the forces of the Olds-Oakland Company, at Cleveland.

Charles Clifton, of the Pierce-Arrow Motor Company, has been elected first vice-president of the Buffalo Association for the Relief and Control of Tuberculosis.

Harry B. Tuttle, for a long time with the Stoddard-Dayton organization, has accepted a position with the Willys-Overland Company as superintendent of agencies.

F. W. Haines, general manager, Regal Motor Car Company, Detroit

J. H. Wills has been chosen factory manager for the Gaeth Automobile Company, of Cleveland, by George S. Patterson, who recently became general manager of the Gaeth Company.

William S. Duvall has been elected president of the Automobile Club of Washington to succeed H. Chadwick Hunter, who resigned on account of ill health. Mr. Duvall was the first president of the club, which was organized in September, 1905.

Emil Gruenfeldt, chief designer at the plant of the Baker Motor Vehicle Company, has sailed for Europe, where he will spend several months studying foreign methods of automobile construction.

D. P. Thorpe, of Detroit, has associated himself with F. S. Carr Company, of Boston, manufacturers of automobile top materials. He was for many years with H. Scherer & Co., of Detroit.

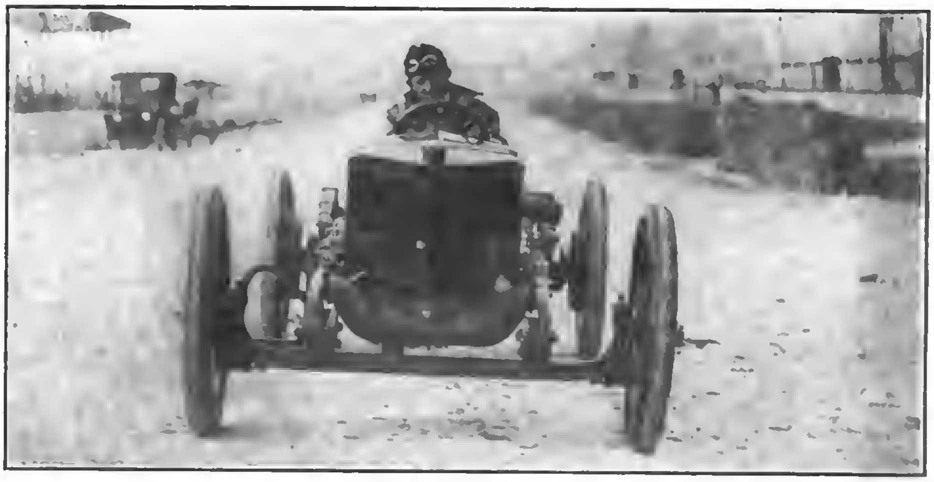
James B. Fiedler, formerly of the Syracuse Buick truck department and later of the Willis Motor Car Company, has accepted a position as traveling salesman for western New York for the Buffalo Regal Auto Company.

C. W. Hatch, well known in the automobile trade as a salesman of accessories and parts and located in Detroit, Mich., for the past few years, has accepted a position as salesman with the Perfection Spring Company.

Alvan T. Fuller, who handles the Packard cars in Boston, is soon to be married, so it is reported in the Hub. His engagement has been announced to Miss Viola Davenport, a well-known singer, who has been studying to become an opera star.

Several notable changes have been effected in the selling forces of the Royal Tourist Car Company, of Cleveland, Ohio. E. D. Shurmer has taken charge of the selling territory, with Chicago as a center, and will in future devote his entire time to the Western districts. A. D. MacLachlin, the former general sales manager of the company, who has been identified with the Chicago end of the Royal Tourist selling forces, takes a traveling sales managership and will confine his attentions to the East with headquarters in New York. Horace B. Hills, Jr., who is the New York representative of the car, has strengthened his sales forces considerably.

C. R. Mabley, manager, American agency, R. I. V. ball bearings



Marmon Yellow Jacket, with wind resistance decreasing body, which has recently proven its utility in automobile racing

News Notes in General

The St. Louis Overland Company has been incorporated to deal in gasoline and electric vehicles. The capital stock is $20,000, of which one-half is paid.

"There would be 5,000 more men employed in Flint in the Buick & Weston-Mott factories if there were enough houses in the city to accommodate them and their families," says C. S. Mott.

Hudson Valley Chauffeurs' Club has been organized at Newburgh with nineteen charter members. The avowed object of the organization is to promote sociability and good-fellowship among the operators.

The A. B. C. Castings Company, of Cleveland, has opened its new foundry at 6515 Carnegie avenue S. E. The plant installed contains the latest equipment and is said to be the largest aluminum foundry in the country under a single roof.

Aldermen of Buffalo have approved the revised ordinances of that city governing public garages. Hereafter it will be necessary to get a permit from the Mayor to conduct such an establishment, and erection of them is made subject to the approval of the Fire Commissioners and Board of Health.

The Holsman Equipment Company has been organized to take care of the repair business of the Holsman Automobile Company, which went into the hands of a receiver last January. The new concern is located in the old Holsman automobile factory, 3600 South Morgan street, Chicago.

D. J. Welton, of Columbus, O., has received a patent on an improvement on the Welton fender, which is manufactured by a Columbus company at Springfield, O. J. W. Howe is general manager of the company. The sale of the fender in Central Ohio is controlled by the Early Motor Car Company.

The Michigan Auto Castings Company will locate a foundry in Pontiac. Ground has been donated by William H. Osmun on Osmun street. Congressman S. W. Smith has wired the promoters that he will subscribe for 5,000 shares of stock. His son, Ferris Smith, has taken 1,000 shares. The capital of the company will be $100,000.

An automobile passenger line, the first of its kind in the Northwest, is to be operated between Minneapolis and Anoka, beginning June 1. The line is to be owned and operated by the Girling Motor Company, which is being incorporated with a capitalization of $25,000. The company has purchased a 16-passenger automobile, which for the first few months will make two trips a day to Anoka and return.

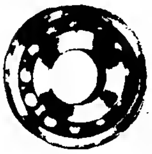
Mayor John F. Fitzgerald, of Boston, and a number of prominent citizens of Boston, Revere, Lynn and Saugus appeared at a hearing before the legislative committee on roads and bridges at Boston last week and advocated the passage of a bill to appropriate $300,000 for the construction of the so-called "missing link" in the North Shore highway from Eliot Circle in the Revere Boulevard to the Lynnway at the Point of Pines bridge.

"Metal Spinning" is the title of bulletin No. 57, from the Industrial Press, 49-55 Lafayette street, New York City. It deals with that ancient art comprehensively, and in view of the scarcity of literature on this subject, not forgetting the importance of metal spinning in the automobile industry, it is a commendable undertaking, and the care with which the material has been prepared is fully up to the customary standard of the publisher. The little work is made up of three articles which were published in "Machinery." The price is 25 cents.

Prominent Automobile Accessories

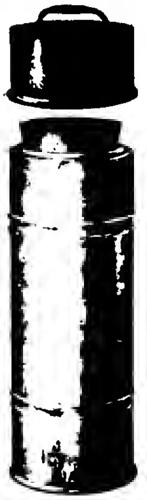
NEW TWO-POINT BALL BEARING

Ten years of experience in the manufacture of ball bearings for automobile use have given the F. F. Cameron Company, Hillsdale, N. H., a sufficient fund of experience from which to evolve not alone a well-made bearing, but a well-designed one as well. The bearing produced, which is illustrated below, is of the two-point type, in which the ball bears on the outer raceways in but two points, and those two opposite one another. The rings are made, both inner and outer, of a special high grade of steel carbonized and hardened so as to give the best results. The balls are of the best imported German make, and are guaranteed to the concern as within 1-1000 in. of being absolutely correct. The high side of the inner and outer races is so made as to make it possible to adjust for wear, thus, also, doing away with the necessity of extra thrust bearings, in situations where the bearing is subjected to an endwise load as well as a radial one. All races are made with very wide sides, this wide side on the races stiffening the same, making it possible to carry a heavier load with any given size of bearing. The bearings are made in all metric and inch sizes. These sizes are interchangeable with the sizes corresponding of other bearings, and the very large stock carried on hand at all times allows quick deliveries.


Cameron Bearing

HEAT RETAINING BOTTLE

Although there are many devices now on the market for retaining the temperature of a liquid just as it is, whether very hot or very cold, for many hours, there is always room for one more. The Icy-Hot bottle, herewith illustrated, is one of these, and now that Summer is coming, with time for long rides into the country, it should be in great demand for carrying the liquid complement to lunches. This form of bottle is made with a vacuum chamber around the central container portion, which vacuum part does not act as a conductor of heat, either from the outside air in or from the inside out. In this way, the dead air space keeps the liquid within at about the same temperature for many hours. Since first brought out, this handy little accessory has met with great favor, and an increasing number of them are sold every year, for just the picnic purpose described above.


Icy-Hot Bottle

PRIZE CUPS TO CLEVER ONES

The Electric Goods Manufacturing Company, of Canton, Mass., is offering fifty $10 prize cups free to motorboat clubs if the clubs will enter into a contest involving "Prefex" Ignition System, in such a way as to bring out the waterproof qualities of same in comparison with the waterproof qualities of ignition systems in general. This offer is to be held open for thirty days. The judge must be the editor of some magazine to be chosen by the competitors.

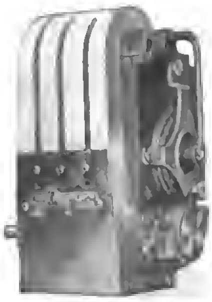
ATWATER-KENT UNISPARKER

Ignition is so puzzling a thing to the average person that any device tending toward simplification of the ignition system, either in part or wholly, is worthy of more than passing mention. In this device, the same result is brought about as in a magneto or combination of batteries and timer, the whole mechanism being very small and decidedly simple in construction. The claims made for it by the makers include first of all the one just mentioned, that of simplicity. Then, it is claimed to be very saving of power, since but one spark is produced at the exactly correct instant, while other ignition systems produce a number of sparks, the waste of current varying with the number produced. The results obtained are such that batteries which ordinarily last but a few months are made to go through a whole season and more. Thus, it is claimed that as high as 3,500 miles has been made off of one small set of ordinary dry cells, which is remarkable, if possible of duplication by the ordinary user.


Atwater Kent Unisparker Complete

K-W HIGH-TENSION MAGNETO

The cause of simplified ignition is furthered by the use of a magneto of such a construction as to permit the ordinary user to make simple repairs and adjustments. Such a one is the K-W, made by the K-W Ignition Company, of Cleveland. The cut shows model H, a four-magnet type, which may be had for four, six, or eight cylinders. The difference between this and other magnetos lies in the windings, both the primary and secondary windings being circular in form and stationary in position, so that the high-tension current is taken directly from the windings and carried to the distributor without the intervention of a commutator and brush.

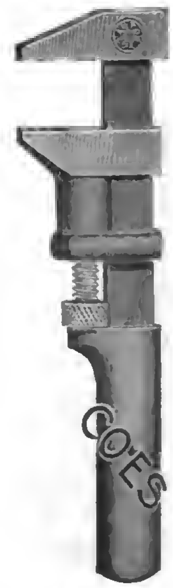

K-W Magneto

FLASH—A POWDERED DECARBONIZER

The Flash Mfg. Co., Zanesville, O., reports that the users of Flash Decarbonizer are pleased with the results obtained. Flash comes in cartons, in dry form, and is designed to remove carbon deposits in gas and gasoline engines. The material when in the cylinders combines with such free carbon as may be present, forms a gas as the product of the combination, which is then expelled with the normal products of combustion.

COES WRENCHES

Any fine tool is worthy of respect, a thing which the ordinary monkey or other wrench seldom gets. The wrenches made by the Coes Wrench Company, Worcester, Mass., are, however, accorded slightly more in this respect than others, for the simple reason that they are very well made, of first-class material, and subject to rigid and numerous inspections.



Coes Wrench

Vol. XXII. New York—Thursday, May 26, 1910—Chicago No. 21

THE AUTOMOBILE

In Lively Run L. I. A. C. Wins From Crescent A. C.

SOLID enjoyment, a sociable run and a fine practical test of the automobile upon the highways of Long Island, were the results of the first annual challenge run of the Long Island Automobile Club and the Crescent Athletic Club of Brooklyn, which was held Saturday and Sunday.

The contest grew out of a bantering challenge on the part of members of the Crescent club, and almost as soon as the challenge had been delivered, the A. R. Pardington cup had been tendered as a perpetual trophy for the winners. Under the conditions as they were finally framed the contest took this form: An equal number of entries (fifteen) from each club should compete. The club that had the least penalization should be declared the winner. Entrants to be active members of either of the clubs. No technical examination at the finish and ability on the road to be the sole criterion of merit.

The affair attracted much interest among the members of both organizations and if the rules had permitted it many more entries than fifteen on a side could have been secured with great ease.

As it was, that number of cars were formally entered and Saturday morning all thirty were sent away from the clubhouse of the L. I. A. C. The course was generally along the South Shore to Blue Point where noon control had been established and where the tourists and a cavalcade of non-contestants enjoyed luncheon. From Blue Point, the way lay to Quogue and Easthampton, where the course turned backward to Riverhead. Saturday night was spent at that place.

The pace was leisurely, the roads were good and the first leg of the tour was accomplished with surprisingly little trouble of any kind. A "stag" party, for which the talent had been imported from New York, enlivened Saturday evening at Riverhead, and Sunday morning the tourists took up the return course.

The first day's run, which covered 132 miles in nine hours, was accomplished by all thirty of the entrants without penalty of any kind for road work. This speaks volumes for the character of the Long Island highways as well for the cars, and as for the care and skill of the various drivers, nothing need be said more than to point out that the result was fitting, and most agreeable.

(*Continued on page 976.*)

A—Columbia that made only Clean Score in Run
B—Official Car making a Short Cut
C—National and Regal Entries at Bridgeport
D—Speedwell that made Creditable Showing

All Connecticut

TRAVELING about 200 miles a day for three days, over roads that ran the gamut of road making possibility, the cars entered in the All Connecticut Reliability Run, under the auspices of the Automobile Club of Hartford, were given a test that measures up closely in severity with the Glidden tour. The run only occupied three days but if there is anything in the way of running conditions that was overlooked in selecting the routes, the fact did not develop.

The principle upon which the courses were picked out was to afford a journey over roads that would prove the worth of any car that could pass over them. This does not mean that the roads were all bad—far from it, for there were stretches as long as fifty miles en route, that cannot be excellent for smoothness, straightness and general excellence. But on the other hand. part of the route was laid out in the sky-line of the Connecticut hills, over roads that seemed to have been broken through the forest the week before for the purpose of giving the cars a few entirely new wrenches.

The entries numbered twenty-two, but the Tiley and the Pierce-Racine were withdrawn and did not start. The pilot car was a Columbia 6-cylinder automobile, an experimental car driven by its designer Charles E. Reddig. It left Hartford at 4 o'clock each morning, two hours in advance of the regular contestants and distributed confetti along the roads. The others started in two classes, commencing at 6 o'clock and 6.30 respectively. The two divisions listed at the smaller figures started first and the more highly priced cars closed the procession.

The first day's trip was about as trying to cars and drivers as it is possible for human ingenuity to devise. There were grand stretches of highway here and there. but up in the northwestern corner of the State the hills and the mud and broken roads gave the cars a terrific trial.

The two Cartercars were the first to succumb, as their gasoline tanks were emptied before noon control at Torrington was reached. Neither of the staunch little machines had developed any structural or mechanical troubles and as soon as the beneficent Standard Oil tank wagon hove in sight, they both put on speed and checked in after the other cars.

From Torrington the roads were superlatively fierce clear past New Milford, but from that point they were generally good to Hartford. Nine cars finished the day with clean road scores.

The first day covered the Northwestern part of the State in a big loop that extended nearly to the New York and Massachusetts lines and was 207.8 miles.

The second day's run was over some of

Reliability Run

the best and a little of the worst going in the State. It went Southwestward through Danbury and Norwalk, touched Bridgeport at noon control and trended back to Hartford by the way of New Haven, Old Saybrook and the Connecticut River road. The finest bits of this route were the Berlin pike, a remarkable highway in a dozen different ways, and a bit of impromptu mountain climbing between Waterbury and the Housatonic River.

Four of the cars that had perfect road scores the first day were penalized during this run and the terrific racking the cars received the first day began to show on the surface in a few instances. But all told, the day was far better in the matter of scores than the preceding day had been for eleven cars received no black marks. The Corbin entry and the Reo suffered most, the first with carbureter troubles and the other with one of its pet cocks.

The third day's course was over the eastern part of the State, passing through New London and Woodstock to Willimantic where noon control was welcomed after 120 miles of exceedingly difficult going. From Willimantic the route was Northwestward to Thompsonville and thence to Hartford, a total of 191.4 miles.

Of the cars that had clean road scores during the first two days, the Franklin No. 3 was the only one to be penalized for road work on the final day's run. The Columbia 16; Auburn 14; Franklin 10 and the Lexington coming through the whole tour without a mark against them for road work.

The technical examination brought out many penalties as the examination was particularly severe. The clutch and brake tests broke several perfect scores and the final measurements and tests added materially to the list of penalization.

The Columbia entry in Division 5A had a clean score on the road and scored perfect in the final tests. The Franklin Number 10 in Division 6A was perfect in road work but was penalized a single point by the technical committee, while the Speedwell 15 and the National 8 only suffered 3 and 4 points respectively for their road work and scored perfect under the technical tests. Both were in Division 5A. The showing of the Regal Number 4 was creditable with only 13 points charged against it. Ten of these were for troubles on the road that had no bearing on mechanical or structural weakness and the other three were levied by the technical committee as appears in detail in the following table.

The whole affair was conducted with professional accuracy and the official comment upon the result was that any car that was able to make a good score in the event, was a "sure-enough automobile."

(*Continued on page* 982.)

E—Class 6 A Franklin. Penalized only one Point
F—Cartercar near Middletown
G—Getting ready to check out at Hartford
H—Auburn Entry checking in at Bridgeport

Just before the Start at Norristown 1
Indicating the Character of the Road in Part
Seen in Wilkes-Barre
Checking in at Reading

Norristown

NORRISTOWN, PA., May 23—After 48 hours work on the 23 cars which were submitted to them at the finish of the Third Annual Endurance Run to Scranton and return, the Technical Committee of the Norristown Automobile Club early this evening announced the Selden, No. 23, driven by Charles Youngs, as the winner in Class A with a penalization of 38 points; Maxwell No. 9, Harry E. Walls, driver, the class B winner with 26 points; Pullman, No. 19, with H. P. Hardesty at the wheel, the successful one in Class C, with 49 points; and the Kline-Kar, No. 30, driven by C. C. Fairlamb, the leader in the race for Class D honors, with 70 demerits to its credit.

In the membership division, Selden, No. 34, Fred Dyer, driver, was awarded first honors. This class was not required to undergo a technical examination.

The run was an especially severe test, as may be gathered from the statement that on the first day 25 of the 36 cars that were classed as contestants were penalized, most of the demerits being due to lateness at controls, or to mechanical defects developed by the hard usage to which the drivers necessarily subjected their cars in the effort to adhere to the schedule. The 20-miles-an-hour schedule was particularly severe on the Class D cars ($1,600 and under runabouts), all of the nine contestants suffering penalization. The road conditions on the first day were generally bad, an intermittent rain falling throughout the day, which, with a steady downpour during the previous night, rendered the roads, especially in the mountains, decidedly unsafe for a 20-mile schedule. This fact was borne in upon the committee at the last intermediate control of the day (Wilkes-Barre) an hour and ten minutes being allowed for the 18.6 mile leg, and the reduction was needed, for the roads between the two cities were frightful. Low and intermediate gear was necessary on a large proportion of the Pottsville-Hazleton, and the Hazleton-Wilkes-Barre legs, and when a good stretch of road was encountered it was usually so slippery that great care was necessary in negotiating it. When the fine State road leading over the mountains from Fairview to Wilkes-Barre was reached, the contestants went in for speed in order to make up the time they had lost, and several nasty accidents were narrowly averted. Palmer-Singer, No. 16, George Parker, driver, was crowded to the outside while passing another car on a sharp curve, and swung into the iron fence protecting the road; it hung for a while over a 90-foot ravine until the crew could get it back on the road; that little incident cost the car 117 road points, all told, not to mention a large proportion of the 59 de-

Reliability Run

merits imposed by the Technical Committee. Inter-State, No. 6, driven by D. F. Templeton, was also a heavy sufferer on the first day, garnering 52 bad marks from a skid into a wagon near Reading. Black Crow, No. 29, tore off its right rear fender in a peculiar manner. A tire chain broke and wrapped around the fender support, breaking it and tearing away the fender. The time lost as a result was so great that the car was later withdrawn, but continued to the finish, unofficially.

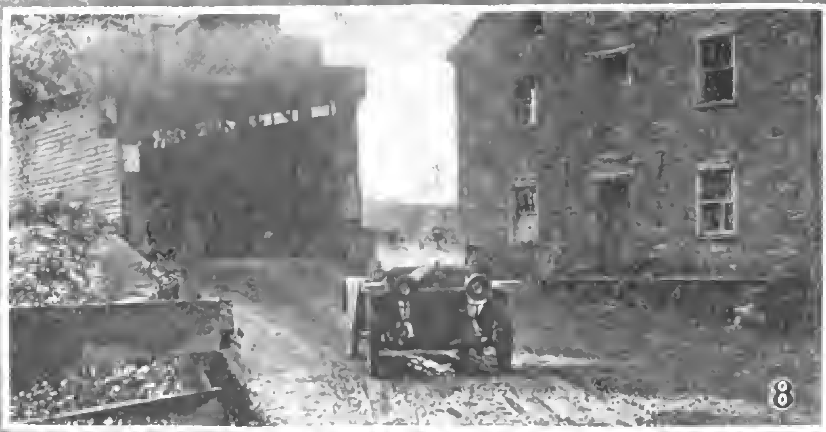
Despite the bad roads, disagreeable weather and the severe trial given as a result of the combination, the road work scores were fair.

The conditions on the second day were just the reverse of those on the first. Clear, warm, sunny weather, and good roads. The beauties of the Norristown scheme of prohibiting a car from laying up in control, or on the road between controls, for a longer period than ten minutes, under a penalty of a point for each minute in excess of ten, were demonstrated to the satisfaction of everybody. There was no racing, no crowding at controls, and the checkers' cards, in most instances, were in excellent shape, owing to the fact that they were not rushed by cars bunching up on them. The results demonstrated the wisdom of the A.A.A. in deciding to allow the promoters to retain this important feature of their rules.

While, apart from the stiff schedule, there were few complaints from contestants for the imposition of such liberal penalties on the road, the same cannot be said of the aftermath of the brake and clutch tests, and the technical examination, especially of the former. There does seem to be a flaw somewhere in the A.A.A. table of penalties, when a car which finishes a gruelling two days' run with an absolutely clean road score, without the necessity of touching a tool, even for tire repair, can be penalized the equivalent of a broken pinion or broken torsion rod, when with wheels locked, it slides 25 or 30 feet over the line, as did some of the clean score cars last Friday. An examination of the penalty table shows that fully 50 per cent of the total demerits were imposed during the brake and clutch test.

Every car submitted to the Technical Committee for examination suffered more or less severely, as was to have been expected, under the conditions. Franklin, No. 13, with 7 points, passed the best examination, followed by the Inter-State, No. 6, with 10; Kline-Kar, No. 20, and Buick No. 11, with 12; Kline-Kar, No. 4, with 16, and Enger, No. 7, with 18. All the remainder were over the 30 mark, with the exception of Walls' winning Maxwell, in Class B, which escaped with 25.

(*Continued on page* 983.)



A Line-Up of the Contesting Cars
Showing Another Stretch of the Orbit
A Bit of Interesting Scenery
Trying to Make a Good Score

Blue Ridge Mountain Trek of Much Interest

By HOWARD A. BANKS

A LITTLE independent railroad in the Carolinas, the Carolina & Northwestern, which runs Northwestward from Chester, S. C., to Edgemont, N. C., has furnished evidence to the country that the Blue Ridge Mountains beyond it are accessible to the automobile. Eighteen machines, big and little, went over 100 miles of good auto roads in one of the prettiest resort sections east of the Mississippi, but which has been considered too far away from railroad facilities for the owners of auto cars to visit. The outing, which lasted five days, from May 12 to 16, was planned by Capt. L. T. Nichols, general manager of the C. & N. W. R. R., and it worked out perfectly. Capt. Nichols sent out invitations to some 35 owners of automobiles to go on this trip, each to bring his lady, but seats were also reserved for newspaper men and a few railroad men. The trekers numbered 70 in all.

The automobiles and the members of the party were hauled free of charge over the C. & N. W. R. R. from the point where they reached the railroad, except as to hotel accommodations. A special freight train carried the machines to Edgemont, the starting point for the mountains. The big cars were run aboard on grooved skids, and three expert mechanicians went along and took care of the horseless carriages as mothers would take care of their babes. The only box car contained pieces of machinery, such as might be needed in a breakdown. The freight train unloaded its cargo on the afternoon of May 11, and on Thursday, the 12th, the start was made from the hotel at Edgemont.

Among the automobiles there were four E-M-F's, a Ford, two White Steamers, two Metz, a Hupmobile, two Reo cars, an Elmore, a Maxwell "30," and two high-wheelers of the International Harvester Company make.

The high-wheelers were put first, in order to prevent any daring chauffeur from going too fast, and they set the pace of the remaining machines. The run to Linville from Edgemont is 18 miles, and the first car, leaving at 3.30, got in at 7 o'clock. The ascent is from 1500 to 3800 ft. The engineer of the road was one of the party. The first half of the road, when it was built two or three years ago, was not intended for an automobile road. Some of the curves were a bit sharp, but the drivers rarely had to stop and back after they had learned the contour of the highway. For the first three miles the maximum grade is 6 per cent. After leaving Cary's Flats, about half way, the maximum grade is 5½ per cent.

One of the automobile experts on the tour said that the grades were without objection, and that on them the cars could make from 10 to 15 miles an hour. The roads were in splendid condition. There was a threatening, "spitting" rain when the party left Edgemont, but the procession climbed above the clouds, and the sun shone for the rest of the trip. At the top of the ridge, shortly before the sharp down-drop into Linville, the road was a little heavy, and it was learned that there had been a heavy rain there in the early morning.

An incident which interested the machine owners developed when the cars mounted into an altitude of about 3000 to 3500 feet. The automobiles began to have carbureter trouble. While the merry party raved over the scenic beauty on every side, or ran down the mountainside to pluck some brilliantly colored wildflower, the chauffeur was opening his air gate. A

Old Man Holtzclaw Takes The Toll

The Start at Edgemont

From Oxomobile to Automobile

A Mountain Grist Mill

few owners who had anticipated this thing at Edgemont, and had changed the mixture, escaped with the least difficulty.

The caravan "dawdled" along, making no effort for a record as to speed. At Cary's Flats a hundred mountaineers had gathered to see the automobile for the first time. The children were pretty, rosy-cheeked, clad in red, blue and other glaring colors. The women, however, were faded. Some of the men carried old muzzle rifles, and the party felt relieved when they said they had been shooting ground squirrels which were playing havoc with their corn. And some of the corn, by the way, on the sheer of the mountainside, looked as if the seed must have been shot in with the same rifles. A white-haired, red-eyed fiddler played "Old Dan Tucker," while another mountaineer danced to the patting of hands.

The occupants of several cars got out, and almost instantly the mountaineers were scrambling in, and the chauffeurs good-naturedly hauled them up and down in front of the country store. At half a dozen other places the same thing occurred, and it was a good stroke of policy to allay prejudice against the automobile and its owner.

The only mishap of the entire trip occurred a little further on. An old machine, four years of age and which had traveled 35,000 miles, stopped still 6 miles this side of Linville. Its transmission had gone wrong. Indeed, it was out of fix before starting, the owner acknowledging that he took a risk in running. Part of its occupants were then loaded on other machines. The two-horse wagon which followed the party picked up the three men who stayed with the car, but it was so cold that they walked into Linville, arriving at 11 o'clock. The dead car was rolled back over the mountains the next day.

The Grandfather, 7000 feet high, is the towering peak of this section, and every now and then, as the cars scudded around a sharp bend, his old-man profile, set upon his upheaving shoulder, would cast a patriarchal benediction upon this bit of wheeling civilization in the heart of the hemlocked wilderness.

Before the gigantic fireplaces at the comfortable Esceola Inn at Linville the party "shucked" their wraps and overcoats, and in the dining room dulled appetites which the keen mountain air had whetted sharp. Linville is a charming little village of 30 or 40 cottages and homes, and the Inn is modernly appointed.

An entire day was spent here in fishing in the lake and climbing the mountains, and in golfing, as there are splendid links here. The kit of auto tools offered by the Linville Improvement Company for the biggest catch of trout by an owner of a machine was won by J. W. Zimmerman, of Charlotte, and the silver cup for the longest speckled beauty—and it was 14½ inches—by S. R. Clinton, of Clover, S. C.

The start on Saturday morning, the 14th, for Blowing Rock, 22 miles, over the Yonahlossee, "the Trail of the Big Bear," and one of the famous roads of the Blue Ridge, was made at 9 o'clock, and the first cars arrived at "The Rock" about 11.30. All the cars made the trip on high gear, and there was none of the carbureter trouble of the first day. The drivers had learned how to use their mixture, and the machines seemed to have become acclimated. The party reached the mountains in a cold season, and there was ice at Linville the morning of the start.

After a run to Boone, the county seat of Watauga County, and named for the great pioneer who once lived there, and whose trail up the Yadkin River and its little tributaries is still pointed out, the party began to disintegrate. By Sunday afternoon they had gone, part through the country and the rest taking the special at Lenoir, below Edgemont, on Monday morning. The run to Lenoir from Blowing Rock, 22 miles, completed the last link in a novel and enjoyable outing. The worst mishaps were two hroken springs, which might have occurred just as easily in the low country.

Questions That Arise

A series of practical questions relating to the automobile, its parts, and their functions, which arise upon various occasions, together with easily understood answers to the same.

[23]—What is the nature of the mechanical contrivance which forces a valve to open?

A torsional moment is applied to a shaft; the shaft is provided with a cam; the cam rotates with the shaft; a roller or its equivalent, in line with, and pressing on the cam, is raised by the eccentricity of the cam as it rotates; guides suitably placed, compel the lift, upon the end of which the roller is placed, to press against the end of the valve stem and the pressure thus exerted compels the valve to open. The force is that due to the use of the wedge principle.

[24]—What is the force of the mechanical contrivance which forces the valve to close?

Gravitational force (if the valve is free to fall)to a slight extent only; the force of a spring for the most part.

[25]—Does the cam-action help in the closing of the valve?

No. The cams used in automobile motor construction are of the single acting type; they press in one direction only.

[26]—Why is it that mechanics have not used the positive action of a cam-motion to close the valve as well as to open it?

Considering poppet valves; remembering that they must press against the seat with a certain definite pressure in pounds per square inch, it follows that a certain precision must be taken advantage of, and, from experience, it is gleaned that lost motion and deflections would thwart any such an attempt.

[27]—Why does a spring eliminate trouble of this sort?

The spring continues to press after the valve is seated.

[28]—Why is it not possible to accomplish this same result positively without having to use a spring?

Because the parts, considering a positive link and lever system, or a straight line motion, as usually employed, would have to be stretched (elongated) after contact with the seat; this would tend to disrupt the members, and, since the valves have to be ground in after they become leaky, it is evident that they would no longer respond to the conditions as originally set. An adjustment would have to be provided, and the accuracy demanded is far beyond the skill of workmen.

[29]—Is there any form of valve motion that is free from the spring closing feature?

Most forms of sliding and rotating valves.

[30]—Why are they not used in place of the poppet valve?

They are in certain types of motors, among which are the Knight, and others.

[31]—What are the main points to consider in connection with the various types of motors?

In a general way, the situation may be summed up as follows:

(a) The desired power must be available at the respective speeds.

(b) The weight of the motor must be within allowable limits.

(c) The power must be obtained in such a way as to afford the requisite measure of flexibility.

(d) The fuel consumption must be for the best thermal efficiency.

(e) The motors must be simple and easy to run and maintain.

[32]—Do rotary valves serve more efficaciously than the poppet valve type of motor?

The comparison is without force; each principle, when properly applied, works to advantage. The following are tests of both the poppet and the Knight type of motor.

MEAN EFFECTIVE PRESSURES
(Disregarding Mechanical Losses)

Make	Cylinders	H.P.	R.P.M	M.E.P.
Daimler	Four 124x130mm.	58.0	1,172	106.8
National	Four 5x5 11-16 in.	64.0	1,400	81.1
National	Four 5x5 11-16 in.	54.1	1,055	90.9
Pierce	Six 4x4¾ in.	44.5	1,263	76.1
Pierce	Six 4x4¾ in.	30.9	800	85.4
Rambler	Four 5x5½ in.	43.5	1,091	73.1
Rambler	Four 5x5½ in.	40.0	900	81.3
Rambler	Four 4½x4½ in.	34.0	1,333	72.2
Rambler	Four 4½x4½ in.	29.0	900	89.2
Thomas	Six 4¼x5½ in.	49.0	1,091	76.0
Thomas	Six 4¼x5½ in.	34.5	700	83.4

[33]—Is it so difficult to design and construct a motor that trouble should be a normal expectation from a large percentage of all the motors designed?

Not necessarily. It is not always possible to convince capital that the difficulties involved are beyond the reach of a man who has the inventive faculty and no skill. In the absence of skill the mere ability of thinking along original lines counts for very little; after action may lead to poor result.

[34]—What is the difference between the inventive faculty and mechanical skill?

An inventive mind is free from the harness which guides the man of skill, borne of experience. The inventor is not afraid of getting into a tangle because he has confidence in his ability to get out again. The inventor is scarcely likely to count the cost—it costs money to get into trouble and more money to get out again. The skilled mechanic, like the judge on the bench, looks up all the precedents before he goes ahead; if the precedents are against him, it is highly improbable that he will take that course. The judicial mechanic, if he is unable to see his way clear to a successful termination of an undertaking, will investigate all phases of the problem, and only advance the work when he is cognizant of a complete solution of the problem; motors that work are the product of the skill of the judicial mechanic.

[35]—Can an inventor violate a principle in the process of designing a motor and not have to pay heavily for thus going contrary to the controlling wind, as it were?

If the inventor can get around Newton's laws, and all the other fixed principles known to mechanics, he may then violate every principle known to mechanics with impunity. No inventor ever yet succeeded in getting away from paying a fine in just proportion to the extent of each violation of every principle involved. and, in the final sum-up, it is more than likely that perfected automobile motors will be those which are in the fullest accord with all the principles known to mechanics, so worked out that they will be in harmony with the exigencies of service, without losing sight of the objective.

[36]—Is not this line of reasoning a little unjust to the inventor, and is it not a little farfetched from the point of view of the discussion of motor problems?

No. In the first place, the inventor of popular conception is not the inventor in fact. The popular view is that an inventor is a man who thinks of a novel way of accomplishing a task; he does not have to know that some other man may have thought of it before him; it is only necessary for him to be ignorant of the working of the other man's brain. There is no question of skill involved—it is a mere thinking process. As a matter of law, and of reasonable fact, an inventor is a man who puts a new and novel idea into practical use, or tells of a way by which anyone skilled in the art may apply the knowledge gained and bring it to a point of practicability. A patent on a device that will not operate, is invalid; merely thinking up a scheme is not an invention; skill and action must be included ere the invention is consummated.

An invention is not operative if it violates some of nature's inscrutable laws; a man who gets so far that he is in violation of these laws, is far from the platform which holds the inventor who is protected by law, and, from what has been said, although it is but an inkling of the whole situation, it is enough to indicate that inventors of popular conception are not slandered when it is told that they make it possible for purchasers of motors to buy both good and bad.

That discussion, such as this, is necessary to the progress which it is desired to make, is avowed, and this contention is proven by the many questions which are asked daily, in which it is desired to know which of two types of motors is the one that should survive. The great main question is entirely overlooked; no thought is given to the controlling factors as follows:

(a) The objective, i. e., the service the motor is intended to render; (b) whether or not the design is free from incongruities; (c) are all the laws of mechanics and of a physical character, properly incorporated, if they are involved? (d) are the parts, considering the character of the materials selected, so designed that they will not be over-fatigued in service? (e) is there a sufficient margin of safety to render the life of the parts in service in keeping with the value of the investment? (f) is the workmanship up to a fitting standard? (g) does the condition expressed in standardization of parts obtain? (h) are the parts insured to the extent of being inspected and tested to be able to know that there is no hidden fault or mistake? (i) how about a final test of the completed motor? (j) is the motor properly related to the automobile so that it will not be cramped in service?

[37]—How will a purchaser know about all these matters?

There is only one sure way; make an examination.

[38]—How can a purchaser do all these things if he is unskilled?

He cannot.

[39]—Under such circumstances what is a purchaser to do?

Display a fair measure of horse sense, and the same acumen that enables him to survive in Wall street and get away without being damaged.

[40]—What is the object in having a differential gear in conjunction with a live rear axle, or in the jack shaft of a side chain-drive type of automobile?

When the torque (twisting moment) of a motor is transmitted to the road wheels, either by means of sprockets and chains, or by a more direct way, as in shaft-driven mechanisms, involving the use of live rear axles, the road wheels are caused to revolve, and, since the two wheels are of the same diameter, they will roll along the ground an equal number of feet per revolution. If the two road wheels are rigidly related to each other, that is to say, if no differential gear system is employed, the automobile will travel in a straight line, unless one of the wheels slips.

It is not desirable to allow one of the wheels to slip every time the automobile is required to turn in a circular path, as when going around a corner, and the differential gear system is introduced to bring about the desired condition. It is the property of a differential system to transmit torque to the two road wheels of the automobile in proportion to their respective tractive conditions, irrespective of the relations of speed, so that in making a curve, as when turning around a corner, the inner wheel may rotate slower than the outer wheel, in proportion to the natural demand, but both wheels will be driving the automobile, nor will there be any slipping of the wheels, despite the fact that one must rotate slower than the other.

[41]—Just why must one of the road wheels travel faster than the other when an automobile is going around a corner?

The two road wheels (referring to the wheels that drive) are of the same diameter, say, 36 inches. The circumference of the wheels then will be:

$$\text{Circumference} = \frac{3.1416 \times \text{diameter in inches}}{12} = \text{feet}$$

$$\frac{3.1416 \times 36}{12} = 9.4248 \text{ feet.}$$

If there is to be no slipping of the wheels it follows that each wheel must roll on the roadbed for a distance of 9.42 feet per revolution, and, since the arc of the circle, which each wheel must describe, is to a different radius, as shown in the figure, the number of revolutions of the two wheels will not be the same, having in mind the fact that there is to be no slipping of either wheel. As the figure shows, considering the difference in the radii $R1$ and $R2$, from the axes OA and OB respectively, of the inner and outer wheels, some device must be used which will permit the two wheels to roll on the ground at different speeds—the differential gear system is devised for just this purpose. The difference in radius between $R1$ and $R2$ is not great in view of the fact that the distance in feet from E to C, as compared to the distance in feet from F to D, of the inner and outer arcs respectively, considering a 90-degree angular relation for both, is proportional to the respective radii.

If the radius of the circle $R1$ is assumed to be 100 feet, the radius of the circle $R2$ will be 100 feet plus the "tread" of the two wheels. If the tread is, say, 5 feet (common practice for cars which are used in the Southern States) the radius $R2$ will then be 105 feet. Considering an arc of 90 degrees, then:

$$EC = \frac{2\pi R1}{4} = \frac{2 \times 3.1416 \times 100}{4} = 157.08 \text{ feet;}$$

and

$$FD = \frac{2\pi R2}{4} = \frac{2 \times 3.1416 \times 105}{4} = 164.93 \text{ feet.}$$

Difference:

$$FD - EC = 164.93 - 157.08 = 7.85 \text{ feet.}$$

The inner wheel would either have to roll independently of the outer wheel, or slip for a distance equal to nearly one - third of its circumference; the difference in the described arc being 7.85 feet and one-third of the circumference of a wheel being in scraping contact with the road in turning. Tire depreciation is involved in this situation, and for the best result it is necessary to use the differential gear.

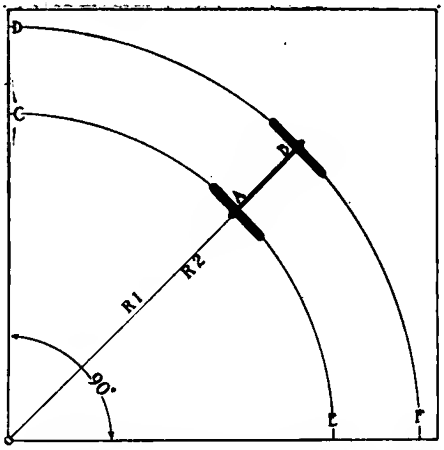


Diagram showing the difference in radius between the inner and outer wheel on a curve.

Engineering Digest

A carefully abstracted digest of accounts of engineering activities as they are reported in society transactions and technical papers throughout the world.

AN **account of the laboratory test** of five kerosene motors in public competition held by a marine association is **presented by Georges Lumet**, chief engineer at the laboratory of the Automobile Club of France. The five motors, of which one is made in Denmark, one in America, and three in France, are described in detail, their main features being as follows:

Dan motor, 4 cylinders, 4-cycle, bore 290 milimeters, stroke 250 millimeters; speed 350 revolutions per minute. The motor is fed by injection of cold liquid kerosene into a cast-iron chamber forming an addition to the combustion chamber and previously brought to a dull red heat. The injection takes place during the fourth cycle (exhaust) of the motor. The kerosene injected into the heated chamber is vaporized on coming in contact with the hot walls. The inlet valves then open to allow pure air to enter the cylinders, where it is mixed with the kerosene vapor. There is no carbureter. The quantity of air aspired is always the same. The amount of kerosene varies with the stroke of the pump. The kerosene nozzles are water cooled.

Aster motor, 4 cylinders, 4-cycle, 160 millimeters, 200 millimeters stroke; speed 550 revolutions a minute, valves on opposite sides. A special Aster carbureter is employed, consisting of a float chamber, a heating chamber obtaining its heat from the exhaust gases, and a variable feed jet. On leaving the jet the heated kerosene is directed against a heated wall, where it is completely pulverized and receives its necessary supply of air through an automobile valve. Ignition is by low-tension magneto contained within a bronze water-tight housing, and make and break. For starting, the carbureter is first heated by a kerosene lamp. Lubrication is by force feed to the main bearings and by splash to the cylinder walls and connecting rod ends, with divisions to retain the oil whatever the inclination of the motor.

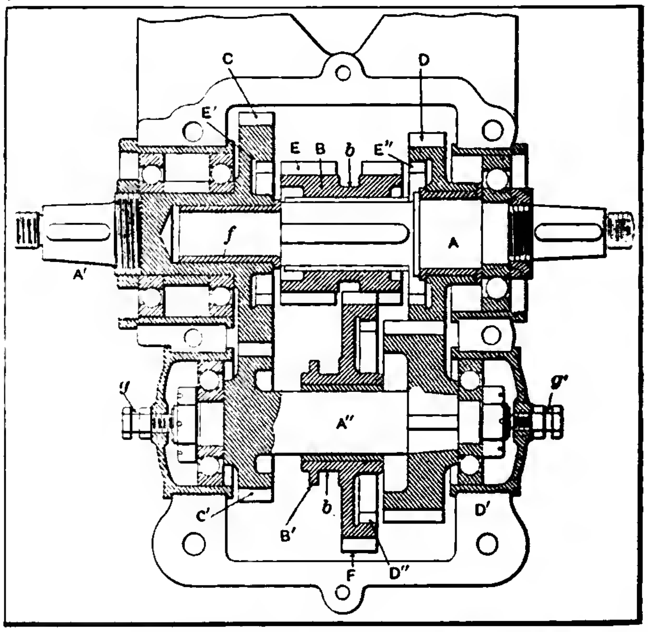
Mietz & Weiss motor, 3-cylinder, 2-cycle motor without valves and without mecanical ignition. Bore 203.2 millimeters, stroke 203.2 millimeters; speed 450 revolutions. The cylinders of the motor compress pure air, and on the maximum of compression being attained kerosene is injected by means of a pump operated from the crankshaft. Ignition is by hot tube.

Peugeot-Tony-Hubert motor, 4 cylinders, 4-cycle, 150 millimeters bore, 190 millimeters stroke; speed 550 revolutions. The cylinders are separate and vertical, with mechanical valves on opposite sides. The motor is fed by two separate Longuemare carbureters heated from the exhaust. Ignition is by high-tension magneto and sparking plugs, or by low-tension magneto and make and break. The carbureters are warmed by means of a lamp to allow of starting; the motor is also designed to receive a compressed-air self-starter. Lubrication is by forced feed through a hollow crankshaft.

Sabathe motor, 3 cylinders, 4-cycle, 220 millimeters bore and and stroke: speed 350 revolutions. On the first stroke the piston aspires pure air; on the second stroke the air is compressed to 60 to 66 pounds per square centimeter, and at the end of this stroke kerosene is admitted. During a portion of the third stroke the admission of kerosent is continued, thus maintaining a constant pressure during a portion of the power stroke. On the fourth stroke the exhaust gases are driven out through mechanically operated valves. Starting is obtained by means of a compressor delivering air at a pressure of 130 pounds per square centimeter.

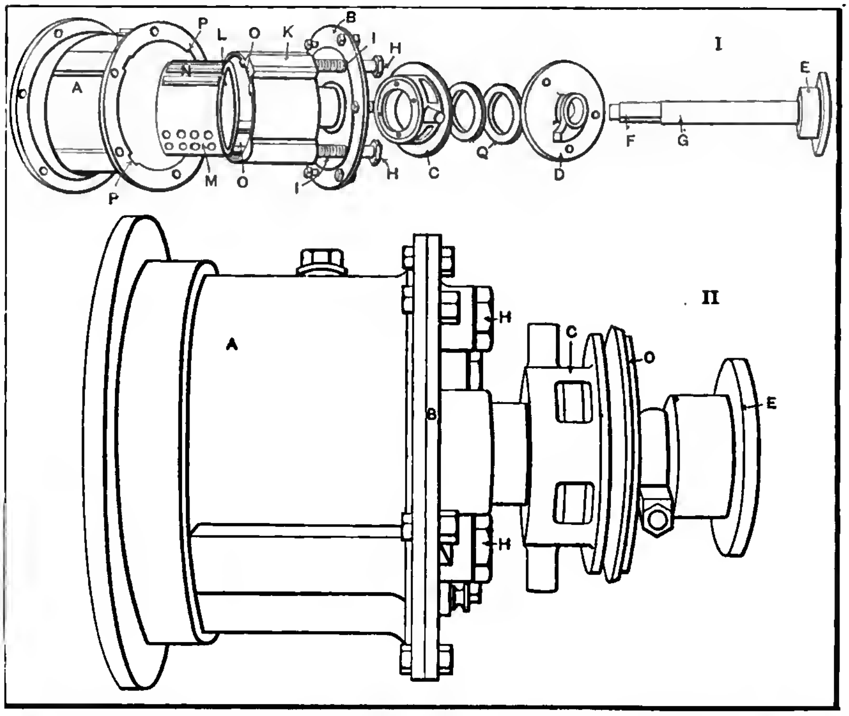
The article is accompanied by a complete table of the results obtained on four tests, two of them being at full power, one at half the normal speed of the motor, and the fourth without load. *Bulletin Officiel de la Commission Technique, Automobile Club de France,* Paris, March number.

Compact Transmission Gear.—Very short shafts supporting their working loads close to their bearings, pinions always in mesh, engagement by internal jaw clutch teeth, direct drive on the third speed, are the characteristic features of this compact transmission gear called the Pujos, the operation of which is readily deciphered from the accompanying drawing. *A* is the primary shaft, *A'* the secondary, *A"* the intermediate. *B* is the first sliding gear pinion, splined on the primary shaft. *B'* is the second sliding pinion, idle on the secondary shaft, and *bb'* are the shifting fork grooves. *C* and *C'* are the constant mesh pinions connecting the secondary and the intermediate shafts. *D* is the idle pinion of the second speed, *D'* the splined pinion of the second speed and *D"* the clutch pinion of the low speed. *E* is the splined pinion of the low speed, and *E'* the clutch pinion of the direct drive, while *E"* is the clutch pinion of the second speed. *F* is the idle pinion of the low speed, *f* the bearing sleeve between the first and secondary shafts and *gg'* screws and nuts for adjusting the intermediate shaft longitudinally.—*Omnia*, April 23.



Section of the Pujos Transmission Gear showing Compactness and Stability by taking Advantage of Short Distances between Ball Bearings of Annular Type, taper methods of fastening Universal Joints to the Stub Ends of the Shafts and other up-to-date Refinements

Small Metallic Conical Clutch.—The cast-iron clutch drum *A* is secured to the flywheel. The shaft of the transmission is secured by collar *E* to shaft *G*, the end of which is squared, and on the squared end is mounted the small drum *L*, which is held between two elastic half-collars lined with bronze bushings, or friction shoes *M*. Each of the half-collars is provided with two conical "gads" *N*. The sliding member *K* has two internal V-shaped grooves tapering at the same angle as the conical gads. When this sliding member is advanced, it pushes the conical gads against one another and thereby grips the drum *L* with the half-collars *M*. If, on the other hand, the sliding member is withdrawn, the gads become free to separate, the collars are released and the vehicle is unclutched, in which action centrifugality assists. The sliding member *K* becomes united with the cylindrical clutch drum *A* by means of splines and grooves. The ball-bearing collar *C* serves to disengage the mechanism and abuts against the clutch brake *D*, which is faced with leather, this permitting quick retardation of the drum *L*. The customary clutch spring encircling the shaft is replaced by four small springs *I* which are adjusted by the screws *H* in such manner that, when the springs are completely relaxed and extended, their rear ends engage slightly with holes sunk for this purpose in the clutch box cover *B*, the idea being that when the clutch is dismounted the springs will not fly in the face of the workman or get lost. The mounting and dismounting of the mechanism are particularly simple. Changes in the consistency of the oil in which it runs do not affect the operation, and repairs would be inexpensive.—*Omnia*, April 23.



Small metallic conical Clutch and Parts of same, which is interesting because of its Rugged Simplicity

An analysis of the gains and losses due to the offsetting of crankshafts in motors is begun by v. Doblhoff in *Der Motorwagen* for April 30. The treatment is mathematical and graphical. Weighing all the factors against each other, the author arrives at the conclusion that the advantages of offsetting reach their net maximum when the offset of the crankshaft axis is about one-half of the crankarm length, as in the Brasier motor. Offset affects: (1) piston travel, (2) the angular velocities of connecting rod and crankarm and (3) the piston accelerations, and thereby causes changes in (1) the cycle, (2) the frictions, (3) the variations of torque, (4) the balancing of the masses and (5) the turning moment on motor and shaft. As piston travel increases with offsetting, if the crankarm length remains unchanged, and the author wishes to compare conditions which are essentially alike, he assumes the piston travel to be constant and takes the crankarm length as the variable of these two. Formulas are derived from diagram for the crankarm length and for the location of the dead centers. With a view to a subsequent calculation of the frictions, he arrives at formulated values for the piston speed, the speed of the crankpin and of the connecting rod, using the tri-polar thesis relating to the movements in one plane of three co-ordinated points, according to which the poles of the three movements fall into a straight line and the velocity of each of the three points may be considered as a function of the velocities of the two other points. The values of piston acceleration are shown constructively by diagram. While it is often claimed as an advantage for offset construction that it affords more time for the expansion of the gases of the explosion, at equal revolutions per minute, due consideration of the difference in the angles described by the crankpin for the downstroke and for the upstroke shows that an offset, even as great as one-half of the piston stroke, produces a difference of only 6 degrees in these angles, and this difference represents only 4 per cent. of the time available for the expansion of gases in a straight-stroke motor, and it is not plausible to assume that the cycle of forces would be greatly influenced by this difference. Under frictions, the author considers piston friction, piston pin friction, crankpin friction and the friction on the shaft bearings, while noting that certain elements of the friction, due to the viscosity of lubricating oil and to the expansion pressure of piston rings, are independent of the lateral pressures transmitted to cylinder walls and elsewhere through the connecting rod, and therefore need not be considered when the question is that of calculating the effect of offset. The frictions are calculated, as "work," from the three factors, pressures, coefficients and velocities, while the weight of the parts is considered negligible in the case of automobile motors. The treatise is yet to be concluded.

Pumping Losses Interfere with the Process

What are pumping losses? They are all the losses which have to be coped with when a motor is put into motion. They detract from the force of the power stroke. Were there no pumping losses, the motor, were it to be put into motion, would keep on running forever, or, until it assumes the form of a mechanical wreck.

If the pumping losses are very great in proportion, it is then that the motor would start on the spark, so called, with great difficulty, or to put it in language more in keeping, with far less certainty. The pumping losses increase with the speed, but they are sufficient in poorly made motors to defeat starting on the spark, so called, owing to the feebleness of the force which it is possible to realize when the compression is limited to that which comes from boiling gasoline in the presence of enough air to provide the oxygen to produce a burning mixture, excepting in a motor's cylinder. Likewise, in a motor which is well made, even assuming that all the parts are so nicely fitted that friction is reduced to a very low point, if the cold compression is high, as it will be, that is to say, the compression which will come as soon as the motor begins to rotate, due to the fact that one piston will make its compression stroke, while another is on the power stroke, the power required to equal the force of the generating compression will be greater than the power which can be wrung out of a feeble explosion.

Cleaning Leather Cushions

Editor THE AUTOMOBILE:

[2,271]—In one of your issues of the magazine lately, you have a notice of the best method of treating the leather cushions to cleanse them and make them look better. A. B. WARFIELD.

Woonsocket, R. I.

We are unable to find the article referred to anywhere back to the first of the year, and issues beyond that would hardly classify as "recent." In the issues since then nothing of this sort has been published. As a matter of fact, the cleaning and treatment are very simple. A weak acid may be used to clean off foreign matter, following which the leather should have a very thorough cleansing with warm water to remove every possible trace of the acid. The leather is then softened with castor oil, or, better, neatsfoot oil, which may be obtained from any dealer in leather, or from nearly all paint stores. It is a good idea to have this oil around and apply it at all times, for it makes the leather softer, more pliable, and much better looking. Moreover, it is useful for all kinds of leather.

Two Versus Four Cylinders

Editor THE AUTOMOBILE:

[2,272]—Is it true that, other things such as power and weight being equal, a two-cylinder car will give better service over rough country roads than a four-cylinder car? Does the former possess any material advantage over the latter for use in heavy sandy roads, because its engine weight is better distributed, when the engine is placed under the frame, than is the case with a four-cylinder engine in the hood? It is claimed that a car with its engine in front will sink deeper into the sand, leaving insufficient weight over the rear axle to prevent the rear wheels from spinning.

Mesilla Park, N. M. FRANCIS E. LESTER.

No; two cylinders will not give better service. However, it is not quite fair to any type of motor to compare it with some other and different design; it is like adding oranges and apples, they are likely to make peaches.

Always Starts on the Spark

Editor THE AUTOMOBILE:

[2,273]—I was much interested in reading Inquiry Number 2,201 in the issue of the 24th inst., but surprised when I read the closing paragraph of your reply in which you said: "It is doubtful if the experiment spoken of, in which the spark plugs and other parts were removed from the cylinder, leaving them open to the atmosphere, and that then, after replacement, the engine started on the remaining mixture, on the spark, ever happened, or could be made to happen."

A year or so ago I recall having read in one of the automobile journals of a man who did this particular stunt with a four-cylinder Cadillac and the publication of the item called forth a statement from another man who said he was glad to know of others who had done this feat, as his friends thought it impossible, everybody at that time believing that it was largely a matter of compression.

I own a 1909 three-cylinder, two-cycle, valveless Elmore and I have not only done this stunt once, but several times before witnesses. Harry S. Kendall, of this town, has also had the same experience. B. A. Lemont, of 6 Tirrell street, Worcester, Mass., while demonstrating to a prospective customer who expressed doubt regarding this feat, stopped the engine, removed the plugs, replaced them, pressed the button and the engine started on the spark. The experiments mentioned were all done with the same make of car.

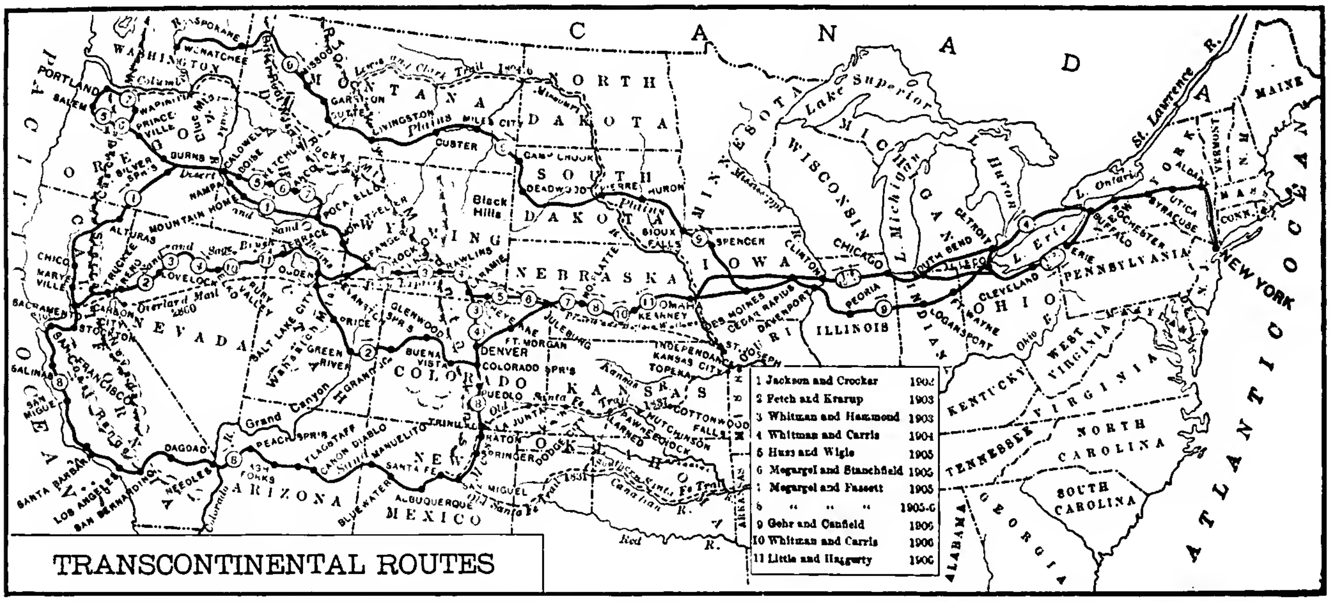
I presume that this experience is more likely to happen with a two-cycle Elmore than with the standard four-cycle motors, and it is probable that the character of the ignition system is an important factor.

I believe that any owner of one of these cars can get the same result if he tries it when his motor has been run and is normally warm. If your friends nearby fail to convince you, come to Gardner, Mass., and I will demonstrate that it can be done. Without attempting to discuss the subject technically I am inclined to believe that the "manufacturer" was within hailing distance of the truth when he told No. 2,201 that "Compression had very little to do with it."

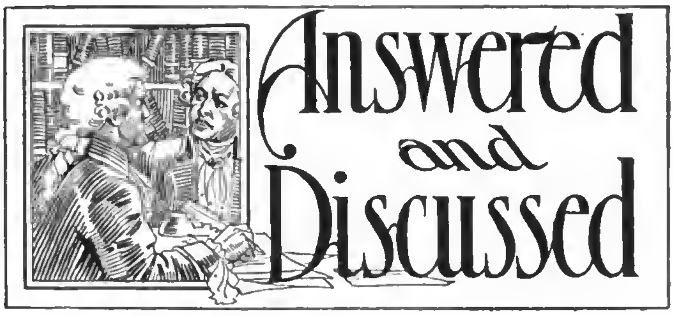
Now I would like to know what kind of car "Manufacturer" used when he performed the experiment.

Gardner, Mass. GEORGE L. MINOTT.

Starting on the spark is not positive, as will be appreciated. To what extent it is possible to depend upon this method of starting is speculative; much depends upon the characteristics of the motor used. If the compression is tight, that is to say, if the motor packing rings are in good order, and the mixture is kept in and is not much diluted with cylinder oil, it is very likely that the spark will be efficacious even though the compression is almost down to the atmospheric line. The spark must be of the effective kind, delivered at the right time, and all the other conditions must be in complete harmony. In view of the interest which seems to be taken in this matter, it will be discussed at some length and in considerable detail, in all probability in the next issue of THE AUTOMOBILE.



Map From Automobile Blue Book, Showing Ocean to Ocean Routes Used by Famous Transcontinentalists, and Best Roads



Best Route Across the Continent

Editor THE AUTOMOBILE:

[2,274]—Can you advise me as to the best route to take in my automobile for the Pacific coast? I am inclined to favor the Southern Pacific railroad via El Paso if I could be sure of getting the necessary supplies. I will take my family along with me, seven in all. I will drive a Chadwick; my destination is Oregon.

New York City. K. C. MILLER.

Referring to the Automobile Blue Book, Vol. 4, "The Middle West," the map as here reproduced affords information as to the routes which were surveyed, and the trips thus far made by the several automobile explorers will be found. The text of the same book, edited for this occasion, affords information as follows:

A brief outline of the general conditions certain to be encountered will help explain what is to follow. To begin with, so far almost all motor-car travel westward from the eastern edge of the Rocky Mountains has had as a starting point either Cheyenne, Wyoming, or Pueblo, Colorado. These two cities, though both at altitudes of about a mile above sea level, are neither of them in the mountains, being simply at the extreme western border of the great alluvial plains of the Mississippi Valley, across which they are approached by an ascent so prolonged, uniform and gradual, that only the evidence of a barometer is convincing to the effect that one is not traversing level country.

Also, until the eastern motorist leaves the Mississippi Valley by way of one of these two cities, he will encounter no conditions of a type with which he is unfamiliar. If he is unfortunate as to season, he will find some bad mud and less bad sand, but on the whole will get along about as in his home locality; perhaps occasionally delayed for roads too dry, or possibly by the necessity for horse aid if he carelessly blunders into too deep sand with too small tires. Roads he will find better than the average, unless wet, all water courses are bridged, settlements are close together, gasoline is low-priced and abundant, and night stops always can be made in towns where accommodations are both good and reasonable.

It is not until after entering the mountains that new conditions, in many respects beyond the imagination of the non-traveled easterner, supervene. From Cheyenne, through southern Wyoming to Ogden, Utah, and from Pueblo, through the Royal Gorge of the Arkansas River to Salt Lake City, the two practicable routes through the Rockies converge to their Utah termini, forty miles apart. From Ogden around the North shore of Great Salt Lake there is a choice of main routes, each about one thousand miles long, into San Francisco along the line of the Central Pacific Railroad and into Los Angeles by cutting down through Nevada and southeastern California—the latter route affording the further alternative toward its end of running either through Death Valley or the Owens River Valley in California.

From Salt Lake City the southern main route can also be reached by leaving along the lines of the Salt Lake and San Pedro, or the new Western Pacific Railroad, soon diverging from these into a run through the mountains to Ely, Nevada. So far as the writer knows no motorist has as yet succeeded in following the line of the "Salt Lake Road" all the way from Salt Lake City to Los Angeles. From Ogden there is a possible route to the northwest, which has been taken by a few transcontinentalists, and at least one car has come east from Los Angeles through Arizona, New Mexico, and Texas, but for the average tourist it will be more satisfactory to follow the better-prospected lines of travel.

Throughout the country under consideration the going becomes chiefly an unending alteration of running through valleys and over summits, even the most desert areas being decidedly mountainous, contrary to popular belief among easterners. Nevertheless the valleys, even in the most unsettled sections will often afford fifty or a hundred miles of ideal speeding. Indeed, there are tracts in Nevada, of hundreds of square miles of almost level ground of natural road material, across which the highways, though improved only to the extent of occasional wheel tracks and sign posts, will admit of full speed with the most powerful cars—though unexpected small gullies are a menace to be kept ever in mind by the driver unfamiliar with the road.

The mountain grades will not disappoint the most extravagant conceptions of them. Again and again before the coast is reached there will be killing climbs of miles upon miles on low-gear, with the ascent always severe and often for very short distances absolutely up to the limits of traction and engine power. Then will follow prolonged descents down which the "tenderfoot" will take the advice of the mountain and desert-wise chauffeurs and brake with his engine, or else learn to his sorrow that three or four hours of continuous down hill, dropping from three hundred to a thousand feet a mile will not merely char brake linings but will absolutely burn the brakes out of a car, wearing the brake drums to shells, and heating them not only enough to blister the paint but even to burn the spokes loose.

Water-cooled brakes and inorganic contact surfaces are of little avail, nothing but letting the car turn the engine over sufficing to dissipate the energy developed in the descent. In this connection there are a couple of tricks worth knowing. One is to disconnect the linkage, if any is provided, between emergency brake and clutch, so that brake and engine can be used together when necessary. Another is that when the car coasts too fast with one gear in engagement, but is not descending abruptly enough to turn the engine over at all with the next lower gear in, keep the lower in mesh and give the motor ignition and just enough fuel to keep the car moving.

In thus depending upon the engine for prolonged braking, it does not follow that the regulation brakes may be neglected. They should be kept at all times in the best possible condition, ready for instant use in stopping on both up and down grades, and for slowing while gear changing during the long coasts—a manipulation, by the way, that will be found just the reverse of the gear changing to which one is accustomed.

In climbing the long grades—sometimes gaining as much as a mile in height in going from 10 to 50 miles, it is of the utmost importance to keep the cooling system in good shape. In fact, there are very few cars in which the carrying of extra water for refilling the radiator will not avoid delays to let things cool during these long climbs. Slipping fan belts, dirt accumulated on the inside or outside of the radiator, or an ineffective circulating pump will make themselves known when their shortcoming would never be suspected under less severe conditions.

Clutches, too, which never cause trouble in thousands of miles of ordinary running, are prone to develop unprecedented weaknesses during long climbs. The safeguard, especially with leather-faced cone clutches, is never to let slipping begin, as once started it rapidly progresses to the ruin of the facing. Dry litharge, dusted liberally upon the contact surfaces, is a western panacea for slipping leather clutches, and as it is not readily purchasable when most needed, a small can of it in the tool box is a safe precaution.

It is particularly important that the tires be of very large section, generally much larger than the normal equipment of the car, this being a secret of successfully traversing bad sand. None smaller than four inches should be used, no matter how light the car. Spare tires must be carried, of course, and an abundance of extra tubes is a necessity, as cemented patches cannot be depended upon in the hot climate. Also, it being any number of times easier to keep going in the sand than it is to start in it, never enter upon a long sandy stretch on the high gear unless the running is down hill, any attempt to change down the gears being almost sure to result in stalling. To start again, when all else fails, a piece of canvas tarpaulin, or even a few gunny sacks worked under the wheels, will do wonders. The car being run slowly on the low gear, the person who places the canvas can by a little hustling easily pick it up and regain his seat.

Bad places, while apt to be very bad, have usually the redeeming feature of being very short. Of the varieties most encountered, there will be "stair steps" in the rocks on grades, excessively steep and abrupt small gullies, fords, patches of deep or very slippery mud, and deep ruts at the sides or high rocks in the middle of the road. The first, on upgrades, can in some cases be surmounted with a low-powered car only by stopping, placing the low gear in mesh, speeding the engine, and then abruptly slamming in the clutch, trusting to good construction to stand the stresses on tires, springs, and transmission. Bad gullies are best taken by "rushing" through on low gear, slowing for just an instant at the bottom of the descent if the rise is very abrupt.

Fords with hard bottoms may be taken at high speed, and must be if very long, or else the water whirled into the bonnet from below will drown the engine. With high-tension ignition it is very easy in fording to cause short circuits that may require hous to dry out. Naturally, the drying-out process is more conveniently accomplished ashore than afloat, from which the logic of "rushing" through is apparent. A ford with very sandy bottom or an abrupt bank on the far side is better rushed on one of the lower gears. A ford with a rough bed of rocks is most treacherous of all, and, if possible, must be gone through slowly. If found in combination with high banks, it may have to be rushed at some risk, on low gear.

The worst place between Los Angeles and Utah is a ford of this description at Twin Springs, Nevada. Piling a lot of sage brush into bad fords or gullies often will reduce the difficulties of getting through. Mud, unless very deep, can be traveled through rather easily with tire chains, while ruts and rocks will do no injury to any car with reasonable clearance if some care is taken in picking the road. Though the desert and mountain roads are very bad in spots, that they do not average so can be inferred from the fact that in one instance of which the writer knows a four-inch tire, with nine hundred pounds on the wheel, ran from Los Angeles to Ogden without pumping.

In Nevada there are some automobile roads roughly maintained by the automobile stage lines that have been responsible for the development of so many new mining camps, and as horse trespassing on these is a penitentiary offense, the sage brush grows high between the wheel ruts. And as it "whips" under a fast-running car it has a trick of turning on gasoline and water drain cocks if these are exposed and the precaution is not taken of wiring them shut.

Many of the runs between settlements are of such length that no standard cars are built with gasoline capacity sufficient to cover the distance, so the carrying of extra gasoline becomes imperative. As gasoline is commonly sold in five-gallon square cans in the west, two cans in a wooden case, these can be fastened to the running boards or elsewhere on the machine. They must be well secured against rattling about, or they will surely develop leaks. The same sort of cans can be conveniently used to carry water. It should be made a rule never to leave a settlement where gasoline or water is to be had without laying in a supply, unless it is positively known that the next supply can surely be reached without trouble.

Carelessness of this sort, in conjunction with a fuel consumption of a third of a gallon a mile through a long stretch of bad sand, once occasioned the writer a 30-mile walk across the desert and two days' delay. Gasoline is cheap on the Pacific Coast and east of Great Salt Lake, but the prevailing prices, even along the railroads, are 40, 50, and 60 cents a gallon throughout the desert country. When there is time enough, and the schedule is sufficiently well defined, gasoline can be shipped ahead for less than it can be bought from point to point. Water is as important as gasoline, for both car and occupants. A five-gallon can for the machine and a couple of two-gallon canteens for the passengers will be about right. With plenty of water to drink the dry desert heat is much more bearable than the humid weather of eastern summers, but without water for even an hour the hardiest begin to suffer, especially should any walking be necessary, while a "dry camp" is a desert synonym for misery. Much of the water that will be found is undrinkable, so the advice on this score should be had from the natives.

Lubricating oil of proper quality is almost impossible to secure except at one or two of the big camps, so enough for practically the entire trip should be taken along.

Dry cells can be had in a few places, and when had will quickly deteriorate, if not already in bad condition, from drying out. Storage batteries can be charged once at most in the course of any possible trip. The result is that magnetic ignition of some type is imperative if serious ignition troubles are to be avoided.

Good lights are desirable for camping rather than for driving, as night running under no circumstances should be attempted. As surely as it is it will result in getting lost, for no matter how well the road itself may be illuminated, the inability to keep track of the general topography of the country will end in missing the road, which, being ordinarily a mere wagon track, can be easily confused with some similar track, perhaps made months before, branching off to one side.

The route should be inquired and verified at every opportunity, as a hundred-mile run without meeting any one is always to be anticipated. In contradistinction to first ideas of the tenderfoot —accustomed to rural ignorance of local geography in the populous eastern states—directions secured from teamsters and others can be depended upon absolutely, even the mileages given often coming out almost exactly on the odometer. Ignorance of the road through the deserts may too easily mean calamity to be permitted to any one. Pencil sketches should be made embodying information secured, distances being such that the best memory is scarcely capable of following the often complicated directions. The post-route maps issued by the government will be helpful, while the topographic maps are particularly useful to the extent that they are to be had for the localities traversed.

By careful planning and avoidance of unscheduled delays, night stops can be usually made at some sort of habitation, but a camping outfit, including blankets and perhaps pneumatic mattresses or sleeping bags, is certain to come in handy, while if it is regularly used it will reduce expenses materially, besides affording complete independence of any schedule. A several days' supply of condensed foods, together with an alcohol cooking outfit, also will prove its usefulness, besides being another means of saving money. A tent is not particularly necessary, as rains are very brief and uncommon during the season when motoring is practicable, but the car should have a top if only to protect from the sun, while a tarpaulin can be used as a protection against any inclement weather that may chance along, besides being useful in sand to keep dust from the baggage, etc.

A very important precaution, which can be neglected only to be regretted, is the care of the skin. The alkali invariably present in the desert dust is excessively irritating to the most calloused complexion if permitted to enter the pores, and often causes violent acute eczemas that can be counted upon to spoil all enjoyment for a week or ten days. The only preventive the writer knows of is the rather disagreeable but quite efficacious expedient of thoroughly greasing face, neck, and hands with cold cream before each day's ride. Washing in strongly alkaline water also is to be avoided, it frequently proving worse than going dirty.

New French Rating Formula Considers Stroke

By MORRIS A. HALL

IN the issue of *Omnia*, Paris, for April 23, Louis Lacoin, the French engineer and designer, gives a new rating formula, which considers not only the stroke as well as the bore, but also the speed. The result is arrived at through a consideration of the volumetric capacity of the cylinders, which is found by multiplying the area by the stroke times the strokes per minute. The area being found directly from the bore times a constant, this constant may be introduced in the formula. So, too, with the number of strokes of the engine, this may be figured as the number of revolutions per minute times a constant, and the latter introduced into the formula.

Considering the bore, stroke and revolutions, a formula for the power developed would take the form:

$$P\ (\text{power}) = K\,d^2\,c\,n,$$

in which K is a constant, d the bore, c the stroke, and n the revolutions per minute.

From a minute and unconsequential consideration of these various items, and their relative bearing upon the final result,

$$P = \frac{d^{1.5}\,c^{1.2}}{12{,}500}$$

which is for ordinary service, but which for test or short trials may be slightly greater, a more accurate figure being obtained from the second formula of similar nature:

$$P = \frac{d^{1.5\ 1.2}}{10{,}000},$$

As the author says, "This formula is remarkable in that the exponent of the bore, d, is less than two. Many formulas have been proposed in which d and c were used, but never has the evaluation of the bore been given a lesser value than the second power. These older formulas have been found to be close enough to the results found in actual practice, so that the ratio of the bore and stroke does not vary between wide limits."

All the above formulas apply to motors with four cylinders.

Speaking further on the subject of the ratio of bore to stroke, the author says, "Suppose, for instance, that this ratio be taken as 1.2, then the formula assumes the form:

$$P = \frac{d^{2.7}}{8{,}000},$$

an expression which shows that the bore d has a value between two and three."

In the accompanying tables, results as obtained from the formulas given (with the 10,000 denominator), with usual sizes of engines are given, while for the sake of comparison the English equivalent of each size of bore is given, and, in addition, a full table of A. L. A. M. horsepower ratings for usual sizes.

In comparing the two results, it will be noted, for instance, that a four-cylinder, four-cycle engine of 4-inch bore would rate at 25.6 horsepower by the old or A. L. A. M. formula, while with equal stroke, that is, four by four, it would rate at something over 25.1, that being the power for an engine of 3.94 bore and stroke. Moreover, with the stroke increased to 110 mm., or 4.33 in., the power rating moves up to 28.1, and for successively longer strokes of 120 mm. or 4.73 in., 130 mm. or 5.12 in., 140 mm. or 5.51 in., 150 mm. or 5.91 in., the rating moves up to 31.3, 34.4, 37.6 and 40.8 horsepower, respectively.

Since the use of metric units in this country is very limited the formulas are of little benefit, unless rendered into other and more common units. With this idea in view, the writer has made the conversion, in which case the formulas assume the form of:

$$P\ \text{average} = \frac{d^{1.}\,c^{1.2}}{2.01},$$

and

$$P\ \text{trial} = \frac{d^{1.}\,c^{1.2}}{1.61}.$$

Both of these would be simplified, and thus, made more suitable for universal use by dropping the last figure of the denominators, making them, respectively, 2 and 1.6. This would make no real change in the result, the increase being slight.

HORSEPOWER OF ENGINES OF A GIVEN SIZE BY THE NEW FORMULA

Diameter mm first In. sec.	Stroke 90	95	100	105	110	115	120	125	130	135	140	145	150
60 2.36	10.3	11.0	11.7	12.4	13.1	13.8	14.6	15.3	16.0	16.7	17.5	18.2	18.9
65 2.56	11.6	12.4	13.2	14.0	14.8	15.6	16.4	17.3	18.2	19.0	19.8	20.6	21.4
70 2.76	12.9	13.8	14.7	15.6	16.5	17.4	18.3	19.2	20.2	21.1	22.0	22.9	23.8
75 2.95	14.3	15.3	16.3	17.3	18.3	19.3	20.3	21.3	22.3	23.4	24.4	25.4	26.4
80 3.15	15.8	16.8	18.0	19.0	20.1	21.2	22.4	23.5	24.6	25.7	26.9	28.0	29.2
85 3.35	17.3	18.5	19.7	20.9	22.0	23.3	24.5	25.7	27.0	28.2	29.5	30.7	32.0
90 3.54	18.9	20.1	21.4	22.7	24.0	25.3	26.7	28.0	29.4	30.7	32.1	33.4	34.8
95 3.74		21.8	23.2	24.6	26.0	27.5	28.9	30.4	31.8	33.3	34.8	36.2	37.6
100 3.94			25.1	26.6	28.1	29.7	31.3	32.8	34.4	36.0	37.6	39.2	40.8
105 4.13				28.6	30.2	32.0	33.6	35.3	37.0	38.7	40.5	42.2	43.9
110 4.33					32.4	34.2	36.0	37.8	39.7	41.5	43.3	45.2	49.0
115 4.53						36.9	38.7	40.6	42.5	44.4	46.4	48.3	50.3
120 4.72							41.1	43.2	45.2	47.3	49.4	51.5	53.6
125 4.92								45.8	48.1	50.3	52.6	54.8	57.0
130 5.12									51.0	53.3	55.7	58.1	60.5
135 5.32										56.3	59.0	61.4	64.0
140 5.51											62.5	64.9	67.5
145 5.71												68.5	71.1
150 5.91													75.0

A. L. A. M. STANDARD HORSEPOWER TABLE FOR COMPARISON

Diameter mm first In. second	Power	Diameter mm first In. second	Power	Diameter mm first In. second	Power
64 2 1-2	10.0	95 3 3-4	22.5	127 5	40.0
68 2 5-8	11.0	99 3 7-8	24.0	130 5 1-8	42.0
70 2 3-4	12.1	102 4	25.6	133 5 1-4	44.1
73 2 7-8	13.25	105 4 1-8	27.25	137 5 3-8	46.0
76 3	14.4	108 4 1-4	28.9	140 5 1-2	48.4
79 3 1-8	15.65	111 4 3-8	30.65	143 5 5-8	50.65
83 3 1-4	16.9	114 4 1-2	32.4	146 5 3-4	53.0
85 3 3-8	18.25	118 4 5-8	34.25	149 5 7-8	55.25
89 3 1-2	19.6	121 4 3-4	36.1	152 6	57.6
92 3 5-8	20.25	124 4 7-8	38.0		

Despite the form of the formula given, and the fact that the table is figured for metric sizes, the inch sizes may be found from it by interpolation. Thus, to find the power rating of an engine of 3-in. bore and 4-in. stroke, take the power for the nearest bore and stroke from the first table, namely, 75 by 100 mm, which power rating is 16.3. From the other table the true size is found to be equal to 76 by 102 mm. In the first table the difference made by increasing the bore 5 mm. is found to be 1.5, so the difference for but one additional mm. would be but one-fifth of this, or 0.3, making the result 16.3. Again, the stroke increases the rating but 1.0 for 5 mm., or 0.2 per mm. The increase here is 2, or twice that, making the total 16.7.

While the formula does not result in a form which is useful in the sense that the present very simple formula is useful, it presents a form long desired, that is, one that considers the stroke. Moreover, to anyone really desirous of figuring out a representative power rating, the figuring presents no difficulty.

(*Continued on page* 984.)

When a New Body Must Be Purchased

By G. J. M.

TIME makes inroads upon the general appearance of an automobile, sometimes at a rate which far exceeds the rate of mechanical depreciation, and the question arises as to the expediency of replacing the body, rather than to purchase a whole new automobile. In the past it has been found a little difficult to replace a body, partly due to the unwillingness of makers to go into this sort of work, and, as styles change with considerable rapidity, it becomes a question as to whether or not one would care to replace an old body with one of the same shape and style.

There are now in use a large number of automobiles which have seen so much service that it is a question of replacing the body with one that is more up to date, or replacing the automobiles rather than to ride in cars that are obviously out of style. This question of style is not to be lightly thrust aside; every man, no matter how much he may try to present an elephant's hide, is bound to find himself a little thin-skinned in the face of ridicule, and the latter is bound to be his portion if he circulates among his friends in an automobile of an ancient vintage, as it were.

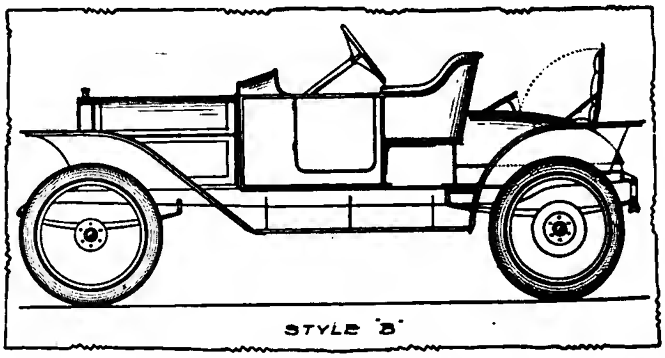
Making an Automobile Look Up-to-Date

The body may cover a multitude of sins, and yet the automobile may look as spick and span as a new creation just from the maker. It is all in having a modern body on the chassis. Of course, it would be poor practice to have a new body made for the old automobile, and not look after the mechanical features of the same. While the body is being made it will be a good idea to have the mechanical portion of the automobile put in the best possible order, the idea being to place one's self in a position to appreciate the good qualities of the new body when it arrives; this is but a matter of having the rest of the automobile in good running order. It is a natural assumption that it will be capable of being put in good order, otherwise it will scarcely be worth while to go to the cost of a new body.

The problem here, under the circumstances, is to show the most modern body work, and a little later, before this series of articles runs out, apply them to real automobiles, thus giving the touch of practicability. The four types of bodies, A, B, C and D, will give a wide range to select from, and they will be so designed, with all details of framing, etc., shown, that they will go on a Cadillac "30" chassis, which is taken as a model to employ in this undertaking, although, as will readily be appreciated, any other automobile will serve the purpose, it being only necessary to conform to whatever differences in measurements there may be between them.

Characteristics of the Four Types of Bodies

Style A shows the body without attachments, i. e., the platform clear for carrying luggage. This platform is 40½ in. long by 33 in. wide, and is formed by boarding across between the side sills. The seat is individual or bucket shaped, with straight line panels of metal; it is 18 in. high in a perpendicular at the back from under the trimming to the seat base line. The underbody is 10 in. high, and from the base line of the sill to the top of the door is 21 in.; from the back of the dash to the front of the seat frame is 32 in.; the door opening is 18 in., and the hood is 9 in. in a horizontal line from the front of the dash. The door, which is on the left side only, is capped with a mahogany wood strip from the hood to the trimming, and the right side is made to correspond. The door has been made to swing from the front, and the lock handle is on the inside; this is done to give a smooth appearance on the left side to correspond to the right. The structure is wood framing with metal panels and moldings. The trimming is generously thick and tufted, and the size of the cushions is 18 in. deep from front to back by 18 in. wide by 5½ in. high or thick at the front and tapered 2 in. toward the back; the height from the top of the floor to the top of the cushion is 14½ in. The trimming is carried on the sides on a line with the top of the door to the back of the dash; this latter is either painted or finished mahogany, and the under side of the hood is painted. The gasoline tank is under the seat, and by utilizing all the space down to the chassis frame a tank holding approximately 18 gallons can be carried. The hand levers are on the outside of the body sides. In our illustration the quadrant is right to permit of this; in case of the quadrant being closer to the chassis, one lever is placed inside

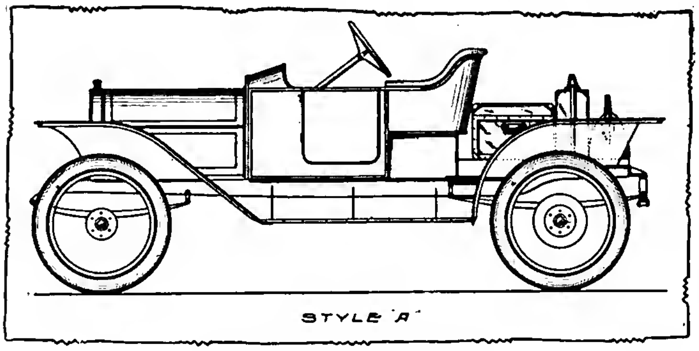


Torpedo stern attached to runabout body as shown in Fig. 1, with a seat for one; it is a popular idea

and one outside of the body; this is accomplished by bending the levers in opposite directions, and making a housing or cut-out from the bottom of the body high enough to fit over the quadrant.

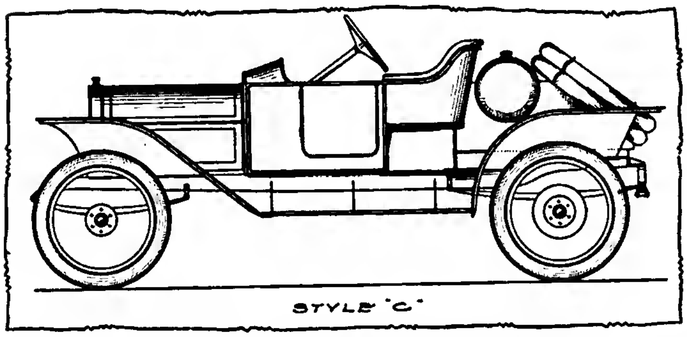
Style B shows the torpedo stern attachment assembled on A. This torpedo stern is entirely self-contained; at the front end where it is assembled to the seat, there is a panel shaped to the curvature of the seat, and also to the line of the underbody. The well, or lid opening, at the top, has a raised ledge or coping to keep out the water, and along the base line a tee molding is fastened, the projecting edge of which laps over the platform edge on the sides and the rear fastenings are by clips or angles secured to the platform by set screws, the same holes on the platform being used for all the different combination attachments. The lid is made in two parts, the rear or lower half forming the back of an auxiliary seat; this automatically opens when the lid is raised, and when closed fits tight to the lid; the metal top is in one piece of 16-gauge aluminum.

Style C shows the racy type assembled to A. This is made of metal also, with wood sill or frame at the bottom. The lid is sometimes made the full size of the sloping back, and the extra tires are fastened to this. To gain access to the interior when the extra tires are in place, one opens the lid, and the tires move outward with same. A small lid that will open inside



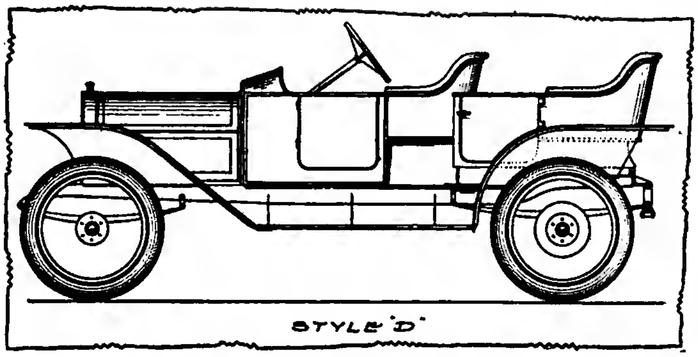
Type of runabout body with a clear platform at the rear to accommodate luggage and what-not the tire opening is most convenient and is illustrated in the working drawing that will follow. This attachment C is entirely self-contained similar to style B at the front, and under the tank are watertight panels; the lid opening is protected by a raised coping and tee moulding is used to keep the water out at the bottom. The tank is secured in place by steel straps that pass over the upper part of the tank and are fastened to the top edge of the body with machine screws.

In style D is shown the parts assembled that go to make the conventional toy tonneau. The door and the seat are made to conform to the design of the front, the seat being made for generous room for two seatings; dimensions are 18 inches from the rear of front seat to the front of rear cushions; the size of cushion is 39 inches long across by 19 inches deep back to front by 6 inches deep or thick at the front and tapered 2 inches toward the back. The style of trimming will conform to that of the front seat, and the doors will have pockets on the upper half; on the top of the doors are mahogany finish strips. The door lock posts at the front are fitted close to the front seat



Racy type of runabout body with a gasoline tank, and tire equipment on the deck back of the driver's seat

panel, but do not touch same, therefore the painted surface is not marred or scratched, and when the tonneau is removed, the true runabout effect is preserved. The door opening is 18 inches



Toy tonneau with a "gunboat" cast; it represents the newer idea, and offers the advantage of being compact

and at the bottom, ahead of the mudguard, the opening is 6½ inches; this is ample room for this type of body, as when entering or leaving the tonneau room for one foot will be found sufficient, provided there is sufficient room higher up, on a line with the hips. A small step is shown on line with the top of the chassis frame; this can be used as the top of the housing over the front end of the rear spring. As the floor of the platform is 2 inches higher than the floor of the front, there is provision for the two front boards to be removed, and below this upper boarding are permanently secured floor boards, on a line with those at the front; this is to permit of sufficient leg room in the tonneau; the detail will be illustrated in the working drawing.

The general appearance of the four types of bodies will be very much as here depicted, and it will be to the advantage of the interested autoist either to use the design selected, without any modification, or have new designs completed for whatever body is selected, on the ground that the result may be very disappointing if modifications are agreed upon without going to the trouble of proving that the appearance will be that desired in the finished automobile.

(To be continued.)

Colors in Their Relation to the Automobile

By M. C. HILLICK

THE most important detail in the process of painting and finishing for the automobile is the selection of the color or color combination to be used, and the application of the same to the surface.

The chief reasons for painting the surface of an automobile body are the protection of the surface by the pigment and the sense of luxury conveyed by the colors. A fitting color which is properly placed upon an automobile of unpromising design will often serve to relieve the ugly features of the car. As is admitted by designers, form, outline and design are, to a large extent, subject to the influence of the color employed.

Within the last two or three years the importance of the use and disposition of colors upon automobiles has come to be widely recognized by all parties connected with such vehicles as users and sellers. Color effects have been found to influence the sale of a car and proved to increase the pleasure of an owner in his machine.

Probably the most preferred color is, at this time, the one which is termed as "red." This color covers a multitude of shades running from light American vermilion to dark maroon. As this year fewer variations of lighter red are being used than during the past years, the public seems to have tired of the "pillars of fire."

The red shades seen most frequently on city thoroughfares are automobile maroon, new maroon, a beautiful deep, rich red, etc., Grosbeak red, deep Agostein red, light and deep, and Julian red, medium and deep. These are opaque colors not requiring, necessarily, a supporting ground.

Among the larger cars, such as touring cars, limousines and landaulets, are to be seen such rare and beautiful lakes of the red order as English and American Ennison lake, medium and deep shade, dark and medium carmine, English scarlet lake, Munich lake, Chatemue lake, and permanent purple. These lakes have grown popular during the past one or two years and the writer has been informed by a traveling salesman for a color-grinding firm that such rare and costly lakes are now sold in 50-pound lots, which formerly were sold in pounds only. They are examples of radiant and effective colors, and their employment is becoming more and more universal among builders and jobbers of automobiles.

During the last two seasons brown has also developed into one of the most desired automobile colors. Various shades of brown have been widely displayed, among them being pongie brown, the original automobile brown, also onyx brown, golden brown, automobile brown, amber brown, Quaker, olive and Detroit brown, and even very fine and nice hazel brown. Browns are commended as a departure from the "sensational" pigments for the light build of cars. They are durable colors, easily handled and will stand a lot of hard usage in service.

Regarding the grays, the use of new, useful and pleasing pigments is confined, in general, to the runabout class and the lighter touring cars. However, many of the larger cars may this season be found painted automobile gray, French gray, light, medium and deep cadet gray, battleship gray, or twentieth century gray.

Studies in Aviation Theory and Practice

By MARIUS G. KRARUP

SUBJECTS for investigation by the aeronautic designer fall into four natural divisions: 1, sustentation; 2, equilibrium; 3, propulsion, and 4, materials. As has already been indicated in introductory articles appearing in recent issues of this journal, the questions relating to sustentation are those which were solved, in a fashion, when the first aeroplane flew. While improved sustentation will permit more substantial construction and a greater independence of wind and weather than is at present enjoyed, the safety of life and limb is more closely bound up with improved equilibrium, and the value of aviation for practical traveling purposes is more closely connected with the improvement of propulsion. Therefore, while the principle of sustentation of weights in the atmosphere is the most fundamental principle for flight, it is the one which at present is best worked out. Giving least concern, it may be passed in review rapidly.

It is approximately true, as found by laboratory tests and confirmed in practice, that a plane of a curvature of one-eighth at a tilt of 7 degrees will support a weight about five times greater than the weight—or force in "gravitation measure"—required for driving it in horizontal flight. Graphically, as in Fig. 1, 250 pounds in a form offering a minimum of air resistance, and hung from a frictionless pulley, can by the gravitation of its mass reach sufficient speed to pull a plane, such as described and weighted to a total of 1250 pounds, horizontally through the air, provided the weight suspended from the plane be so distributed as to hold the plane in equilibrium at a tilt of 7 degrees, but, if the weighty portions in themselves produce a considerable air resistance, some allowance is to be made for this resistance which reduces the weight-carrying capacity of the plane. If the equilibrium is changed so as to produce a higher tilt, the plane will offer more resistance to propulsion, but if increased power makes it reach the same speed as before, it will support more, even considerably more, or, with the same weight, it will rise in the air at an inclination proportionate to the increase of tilt, so long as the angles remain small. But at the high tilts, from 15 to 30 degrees, where the maximum of sustentation is reached, the increase in sustentation progresses at a considerably slower rate than the increase in tilt. Under all circumstances the sustentation does not begin until some speed has been reached. In the graphic example of Fig. 1 the falling weight must have gained some headway before the plane can leave the ground. The speed required depends upon the area of the plane, while the propulsive thrust needed for reaching the required speed, for a given area held at a given tilt, depends upon the skill of the designer in minimizing those factors which offer resistance without contributing to sustentation.

With planes of smaller curvature than one-eighth, the sustentation produced is smaller, but the resistance to propulsion is also smaller, and the higher speed required for sustaining a weight five times greater than that which measures the power is reached as readily as the more arched plane reached the lower speed required for it, and it seems probable that the sustentation obtained now by means of planes with an one-eighth curvature may be produced with planes offering less resistance through simple improvements in design and materials.

From the foregoing it is evident that sustentation does not depend on power, in the sense that the plane should fall rapidly when the power ceases to act. The machine's own weight, say, 1250 pounds, when allowed to descend at an angle giving one foot drop for every five feet of horizontal displacement, supplies in itself a power equal to the vertical gravitation of 250 pounds and is therefore sufficient to maintain the 1250-pound machine at that angle, and by employing planes of a sufficient area both the speed and the angle for an involuntary or voluntary descent may be reduced, without the use of propelling power, wholly according to the skill of the designer. The less resistance the machine offers of the kind which does not contribute to sustentation, the more gradual the descent by gravitation may be made for a given relation between weight and area of the plane.

In Fig. 2 curves are plotted showing the support derived from one square foot of area at speeds of 15, 20, 30 and 40 miles per hour by a plane of one-eighth curvature. Where the curves are wavy, an unstable support, due to shifting of the center or axis of pressures, is indicated. The curves are approximated from actual flying practice and the tests conducted by Rateau, Brillouin, Eiffel and Ribouchinski. Fig. 3 similarly presents comparisons between propeller thrusts required at the average aeroplane speed of 25 to 30 miles per hour, and the weights supported by means of these thrusts, in planes of different curvatures, but it is evident that the curves shown cannot be highly accurate and that they are destined to be superseded, as soon as designers shall have learned to get the sustentation from a plane of one-fiftieth or one-thirtieth curvature which is now obtained only if the one-eighth curvature is employed, or in the case of any other important improvement in planes being made.

With regard to sustentation, the situation lies then so satisfactory that the designer need not worry. With curvature, area, tilt and speed all measurably at his command and all adapted to produce sustentation, he finds himself in position to support all the engine power which he should need and all the extra load which there is any immediate necessity for carrying. Between 15 and 50 miles per hour he has *carte blanche* to juggle with areas, curvatures and tilts in order to get support for his structure. If it is so constituted that he can drive it into the air with his power equipment it is *eo ipso* also so constituted that it can be made to descend gradually without power, provided he is high enough up in the air, when the power gives out or is shut off, to allow him a second or two for operative control action. But if the designer wishes to fly at a smaller speed than 15 miles, he must invent decisive improvements over present construction. In order to rise into the air at a moderate speed, he only has to provide a propulsive power which, measured in pounds, equals one-fifth of the weight of the structure. He can then have either a large area with small curvature or a smaller area with greater curvature, and in either case he can produce variations in sustentation by varying the tilt. By choosing both large area and large curvature he can reduce his power much below one-fifth of his weight and still have enough sustentation for rising. He can finally reduce both area and curvature and manage to rise by high propulsive power and high tilt, but if he manages so closely as to require the high tilt constantly, he will have little range of tilt left for control purposes—as in the Santos Dumont "Demoiselle" type—because the useful and dependable tilts, with present limitations of construction, vary in practice only between 5 and 20 degrees.

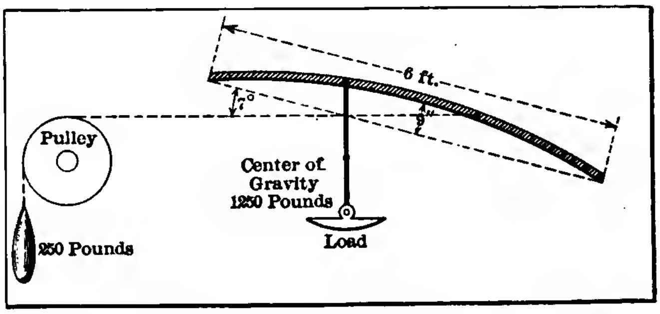


Fig. 1—Illustrating Principle of Sustentation by Aeroplanes

Even at the present stage of the science of aviation, the question of sustentation is then practically reduced to the question of producing a suitable propulsive thrust, and, on the other hand, of so shaping the machine that this thrust is translated into speed with as little waste air resistance as possible, and particularly to produce a thrust which will equal or nearly equal in power the gravitation of one-fifth of the machine's weight. This is already accomplished with the engines, planes and propellers now in use, but the greatest diversity of opinion exists with regard to the proper means for measuring the propeller thrust. The designer requires to know what his propeller will do in combination with the engine at his command and with directly comparable reference to the weight which he has to sustain. It is of no value for him to know how many cubic feet of air the propeller will displace or thrust in any given direction, at one speed or another. Calculations on these points simply change the large bill of foreign denomination into small coin equally foreign and not possible to pass current for the transaction in hand. The thrust produced by the propeller must be known in terms which have nothing to do with the dynamics of the atmosphere, which themselves constitute the subject under investigation.

The most suitable unit for measuring the thrust—without going into the scientific refinement of employing the absolute units, ergs and poundals for measuring force and work—would seem to be the one usually employed, which is the gravitation force of one pound, or of one kilogram where the metrical system is preferred. The gravitation force of one pound is equal to about 16 foot-pounds, while one horsepower equals 550 footpounds, so that the sustentation of 34 6-16 pounds in a vacuum equals one horsepower. If the measure of propeller thrust in pounds shall mean anything definite and applicable, and something in which the confusing element of air resistance is not introduced in the very unit of measurement for a dynamic action in which air resistance is the most important element, one pound of propeller thrust must then mean 16 foot-pounds of propeller thrust, and 34 6-16 pounds of thrust—if the thrust has been ascertained and measured with reference to the weight it will sustain—must mean one horsepower delivered by the propeller. The methods adopted in practice for measuring propeller thrust do not always agree with this view of the subject, but if it is accepted as nearly correct, it is seen that a thrust of 250 pounds for a propeller driven by a 30 or 50 horsepower motor represents only a delivery of 7 3-11 horsepower. And in the practical flight of aeroplanes this thrust represents at present all the power actually utilized for sustaining and driving a machine weighing 1200 pounds or more, at speeds ranging from 20 to 50 miles per hour. The work done by the delivery of 7 3-11 horsepower compares therefore favorably with the work done in driving an automobile at a similar expenditure of power. The waste is between the engine and the propeller thrust; that is, it is in the propeller design. In early automobiles a similar waste took place between the engine and the rear wheel rims; that is, in the gear transmission. High claims for efficiency in transmission gears were made then, and similar high claims are made to-day for efficiency in propeller design, but the true figures, now as then, do not permit the acceptance of the claims. On the other hand, the less efficient the propulsion must be acknowledged to be in the machines which nevertheless fly successfully, the less fault there is to be found with the sustentation and the means by which sustentation is at present secured. While sustentation is subject to improvement, the designer can get along very well with the well-known means currently employed for securing it, and his attention turns naturally to the three other divisions of the subject of aviation: Equilibrium, Propulsion and Materials.

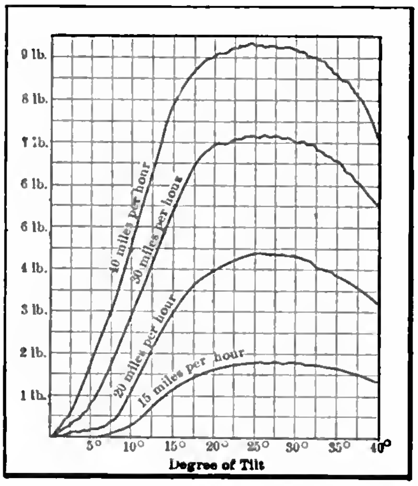


Fig. 2—Approximate Sustentation per Square Foot by Plane of "1/8" Curvature at Different Tilts

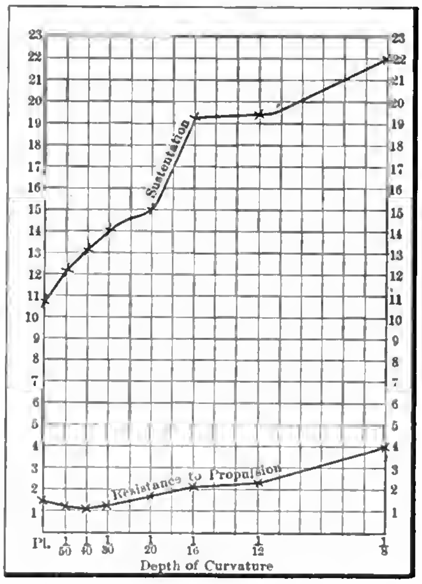


Fig. 3—Approximate Relations between Propeller Thrust and Weight Carried by Planes of Different Curvatures at 25 to 30 Miles per Hour

In the study of Equilibrium which is to follow, the situation is different. While the facts relating to sustentation are becoming known by experiments and practical flying, they remain quite unrelated to the physical laws which are generally understood. The laws which they represent are yet to be formulated. With regard to equilibrium, the laws are generally understood in theory, but their application to a structure which must be light and must be shaped so as to afford sustentation under a wide range of differing conditions presents numerous stumbling blocks for the mind as well as for the mechanic.

Alloys Used As Bearing Metals*

Theoretically all metals have the same friction, according to Thurston, and the value of the soft white alloys for bearings lies chiefly in their ready reduction to a smooth surface after any local impairment of the surface, such as would result from the introduction of foreign metal between the moving surface and the bearing. Under these circumstances the soft alloys flow or squeeze from the pressure into the irregularity, forming a larger area for the distribution of the pressure, thus diminishing its amount per unit of area. Further, the larger the area over which the pressure is extended the less becomes the liability to over-heating and consequent binding.

Lead flows more easily than any of the common metals under pressure, and hence it has the greatest anti-frictional properties. Of course, a number of metals exceed lead in this property, but their cost or some other factor render them unavailable. Lead is the cheapest of the metals, except iron, and in comparison to the other metals used in the formation of bearing alloys their relative prices are somewhat in the following order per one hundred pounds: Lead, $4; zinc, $5; antimony, $9; copper, $13; and tin, $30 or more. It can thus be seen that the more lead is used in a given bearing, the softer it is, the less friction it possesses, and the cheaper it can be furnished. It is, however, too soft to be used alone, as it cannot be retained in the recesses of the bearing even when used simply as a liner and run into a shell of brass, bronze or gun-metal or some other alloy. Various other metals have been alloyed with it, such as tin, antimony, copper, zinc, iron and a number of non-metallic compounds, such as sodium, phosphorus, carbon, etc., and the effect of the different ingredients is to-day fairly well understood.

*From "Machinery."

Elastic Limit of Manganese and Other Bronzes*

By J. A. Capp, Schenectady, N. Y.

TO keep up with the demands upon the laboratory for more work in a given time, testing machines have been speeded up and the slow extensometer has largely been displaced by the dividers, used either unchanged or with some means of magnification. To represent castings and forgings the short test piece with one-half inch diameter and two-inch gauge length is almost universal. As a consequence, while reports of tests usually include a statement of "elastic limit," the property of the material actually determined is in reality that more or less vague value called the yield point. It is the object of this paper to show that while the yield point for steel is so well marked in properly conducted tests, and bears a sufficiently definite relation to the true elastic limit to warrant the dependence placed upon it by the engineer, there is no equally well defined point found in testing bronzes, and the value commonly obtained from rapid commercial tests as the elastic limit or yield point on bronze may be quite misleading.

Manganese bronze was selected as the metal to be subjected to the series of tests here recorded because, of the modern alloys, it is one of the strongest and is readily obtainable in the market. It is not proposed, however, to discuss at length the properties of manganese bronze as such. This metal is used as a type and the results, so far as behavior under a tensile test is concerned, may be taken as typical of brasses and bronzes in general, at least so far as they have come under the observation of the author in some seventeen years of testing materials.

Specifications issued by the Navy Department for manganese bronze, March 30, 1909, required the following approximate composition:

Copper	52 per cent
Iron	1 per cent
Zinc	46 per cent
Tin	1 per cent
Manganese	Trace
Aluminum	0.5 per cent

The specification further required:

Tensile strength	65,000 lb. per sq. in.
Elastic limit	30,000 lb. per sq. in.
Elongation	15 per cent in 2 in.
Reduction of area	25 per cent

They state "the elastic limit is to be the yield point, measured by the drop of the bar."

Manganese bronze castings in the form of cylindrical bars about 1 1-2 inches in diameter by 24 inches long, were ordered from several foundries supplying this alloy; the orders were placed through the regular channels, bars of about this size being required in ordinary production. In this way it was hoped that commercial material would be obtained, such as might be expected in castings of more intricate shape. The results on these specimens, ordered without reference to intended use, checked very well with those upon samples submitted previously by the same parties, especially for the purpose of showing the qualities of their material. To indicate the effect of working upon the metal, there were also ordered two bars of the same dimensions hot-rolled to size, and two bars hot-rolled and cold-drawn. The effect of the cold drawing was lost to a great extent by the necessary turning off of the surface in preparing the specimen for test. Much of the cold-drawn metal is used in this way, however, when screw threads are required to provide means of fastening the part in place in the structure. From the bars so obtained, specimens were turned which provided a test section one inch in diameter by eight inches between gauge marks, and which had, for the purpose of gripping, ends 1 1-2 inches in diameter threaded to fit the nuts required by the testing machine.

Some of these specimens were pulled in the laboratory of the General Electric Company at Schenectady, some in the testing machine at the United States Arsenal at Watertown, and others in the laboratory of the Halcomb Steel Company at Syracuse. The tests in the Halcomb laboratory were made to obtain autographic strain diagrams; the other tests were made with an extensometer.

In the tests with the extensometer, after the instrument had been placed, an initial load of 1,000 or 2,000 pounds per square inch was applied and the first reading taken; readings were then obtained at successive loads applied in equal steps. In some cases the readings were continued regularly until the increase in extension per increment of load was so great that there was no doubt that the strain diagram had departed markedly from the straight line demanded by Hook's law; in other tests the normal succession of readings was continued only until the first positive increase in extension per increment of load was noted, when the stress was reduced to the initial load for the measurement of permanent set, after which the load was returned to the value just left, a new reading taken and the test continued with further determinations of set intervals. The values of stress and corresponding strain obtained were plotted, and the elastic limit recorded as the stress at the point of infection of the curve drawn through the points.

The specimens subjected to these tests were about 12 inches long over all. From the remainder of the 24-inch bars the usual 1-2 inch by 2-inch test pieces were turned and tested in the

TABLE 1.—CAST MANGANESE BRONZE, MARK 9902B

Extensometer Test

Original Diameter, 0.9995 in. Original length, 8 in.

Stress		Readings Extensometer		Difference Mean	Total Strain	Unit Strain
Actual	Per sq. in.	Right	Left	Initial Reading		
1,570	2,000	0.0235	0.0075	......	......	......
3,140	4,000	0.0245	0.0089	0.00120	0.0012	0.00015
4,710	6,000	0.0254	0.0107	0.00135	0.00255	0.00032
6,275	8,000	0.0263	0.0122	0.00120	0.00375	0.00047
7,845	10,000	0.0272	0.0136	0.00115	0.00490	0.00061
9,415	12,000	0.0282	0.0151	0.00125	0.00615	0.00077
10,985	14,000	0.0293	0.0165	0.00125	0.00740	0.00092
12,555	16,000	0.0306	0.0181	0.00145	0.00885	0.00111
14,120	18,000	0.0320	0.0198	0.00155	0.01040	0.00130
15,690	20,000	0.0842	0.0219	0.00215	0.01255	0.00157
17,260	22,000	0.0370	0.0246	0.00275	0.01530	0.00191
18,830	24,000	0.0414	0.0279	0.00385	0.01915	0.00239
20,400	26,000	0.0456	0.0321	0.00420	0.02335	0.00292
53,040	67,600	Tensile	Strength	......	......	......

Reduced diameter	0.695 in.
Reduction of area	51.6 per cent
Length after test	10.20 in.
Elongation	27.5 per cent
Elastic limit (from curve)	15,000 lb. per sq. in.
Modulus of elasticity	12,900,000 lb. per sq. in.

Commercial Test

Original diameter	0.503 in.
Original length	2 in.
Reduced diameter	0.387 in.
Length after test	2.65 in.
Reduction of area	40.8 per cent
Elongation	32.5 per cent
Rapid stretch (yield point)	26,000 lb. per sq. in.
Tensile strength	69,650 lb. per sq. in.

*Paper read at a meeting of the American Society of Mechanical Engineers in Boston, March 11.

customary commercial way, using a pair of multiplying dividers to indicate the point of increase in rate of stretch or yield point.

In Table I are given in detail a typical set of readings taken in a test at regularly increasing loads, together with the results of

TABLE 2.—CAST MANGANESE BRONZE, MARK 9902A

Extensometer Test

Original diameter 0.995 in. Original length 8 in.

Stress		Extensometer Readings		Mean Difference	Strain	
Actual	Per sq. in.	Right	Left		Total	Unit
				Initial Reading		
1,570	2,000	0.0255	0.0125	......	......	......
3,140	4,000	0.0270	0.0133	0.00115	0.00115	0.00014
4,710	6,000	0.0282	0.0147	0.00130	0.00245	0.00031
6,275	8,000	0.0290	0.0163	0.00120	0.00365	0.00046
7,848	10,000	0.0298	0.0179	0.00120	0.00485	0.00061
9,415	12,000	0.0307	0.0194	0.00120	0.00605	0.00076
10,985	14,000	0.0218	0.0208	0.00125	0.00730	0.00091
12,555	16,000	0.0328	0.0223	0.00125	0.00855	0.00107
14,120	18,000	0.0342	0.0239	0.00150	0.01005	0.00126
1,570	2,000	0.0264	0.0122	0.0003	set	......
14,120	18,000	0.0345	0.0232	......	......	......
15,690	20,000	0.0360	0.0253	0.00180	0.01185	0.00148
1,570	2,000	0.0270	0.0125	0.00075	set	......
15,690	20,000	0.0365	0.0250	......	......	......
17,260	22,000	0.0384	0.0273	0.00210	0.01395	0.00174
18,830	24,000	0.0412	0.0301	0.00280	0.01675	0.00209
1,570	2,000	0.0291	0.0140	0.00265	set	......
18,830	24,000	0.0418	0.0296	......	......	......
20,400	26,000	0.0446	0.0332	0.00320	0.01995	0.00249
53,480	68,160	Tensile	Strength	......	......	......

Reduced diameter....................0.717 in.
Reduction of area....................48.5 per cent.
Length after test....................10.22 in.
Elongation ....27.8 per cent
Elastic limit (from curve)...........16,000 lb. per sq. in.
Modulus of elasticity................13,000,000 lb. per sq. in.

Commercial Test

Original diameter....................0.5028 in.
Original length......................2 in.
Reduced diameter.....................0.338 in.
Length after test....................2.84 in.
Reduction of area....................54.8 per cent
Elongation ....42.0 per cent
Rapid stretch (yield point)..........25,000 lb. per sq. in.
Tensile strength.....................67,940 lb. per sq. in.

the commercial test upon the specimen from the same bar. In Table 2 similar data are given from the test with measurements of set. Table 3 shows the results obtained upon the other specimens tested at Schenectady. The curves for all these tests are assembled on Fig. 1. Details of the tests at the Watertown Arsenal are stated in Tables 4 and 5, and the curves from these data are given in Fig. 2. The results of the work at the Halcomb laboratory are shown in Table 6 and Fig. 3; the scale of the diagram is so small that the location of the point of inflexion is uncertain within about 2,000 pounds actual load, and the values in the tables are placed rather high. The multiplying dividers used in the commercial tests here recorded magnify the movement of the gauge marks about ten times, and are a much more sensitive instrument that the machinists' dividers for locating the yield point, hence the yield points recorded are lower than are usually reported.

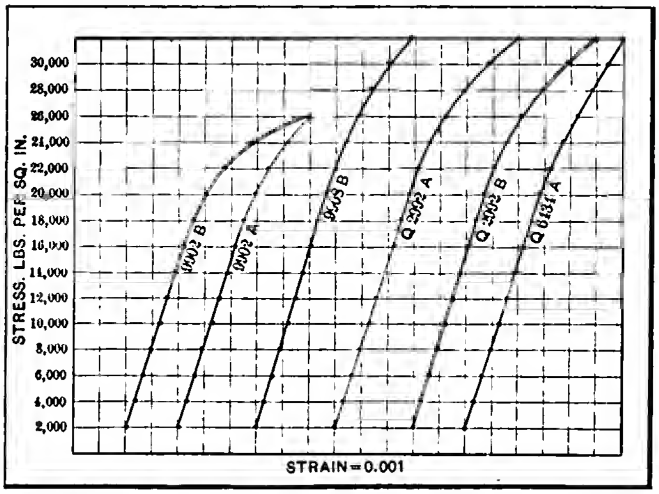


Fig. 1—Curves plotted from extensometer test data given in Tables 1, 2, and 3

TABLE 3.—EXTENSOMETER AND COMMERCIAL TESTS

Extensometer Tests: All Specimens 1 in. (Approximate) Dia. by 8 in. Long

Mark	9908B	Q2992A	Q2992B	Q6434A
Sample	*Cast	Hot-Rolled	Hot-Rolled	Cold Drawn
Reduction of area, per cent	14.1	52.2	52.2	53.3
Elongation, per cent	6.25	33.5	33.75	31.0
Elastic limit, lb. per sq. in.	19,400	18,000	18,000	17,000
Tensile strength, lb. per sq. in.	62,070	71,800	71,640	71,620
Modulus of elasticity, lb. per sq. in.	13,810,000	13,000,000	13,810,000	12,800,000

Commercial Tests: All Specimens 0.5 in. (Approximate) Dia. by 2 in. Long.

Mark	9908B	Q2992A	Q2992B	Q6434A
Sample	Cast	Hot-Rolled	Hot-Rolled	Cold Drawn
Reduction of area, per cent	28.5	44.9	45.9	39.9
Elongation, per cent	26.5	37.5	36.5	34.0
Yield point (rapid stretch), lbs. per sq. in.	29,000	30,000	30,000	43,000
Tensile strength, lbs. per sq. in.	80,420	74,780	74,480	74,260

* Bar 9908B was unsound, hence ½ in. by 2 in. test was turned from side of bar, instead of center. Unsoundness due to oxidation and perhaps segregation, probably accounts for the apparent cold shortness of the 1 in. by 8 in. test piece. Fracture occurred in a flaw, while many incipient fractures or cracks were noted in surface before final rupture.

In the text-books and elsewhere the limit of elasticity is defined as that value of stress beyond which there is not full recovery of the initial dimensions or shape of the specimen after release of the load, or as the maximum stress that can be applied without producing permanent set. In other words, it is the value of stress beyond which Hook's law no longer holds, and it is sometimes spoken of as the limit of proportionality of stress to strain.

TABLE 4.—CAST MANGANESE BRONZE, MARK 9902B

Watertown Arsenal Test

Original diameter, 1,000 in. Original length, 8 in.

Stress				Strain		
Actual	Per sq. in.	Reading	Difference	Total	Unit	Set
785	1,000			Initial Reading		
1,571	2,000	0.0008	0.0008	0.0008	0.00010	.....
2,356	3,000	0.0013	0.0005	0.0013	0.00016	.....
3,142	4,000	0.0020	0.0007	0.0020	0.00025	.....
3,927	5,000	0.0027	0.0007	0.0027	0.00034	0
4,712	6,000	0.0033	0.0006	0.0033	0.00041	.....
5,498	7,000	0.0038	0.0005	0.0038	0.00048	.....
6,283	8,000	0.0044	0.0006	0.0044	0.00055	.....
7,069	9,000	0.0051	0.0007	0.0051	0.00064	.....
7,854	10,000	0.0060	0.0009	0.0060	0.00075	0
8,639	11,000	0.0067	0.0007	0.0067	0.00084	.....
9,425	12,000	0.0075	0.0008	0.0075	0.00094	.....
10,210	13,000	0.0080	0.0005	0.0080	0.00100	.....
10,996	14,000	0.0086	0.0006	0.0086	0.00108	.....
11,781	15,000	0.0090	0.0004	0.0090	0.00113	0
12,566	16,000	0.0105	0.0015	0.0105	0.00131	.....
13,352	17,000	0.0119	0.0014	0.0119	0.00149	0.0005
14,137	18,000	0.0133	0.0014	0.0133	0.00166	.....
14,923	19,000	0.0145	0.0012	0.0145	0.00181	.....
15,708	20,000	0.0167	0.0022	0.0167	0.00209	0.0025
19,635	25,000	0.0280	0.0113	0.0280	0.00350	0.0085
23,562	30,000	0.0487	0.0207	0.0487	0.00609	0.0241
31,416	40,000	0.2090	0.1603	0.2090	0.02613	0.1730
50,600	64,458	Tensile strength				

Reduced diameter....................0.70 in.
Length after test....................10.53 in.
Reduction of area....................51.0 per cent.
Elongation ....31.6 per cent
Elastic limit........................16,000 lb. per sq. in.
Modulus of elasticity................12,390,000 lb. per sq. in.

Commercial Test (Made at Schenectady)

Original diameter....................0.503 in.
Original length......................0.787 in.
Reduced diameter.....................2 in.
Length after test....................2.65 in.
Reduction of area....................40.8 per cent.
Elongation ....32.5 per cent
Rapid stretch (yield point)..........26,000 lb. per sq. in.
Tensile strength.....................69,650 lb. per sq. in.

Accepting this definition of elastic limit, it is seen that its value in the bronzes tested is from 16,000 pounds per square inch to 23,000 pounds per square inch, whereas the yield points

TABLE 5.—CAST MANGANESE BRONZE, MARK 9908B

Watertown Arsenal Tests

Original diameter, 9.7854 in. Original length, 8 in.

Stress				Strain		
Actual	Per sq. in.	Reading	Difference	Total	Unit	Set
785	1,000	0		Initial Reading		
1,571	2,000	0.0007	0.0007	0.0007	0.00009	.....
2,356	3,000	0.0013	0.0006	0.0013	9.00016	.....
3,142	4,000	0.0017	0.0004	0.0017	0.00021	.....
3,927	5,000	0.0028	0.0006	0.0023	0.00029	0
4,712	6,000	0.0028	0.0005	0.0028	0.00035	.....
5,493	7,000	0.0036	0.0008	0.0036	0.00045	.....
6,283	8,000	0.0040	0.0004	0.0040	0.00050	.....
7,069	9,000	0.0047	0.0007	0.0047	0.00059	.....
7,854	10,000	0.0052	0.0005	0.0052	0.00065	0
8,639	11,000	0.0059	0.0007	0.0059	0.00074	.....
9,425	12,900	0.0064	0.0005	0.0064	9.00080	.....
10,210	13,000	0.0070	0.0006	0.0070	0.00088	.....
19,996	14,000	0.0074	0.0004	0.0074	0.00093	.....
11,781	15,000	0.0081	0.0007	0.0081	0.00101	9
12,566	16,000	0.0088	0.0007	0.0088	0.00110	.....
13,352	17,000	0.0094	0.0006	0.0094	0.00118	.....
14,137	18,000	0.0099	0.0005	0.0099	0.00124	.....
14,923	19,000	0.0104	0.0005	0.0104	0.00130	.....
15,798	20,000	0.0113	0.0009	0.0113	0.00141	0.0001
16,493	21,000	0.0120	6.0007	0.0120	0.00150	.....
17,279	22,000	0.0126	0.0006	0.0126	0.00158	.....
18,064	23,000	0.0135	0.0009	0.0135	0.00169	0.0003
18,850	24,000	0.0143	0.0008	0.0143	0.00179	.....
19,635	25,000	0.0156	0.0013	0.0156	0.00195	9.0019
20,420	26,900	0.0165	0.0009	0.0165	0.00206	.....
21,206	27,000	0.0171	0.0006	0.0171	0.00214	9.0015
21,991	28,000	0.0185	0.0014	0.0185	0.00231	.....
22,777	29,000	0.0200	0.0015	0.0200	0.00250	.....
28,562	30,900	0.0210	0.0010	0.0210	0.00263	0.0034
27,489	35,000	0.0325	0.0115	0.0325	9.00406	0.0118
31,416	40,009	9.0607	0.0282	0.0607	0.00759	0.0384
35,343	45,000	9.1225	0.0618	0.1225	0.01531	0.0920
53,900	68,662	Tensile strength				

Reduced diameter....................0.91 in.
Length after test....................8.85 in.
Reduction of area....................17.2 per cent.
Modulus of elasticity...............10.6 per cent.
Elongation ....23,000 lb. per sq. in.
Elastic limit.........................13,300,000 lb. per sq. in.

Commercial Test (Made at Schenectady)

Original diameter.....................0.504 in.
Original length.......................2 in.
Reduced diameter.....................0.426 in.
Length after test.....................2.53 in.
Elongation ....26.5 per cent.
Rapid stretch (yield point)..........29,000 lb. per sq. in.
Tensile strength......................80,420 lb. per sq. in.

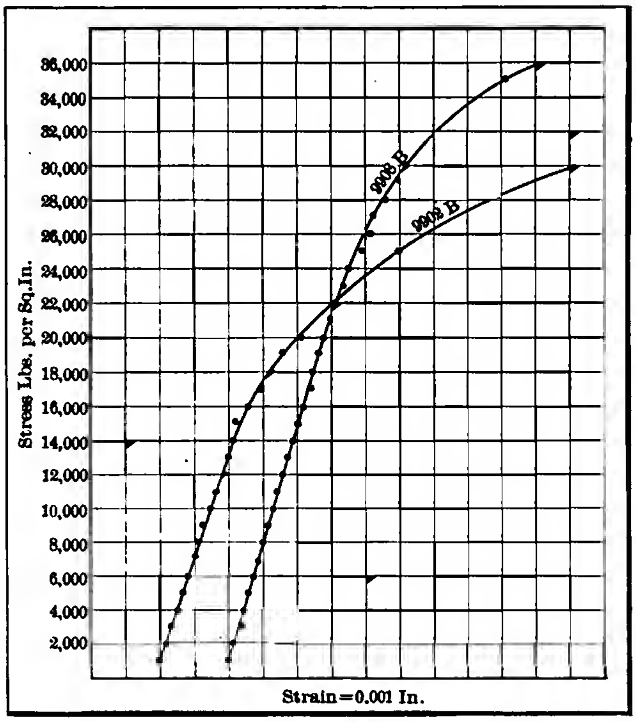


Fig. 2—Curves plotted from Government tests, data being given in Tables 4 and 5

found for the cast metals ran from 25,000 pounds to 29,000 pounds, and for the worked metals from 30,000 pounds to 44,000.

(To be continued.)

Legal Definitions and Explanations of Words

By XENOPHON P. HUDDY, LL.B.

A NUMBER of the legal controversies which have arisen concerning the automobile and its operation have hinged for determination upon the definition or meaning of the word or term used in connection with the automobile.

Generally speaking, a highway is a way along which the public at large has a right to pass. The term "highway" or public highway includes a turnpike and toll road, also a bridge and a ferry. A navigable river is a highway, so is a railroad. It is only when motor vehicles are operated on the public highways that the automobile laws apply. The owner or operator of a motor vehicle need not comply with any of the automobile regulations if the machine is used on a private road. A man may do as he pleases on his own private property.

In the United States we seldom hear of footpaths, bridle-paths, driveways, highroads, but each of these terms has a definite meaning, and will be found in existence in this country where the common law exists, which is in every State.

If the right of the public is one to pass and repass on foot only, the way is a "footpath."

If the right is confined to riding or leading a horse, the way is called a "bridle path."

If the public has the right to drive cattle along the way, it is a "drift way."

If the right is to drive in carts and carriages it is a "high road."

Only in the United States, especially throughout the country districts, it is customary to use all roads for all the purposes mentioned, still it may not be strictly legal under certain conditions for a person to use the road to drive cattle thereon, when it is being used at the same time by vehicles.

Considering the terms found in use to cover the automobile, we find that the State legislatures have specially defined the terms "motor vehicle" and "automobile" substantially as meaning any vehicle operated by power other than muscular.

The term "motor vehicles" also includes motorcycles, and where a registration law provides that motor vehicles must be registered and licensed, with no specific mention of excluding motorcycles, the latter vehicles are included, according to a recent decision of the highest court of one of our States.

When a person buys an automobile it may not be entirely clear as to what is included within the term. Already dispute has arisen concerning what is meant by a chassis. Manifestly certain accessories would not pass under a contract for the sale and delivery of an automobile. There are certain fixtures, however, which would be included within the meaning of the term, such as tires, the horn, and lights. Inasmuch as the automobile laws provide that motor vehicles must be equipped with certain things, these ordinarily would be expected to be received by the purchaser of an automobile. Chains, speedometers and clocks would not pass, nor would robes and goggles.

The courts have said a great deal about the automobile in describing it. It has been judicially stated that the automobile is not a work of art, nor is it to be classed with combustibles and inflammables, such as gunpowder and nitroglycerine. It is not in the same category as evilly disposed mules, according to the Court of Appeals of Georgia. It is no more dangerous than a sailboat or an ordinary carriage, says the Supreme Court of New York. Motor vehicles are not "household effects" within the meaning of the customs law, but the washing of an automobile constitutes a domestic use of water, and the owner does not have to pay an extra water tax.

The automobile is not a tool or implement of trade, and therefore exempt from attachment, but it is a carriage, according to some decisions. The Supreme Judicial Court of Massachusetts has held to the contrary, however, and declares that the automobile is not a carriage. A very recent decision of that court holds that one who hires an automobile is not guilty of a penal offense because he does not pay for the same under the law of Massachusetts which provides that it is a misdemeanor to hire a carriage and refuse to pay therefor. The automobile is not a locomotive, but a traction engine is an automobile. It is a vehicle, however, and is a "team" within the meaning of the law of Maine, which defines the word "team" as meaning all kinds of carriages used on the public ways for carrying persons or property.

The automobile is not a nuisance unless the driver makes a nuisance of it, which he may do if he obstructs the public highways or causes obnoxious smoke to be emitted from his car.

An automobilist is one who uses an automobile, whether he drives or owns a car, but an automobile driver is one who actually and physically operates an automobile. It has been held, however, that a person who sits beside a chauffeur and superintends the driving of an automobile may be convicted of driving the machine faster than allowed by law, although he did not actually and physically operate it. Ordinarily speaking, a chauffeur is one who drives an automobile for hire and at regular wages. Under the Pennsylvania Act the term means any one who operates an automobile or motor vehicle, and does not necessarily mean the person paid and employed for that particular and exclusive work.

The Garage Under the Law

The garage has been called the modern substitute for the ancient livery stable, but a garage keeper, independently of statute giving him the right, possesses no lien for unpaid charges for storage as is the case of a livery stable keeper. A garage is not a nuisance *per se;* however, it may constitute an "offensive business" within the restrictions of a deed of land prohibiting the conducting a business offensive to residential purposes. It may be a nuisance, however, if proper care is not taken in storing gasoline, especially if frame houses are adjacent to the garage.

In framing automobile legislation it is very important that the terms used should be clearly and explicitly defined, otherwise it may be impossible to accomplish what is intended to provide for. Those things and acts which are expressly included within the law are subject to it. Everything not covered by the law is not within its control. Take, for example, in the State of Vermont, where the motor vehicle law provides for the registration of automobiles, but does not expressly exclude traction engines. The Supreme Court of this State held that traction engines were automobiles, even though the legislature did not require these machines to be registered as motor vehicles. A similar situation arose in Michigan, where it has been held that the term "motor vehicle" includes a motorcycle.

It will be seen that definitions of terms are most important in considering the legal aspect of automobiling.

For Women Who Hold the Wheel

By MRS. A. SHERMAN HITCHCOCK

MOTORING has from its earliest advent proven an exceedingly fascinating pastime for the fair sex, and the women are constantly, through association and experience, learning more fully the mechanical detail of the car and are acquiring greater knowledge of its capabilities and necessities. The motor vehicle has created for women new possibilities for amusement and recreation, and has given them immensely increased independence. The stimulus of speed, the physical exhilaration without physical exertion, and the distance that can be travelled, all conduce to the general fascination, and whether one has been a lover of the horse or an enthusiastic cyclist, there is certainly nothing that can equal the motor car if saving of time and a maximum of comfort are to be derived. The successful woman motorist is the one who makes a complete study of her car and guards so far as possible against troubles arising when driving. Away out upon a country road, inconveniently far from expert aid, a motor woman is wholly dependent upon her mechanical knowledge to avoid delays which, in the majority of cases, are caused by quite simple failures, which might be easily overcome. A motorist should not expect to depend upon others to help her in cases of emergency. When the motor stops upon the road, one of two things is most likely the cause—either the proper supply of fuel is lacking or the means for firing the gas have gone wrong. In the first instance the fault is probably in the carbureter or with the gasoline supply. In the second it is the ignition system that requires attention. If previous to the stop there were weak explosions or a great deal of smoke in the exhaust, the indications are carbureter trouble. If there be missing explosions in the cylinders or back-firing in the muffler, the failure is undoubtedly in the ignition system, although both skipping and muffler explosions are sometimes due to a poor mixture. A common cause of ignition trouble is a short-circuited plug. If a certain cylinder is missing fire and the plug has been examined and cleaned and seems to spark well when the car is running on the level or down hill, but refuses to do duty when a hill is reached, it is an almost certain sign that the plug in that particular cylinder is short-circuiting, either from dirt or oil on the inside, or perhaps because it is cracked. The remedy is to change the plug for a new one. Soot on the surface of plugs often short-circuits them, permitting the current to pass through without forcing it to leap the spark gap. When a car is ascending a hill the motor will gradually slacken speed. The spark lever should be retarded by degrees as the speed of the motor decreases, that it shall not fire before the piston is over the dead centre. Before the motor has begun to run dead slow the gear should be changed and the ignition lever slowly advanced as the engine picked up. Another thing that causes chagrin to the beginner is to have the motor stop because the ignition is advanced too far while the motor is carrying a heavy load. Experiments with both the throttle and the ignition levers should be made until the best results under all conditions are obtained. The beginner will be very much humiliated to find that the reason the car refuses to go is because the brakes are on. This condition is not an improbability with the novice, so that one should be careful to see that the brakes are off before attempting to start the car. Another important thing to observe is that the ignition lever is always set back before attempting to start the engine. The beginner may suffer a sprained wrist, if not worse, from a back kick unless this lesson is well learned. Women motorists are often rather uncertain in starting their car and are fearful of their safety. An absolutely safe method is to have the car in proper condition; then, with the switch open, turn the engine over several times, allowing it to come to a stop by balancing between compressions. After this has been done, if the batteries are thrown in, unless the motor is absolutely cold the motor will be started on the spark.

Sullivan Delivery Wagon

INDICATIONS point to a decided increase in the commercial phase of the automobile, and among the conspicuous new efforts which are now taking form, the Sullivan Delivery Wagon will be mentioned. This commercial is the product of the Sullivan Motor Car Company, Rochester, N. Y., and the particular car here presented is designated as Model "20," and sells for $1,050, which price includes two oil side lamps, one oil tail lamp, horn, and a full set of necessary tools. In view of the diversity of the requirement by the different customers, from the body point of view, each body is made to conform to the particular requirement of the individual purchaser.

Excellence of the power plant is the first requirement in commercial service, not only because the load to be drawn is variable over wide ranges, and even excessive at times, but in view of the lack of mechanical knowledge of the driver, who, more often than not, ranks as an apprentice boy in a grocery store. That the power plant should be self-contained, and include everything complete, back to the universal joint, which intervenes between the driven shaft of the transmission and the propeller shaft of the car, is the idea of the designer in this case, and the manner in which the design features were executed will be appreciated by examining Fig. 1, in which the 2-cylinder opposed motor is placed with the cylinders C2 in the lateral plane, and the flywheel F1 is located at the front end. A close inspection of the whole design discloses a nice relation of the component parts. The radiator is placed just in front of the flywheel, as shown in Fig. 2, with two leads W2 from the top of the cylinders (one from each cylinder); the water passes from the motor cylinders to the radiator, through the connection W1.

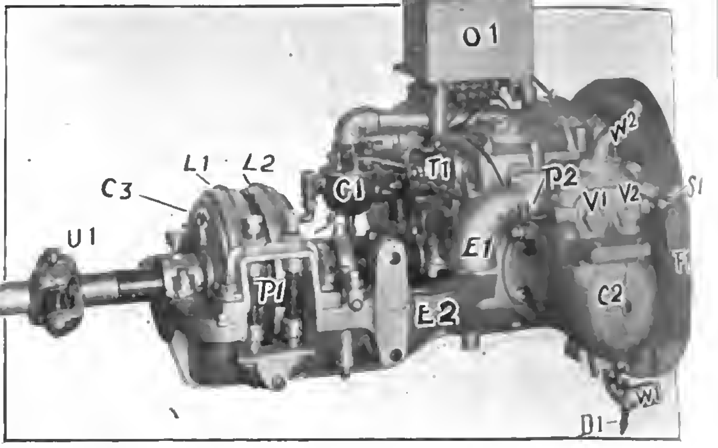


Fig. 1—Self-contained power plant showing 2-cylinder opposed motor, and extension of crankcase casting to house the planetary

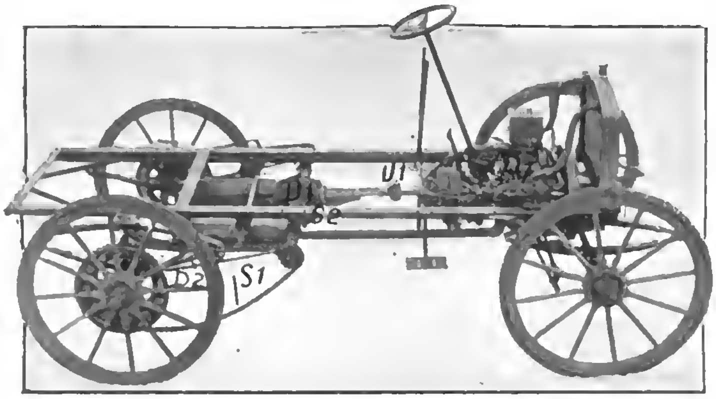


Fig. 2—Chassis presenting the mechanical layout with motor in front, independent differential system, and side chain drive

The planetary gear system P1 is nested in an extension E2 of the motor frame, so that alignment between the motor and the transmission is assured. Accessibility is a point of merit in the design, it being the case that the valves may be gotten at through the covers V1 and V2 for each cylinder; the exhaust connects through the fitting E1, and a relief cock P2 is placed for each cylinder in the plane of the valves at the rear, while the ignition boss which locates the spark plug S1, is at the front in the same place. The Schebler carbureter C1 serves for both cylinders, and is placed in a protected position between the crankcase and the planetary gear on the top side. The timer T1 is also above and in a protected location; it is driven from the end of the camshaft which extends out from the motor case.

The mechanical oiler O1 is placed above the case securely mounted thereon, and the leads, of which there are four, take care of the two cylinders, crankcase and main bearings. Passing back to the transmission gear, which is of the planetary type, the clutch C3 is manipulated for high speed, whereas L1 and L2 represent the bands of the low gear and reverse. The shaft extends back to the universal joint U1, which completes the connection with the propeller shaft in the regular way. The whole power plant is designed for long life and low depreciation. These desirable conditions are brought about through the use of suitable material, capable designing, and careful work during construction, each operation being checked with the idea of holding closely to the proportions which will assure interchangeability.

Accessibility is one of the recognized requirements in commercial work, and Fig. 2 of the stripped chassis shows how this phase of the problem was coped with for a successful issue in this undertaking. The power plant P1 is located at the front end of the chassis, but the load is taken at a point back of the center line of the front axle, and the alignment of the machinery is assured in view of the unit construction back to the universal joint U1. The car is of the side chain drive S1, and the differential gear system D1 is suspended under the chassis frame S2. The differential and bevel drive are self-contained, and the diagonal component of the torsional effort of the motor is taken up by the self-contained differential system so that the chassis frame S2 does not participate in the work, and it becomes a matter of no moment at all as to whether or not its alignment is good or bad. The front spring suspension is of the full elliptic type, but the rear suspension is a full elliptic scroll type. The distance rods D2 are free to maintain the correct axle distance from the jack shaft, in view of the use of the scroll idea in the rear springs, and the side chains are therefore permitted to do their work without being tugged at in any way in response to road inequalities as they affect the movement of the rear axle.

Fig. 3 shows the car complete with a delivery body. Ground clearance is ample, due to the use of large diameter wheels, and the cost of transportation per ton mile for the goods is maintained at a low ebb, in view of the selection of solid tires of right proportions, considering the total load, and the further fact that the load distribution is carefully worked out.

Fig. 3—Delivery Wagon type showing full elliptic rear spring suspension, large diameter wheels, and solid tires

Central New York Relay Club Run Preliminaries

SYRACUSE, NEW YORK, May 23—Leaving here last Wednesday morning Deputy State Commissioner of Highways Frank D. Lyon and a party of State and county road officials, accompanied by J. Arthur Ritchie and Harold N. DeWitt, of the Empire State Motorist, made a thorough inspection of the roads to be covered next week by the Central New York relay club run. At each road district, the district, county and town supervisors were picked up by the official party and taken over the territory that lies within their jurisdiction. Any needed repairs were ordered made by Commissioner Lyon who has guaranteed that these roads will be in as perfect condition as roads can be by Saturday next. As it is, they are almost ideal over 90 per cent. of the distance and but little work was found to be done.

Fig. 1—Hign bridge near Ithaca

This tour, which is fathered by Messrs. Ritchie and DeWitt, is simply a sociability event in every detail with its one object "Good Roads and Fair Laws." There is no contest feature in so far as technical condition of the cars nor their running time within fast limits is concerned. Prizes will be given for the nearest approach to a predetermined secret time that will be very slow and wholly within the limits of the slowest legal regulations.

In a word it is, as the name implies, a relay tour of club members with the exception that many of the clubs will have entries that will drive the entire distance.

The start will be made from Syracuse on May 28 with certain messages from Syracuse officials to Auburn officials. The Syracuse club will carry these to the Auburn club. Here the Auburn contingent will be annexed to carry the words to Cortland where lunch will be had. Then on to Ithaca in time for the Michigan-Cornell game and into Watkin's Glen for the night stop.

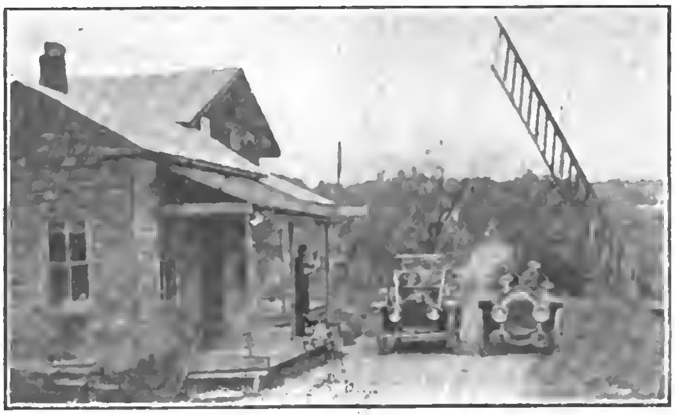


Fig. 2—A bar to progress which has been lifted forever; it costs nothing now, a "quarter" was the charge in the old days

Sunday morning the tourists will be shown through the Glen by guides furnished for the especial occasion.

The third day run will be from Binghamton to Oneonta for noon and Cooperstown for the night stop. The last day will take the caravan back to Syracuse by way of Richland Springs, Utica and Rome.

The fact that the time set for this run will admit of practically three holidays, Saturday, Sunday and Memorial day, and the fact that each entrant can go as far or as little a distance as he desires portend an enormous entry list. It seems likely that more than a hundred cars will enter some of the controls during the Sunday and Monday runs. Every arrangement has been made to care not only for the cars and owners but for the families, the women and children as well.

The survey just completed demonstrates without doubt that those who do participate in the regular run will be treated to a bit of scenery not outrivaled by any traversible road anywhere in this country and to about 400 miles of beautiful earth and macadam roads.

The shortness of the day's runs will enable everybody to drink in to the fullest the beauties of the country, and the spots of National importance such as the Glen will be inspected.

At all of the night controls special entertainment arrangements have been made for the visit of the tourists.

This is the first run of this sort to be held in the State and the novelty of its plan is responsible for the great interest displayed on every hand. The question of local pride is entering into the matter in every way and this helps to keep up interest at high pitch. Each club is anxious to have more entries than its neighbor and each road district to have its roads in better shape than those of its neighbors.

The State commission is interested chiefly because it offers an opportunity to show the results of the indefatigable efforts of the road builders during the past few years in the interest of good roads.

Fig. 3—On the State road leading from Elmira to Binghamton

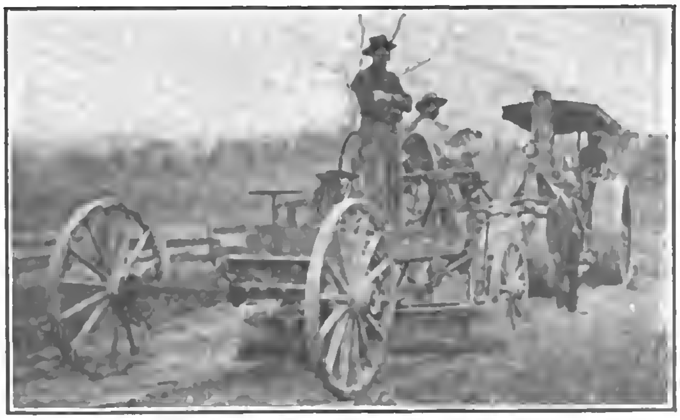


Fig. 4—Equipment for road-building caught in the act

Specimen of Long Island Road for a Part of the Way over which the Tour Trudged

In Lively Run L. I. A. C. Wins From C. A. C.

(*Continued from page* 951.)

The whole course was about 240 miles. All contestants checked in at the various controls within the time limits set and when the cars had finished at the Bay Ridge clubhouse of the Crescent Athletic Club and the cars had been turned over to the contest committee it was found that the Long Island Automobile Club had won by a good margin. The average penalty of each of the cars entered in that team was nine points, while those of their opponents totaled 168 or an average of 11 2-3 points per car.

At one of the Controls, the Automobiles Parked for the Time and the Contestants Enjoying Life

The possession of the Pardington cup is thus given to the L. I. A. C. for this year.

There was not an accident during the run and the best of feeling was apparent in the little brushes indulged in.

Those who represented the L. I. A. C. on the run were as follows:

C. W. Caffrey, Stoddard-Dayton; F. H. Evans, Franklin; Joseph D. Rourke, Haynes; Charles J. Banta, Speedwell; Alfred Wilmarth, Velie; Guy Loomis, Fiat; V. F. Parker, Simplex; Charles Hewlett Stevens-Duryea; Charles Werner, Locomobile; Albert Bryant, Overland; H. Grattan, Pope-Hartford; J. P. Disbrow, Rainier; A. W. Swanstrom, Chalmers-Detroit; C. H. Humphreys, Maxwell; M. Speiro, Pope-Hartford; L. R. Adams, Stearns; A. C. Alderman, Knox, and Jeremiah S. Frazee, Rambler.

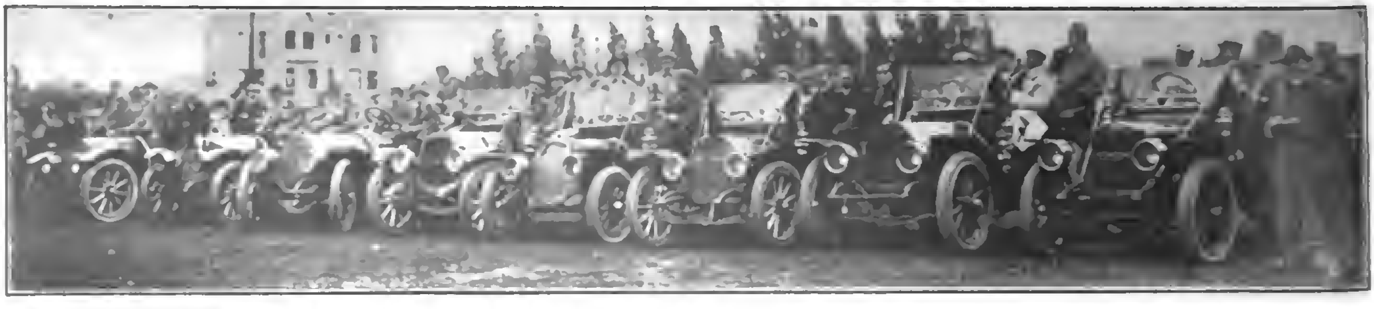
The Crescent Athletic Club team was composed of the following:

Foster Crampton, Peerless; George Brower, Franklin; Kingsley Swan, Stearns; Frederick Whitney, Locomobile; J. S. Masterson, Chalmers-Detroit; A. P. Palmer, Palmer-Singer; A. W. Blanchard, Herreshoff; S. C. Kirkman, Columbia; C. V. Bossert, Mercedes; W. C. Candee, Stoddard-Dayton; T. A. Buys, Oakland; J. I. Grady, Cadillac; G. F. Deely, Berkshire; G. Stephenson, Peerless; P. N. Bainbridge, Locomobile; J. P. Fairchild, Locomobile; Frank B. Stephenson, Peerless; A. R. Pardington, Chalmers-Detroit; H. C. Martin, Peerless.

Good Roads Tour Enthuses South

Swinging northward on its return trip to New York after exploring a route to be followed in June by the Atlanta-New York good roads tourists, the Columbia pathfinder has made excellent progress. Heavy rains below Roanoke, Va., made the going poor during one day last week, but in the main the trip across the Blue Ridge and Alleghanies was accomplished satisfactorily when the muddy roads are considered. Entries to the number of forty-one have been formally made and many others are being prepared. The entry box remains open until June 1. Mayor William J. Gaynor, of New York, has accepted an invitation to welcome the cavalcade when it appears at the water gate of the metropolis and has agreed to deliver the address of greeting.

In securing the consent of His Honor to officiate, the fact was brought out that the good roads movement in the South has resulted in the expenditure of over $18,000,000 for road improvement and steel bridges since the vogue of motoring swept that section. It was pointed out to Mayor Gaynor that the convicts of Georgia at present are making ten miles of good roadway every day of the year.



The "Muster" at which Thirty Automobiles Reported Present or Accounted for.

Callan Bill Passed Up to Governor Hughes

By a decisive vote, the Callan automobile bill was passed by the New York Assembly Monday night and is now lying upon Governor Hughes' table awaiting official approval. The bill was sharply fought in certain particulars and in its present shape represents a series of compromises, some of which are agreeable to motordom and some are not. The measure provides for a speed limit of fifteen to thirty miles an hour and for annual registration, the fees for which are scaled to correspond with the horsepower of the automobiles so registered.

One of the features that was eliminated from the original bill as passed by the Assembly was the provision to allow small cities and villages the right to regulate the speed of automobiles. This section was fought desperately by motorists all over the State, and the Senate finally passed an amendment taking the power to hamper automobilists by local regulations out of the hands of the small towns.

In a brief way the new law provides the following rules for motoring: A speed limit of thirty miles an hour on any State highway. Only one license number, which must not be allowed to swing, but which must be displayed both front and rear and must be illuminated in the rear and easy to read at all times. Drivers must be at least 18 years old unless accompanied by a licensed chauffeur. The speed limit in the larger cities may be fifteen miles an hour.

License numbers must be carried on plates fifteen inches long by six inches high and the letters must be four inches high.

The horsepower tax will raise the cost of New York registration from $1, as it is at present, to from $5 to $20 a car, depending upon the power of the automobile. Under twenty-five horsepower, the fee will be $5 and ranges upward until the maximum fee is charged for cars having more than fifty horsepower.

The Callan bill makes it a felony, punishable by a fine of $500 and imprisonment for not more than two years, for a chauffeur to run away after an accident in which his car has injured anybody. Driving while intoxicated is made a misdemeanor and on second offense, the driver may be imprisoned for from one to five years.

The victory of the motoring interests in preventing the possibility of heavy, restrictive regulation by small cities has been a source of satisfaction to motordom generally. Pressure was brought to bear upon the members of the upper house from all sides. The Long Island Automobile Club was particularly active in this matter and was the scene of a number of spirited meetings during the pendency of the bill. The result was the introduction of an amendment that passed the Senate without much difficulty after the members of that body had been duly impressed with the spirit of justice that actuated the motorists.

The Assembly already had passed the bill in its original shape and some opposition to the Senate amendment was feared in the lower house, but missionary work had been effectively applied there also and the popular body concurred in the amendment with only slight opposition.'

The clauses in the bill that were opposed by motorists were particularly the horsepower fee system and the chance given under the original bill for annoyance to tourists in small towns.

Coming Events in the Automobiling World

June 20-July 6....Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.

Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Feb. 13-25, 1911..Chicago Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

May 27, 28-30....Indianapolis, Ind., Automobile Races, including Championship Events on Motor Speedway.

May 28...........White Plains, N. Y., Hill-Climb under auspices of Amateur Automobile Contest Association.

May 30...........Fairfield, Conn., Hill-Climb under auspices of the Bridgeport Automobile Dealers' Association.

May 30...........Oklahoma City, Okla., Reliability run under auspices of the "Daily Oklahoman."

May 30...........Bridgeport, Conn., Hill-Climb up Sport Hill, Automobile Club of Bridgeport.

June 2...........New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.

June 4...........Worcester, Mass., Fourth Annual Hill-Climb, Dead Horse Hill.

June 6-14........Atlanta, Ga., Reliability Run to New York City, New York Herald and Atlanta Journal.

June 7...........New Haven, Conn., Hill-Climb up Shingle Hill, Yale University Automobile Club.

June 11..........Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.

June 14-15.......New York, Reliability Run of Motor Contest Association.

June 14-30.......Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, Through the Southwest.

June 16-22.......Albany Automobile Club, Albany, N. Y., Sixth Annual Tour to Atlantic City and Return.

June 18..........Baltimore Hill-Climb of Automobile Club of Maryland.

June 25..........Port Jefferson, Long Island, N. Y., Hill-Climbing Contest, Automobile Club of Port Jefferson.

July 4...........Indianapolis, Ind., Cobe Trophy Race. Held on Speedway Track, Chicago Automobile Club.

July 4...........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.

July 18-22.......Milwaukee, Reliability Run, Wisconsin State Automobile Association.

July 30..........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.

Aug. 3-5.........Galveston, Tex., Beach Races, Galveston Automobile Club.

Sept. 5..........Wildwood, Pa., Speedway, Labor Day Race Meet of North Wildwood A. C.

Sept. 17.........Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.

Sept.............Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.

Oct. 1...........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.

Oct. 8...........Philadelphia, Fairmount Park Race, Quaker City Motor Club.

Oct. 15..........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.

May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.

May 29...........Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.

June 2-8.........Prince Henry (German) Touring Competition.

June 13-18.......Scotland, Scottish Reliability Trials.

June 20..........French Voiturette Race.

June 21..........French Stock-Car Race.

June 22-July 5...Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.

June 27..........Speed Trials at Kiev, Russia.

THE AUTOMOBILE

Vol. XXII Thursday, May 26, 1910 No. 21

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager

231-241 West 39th Street, New York City

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ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

WHILE contests are the order of the day, and the automobile is putting its best foot forward in many such ways, it may not be out of place to call attention to the very nice arrangement which ended in enjoyment, nor is it too much to say, profit, which took the form of a two-day run on Long Island last Saturday and Sunday. The event which is the basis of editorial comment was run by the Long Island Automobile Club, collaborating with the Crescent City Athletic Club, but the matter here to be noted is based on the fact that the tour was one of leisure. Some of the contestants called it a "loafing tour," and it is to the credit of the sponsors of the run that they had the good sense to depart from the speed question just enough to give the participants the fullest opportunity to determine how nice it is to try the reverse to the usual methods. From what has been shown, it is believed that this tour, while it savored of a contest, was one of the most healthy and enjoyable events that was ever undertaken, and the L. I. A. C. is to be congratulated for having set the excellent example, which tells autoists that they do not have to go fast just because there are a lot of them in company.

⁂

AFTER struggling at first with the problem of getting up in the air the aeronautical world has now turned its best efforts toward solving the problem of getting back to earth with man and machine unharmed, and in these efforts it has been brought out that a motor of moderate weight working and obedient to throttle control affords more reassuring guarantees of a pleasant landing than the most ingenious wonder-engine capable of developing one-horsepower per pound but endowed with an instinct for spasmodic balking. Reliability looks "good" to a man whose frail frame is separated from the hard earth mainly by one mile of atmosphere; as indispensable as a featherweight engine formerly appeared to the designer who had not yet learned that free air only has to be tickeled in the right manner in order to be made to support heavy burdens with astonishing grace and ease. A rapid survey of the aviation-motor situation in Europe shows not only, however, that the early views with regard to the requirements for a combination of light weight and high power have been sobered, but also that much has been gained by the half-mistaken, previous demand for extraordinary lightness in motor construction. The slumbering designers were awakened and set about producing what they thought was wanted and, presto, it was discovered that the possibilities for refining the automobile motor had not after all been exhausted. A number of motors have seen the light of day, which were first made very light and afterwards quite reliable without losing much of their lightness, and these now bid fair to influence the design of motors for purely earthly roadways, where lightness over the front axle is also a quality of some economical value, particularly if it permits a corresponding lightening of the rear, now excluded by considerations relating to that distribution of weights which makes for the avoidance of slewing and safety in city traffic.

⁂

USED automobiles, after the original purchaser gets through with them, will still occupy space in garages or elsewhere, and they are likely to prove to be at least an annoyance to makers, if indeed they do not become a serious handicap of growing import, which will have to be coped with in the long run. In the meantime, to defer the evil day, is to teach the original purchasers how to retain the automobiles they acquire as long as possible. Weak minded individuals might consistently arrive at the conclusion that the sooner users discard cars they pay good money for, the better will they serve the industry from the point of view of makers. There is absolutely no basis for trade which may be regarded as healthy, if it has no better foundation than that involving the casting off of a device before it is worn out.

Of the total number of automobiles which reach the second-hand market within two or three years after they leave the makers' final test, nearly all of them are serviceable, but it is appearance that is against them. Then, too, they become noisy. This question of appearance is not merely tied up in the finishing problem; the bodies pass out of style. One of the first things to do in order to get more service out of an old car is to equip it with a new body; let the body be up to the times. It is much cheaper and better all around to purchase and pay for a new body than it is to abandon a good automobile for a new one, which, from the utility point of view, may not be very much, if any better.

Repair men, instead of confining their efforts to the mere process of replacing worn out parts, should pay more attention to the methods which will eliminate noise. An automobile may be capable of going and coming, but it may make too much of a fuss in the doing.

S. A. E. Succeeds Mechanical Branch of A. L. A. M.

President Coffin's Speech to Association Board

THE public is familiar with the aims, accomplishments, and character of the work formerly carried on by the Mechanical Branch of the Association of Licensed Automobile Manufacturers. Owing to the magnitude of the still fast-growing automobile industry, it is necessary that this engineering work be carried on, not only in accordance with the best methods that have obtained in every other industry of prime importance, but also in accordance with those conditions peculiar to the motor car business.

In no other industry has there been such development in such a short space of time. No other industry has given such economic value or has appealed so much to the element of personal interest upon the part of the average man. Methods long in use in the manufacturing arts have been revolutionized and new ones have been created to meet the demands of this wonderful age of mechanical transportation. If, in other great industries of the world, concerted work upon the part of engineers has been found necessary, then certainly it is of vital importance that the motor car engineers work hand in hand in the solution of those problems which fundamentally affect the future development of the automobile business.

The work of the A. L. A. M. Mechanical Branch was discontinued primarily for legal reasons having to do with the basic organization of what has now become the preponderating sales element in the automobile industry of America. At the last meeting of the Board of Managers of the Licensed Association, formal action was unanimously taken transferring to the Society of Automobile Engineers the data, records and goodwill of the Mechanical Branch. The society will continue the periodical publication of the specifications upon materials, prepared by Henry Souther and will carry on in a broader way much of the work begun by the Mechanical Branch. This action upon the part of the association is a short cut which will very materially favor the progress of the society's work in the simplification and solution of many of those difficulties which require concerted action upon the part of motor car engineers.

Howard E. Coffin, president of the Society of Automobile Engineers, in his address before the Licensed Association meeting, said:

"The Mechanical Branch, as you will recall, was discontinued, not because of any absence of the need for such an organization, but because of purely legal and business reasons. A good many suggestions have been made as to the possibility of a renewal of this work under the direction of the Licensed Association. But this is, I believe, impossible.

"It is superfluous to say anything to you as to the great need for concerted action on the part of our motor car engineers. Every purchasing department in the business is being seriously hampered in its work by the lack of uniformity in the material specifications, which are being passed on to them by our engineering departments. Every individual engineering department is a law unto itself in nearly all matters touching design and the preparation of specifications. Individuality of design is one thing and should be encouraged. Individuality in specifications is largely useless and should be restricted within reasonable limits. As a case in point, the engineering department of my own concern has lately delivered to our purchasing department material specifications upon which six months' delivery dates are the best promised. As a direct excuse for this delay the mills report their utter inability to care properly for the multitudinous and special demands which are being made upon them by motor car engineers. Among the similar situations which confronted the Mechanical Branch some three years ago was the question of steel tubing sizes and deliveries. The tube mills reported to our investigating committee not less than 1,600 different sizes of tubing which they were being asked to supply for the motor car trade. Few, if any, standard sizes could be stocked, because of the minute and immaterial differences in the specification in each individual case. The committee having this work in hand unearthed the further astonishing information that the specifications being turned in to the tube mills by individual automobile makers building only one or two models, covered not less than 80 distinct sizes or thickness of wall.

"With purchase orders in hand covering 1,600 different specifications through the comparatively limited range of the tubing diameters used in motor car work, it is small wonder that the expression of the tube mills' management to our committee was 'for God's sake, do something.' The net result of the Mechanical Branch work in connection with the tube mills will be found in a printed and framed table supplied to every engineering department within the association. In this table were listed something like 150 sizes of tubing actually needed in automobile work, and upon which practically immediate delivery was guaranteed by the mills.

"This tubing list again needs attention. The sheet metal situation is little better than was that upon tubing three years ago. There are a dozen other examples which might be cited, wherein standardization work would in no way affect individuality of design, but could lessen, the purchasing department problem.

"We see much in the press and in the advertising columns about the standardization of the modern motor car. There may be something in this term, if by it we mean that every car has a motor, a clutch, a transmission, a frame, springs and axles; but it is not any of these big generalities which cause us the trouble or which need standardizing. It is the little things—the little things which are different merely because they are different and for no good reason—which keep the purchasing departments in hot water and delay production. Nine times out of ten it is not the unavoidable act of Providence which delays the output—it is the irresponsible draftsman or designer who is permitted to draw upon his imagination for specifications throughout the entire range of theoretical possibilities. We need standard tables for reference in our engineering departments.

"The work of standardization in the specification of raw materials was only one of the several approved activities of the Mechanical Branch. Every other industry in the world of one-half the magnitude of the motor car business has its engineering organization, to which may be referred the innumerable problems requiring some concerted action upon the part of its engineers and designers. There is at the present time in this country only one organization which can be made to serve the very serious needs of the automobile industry. The Society of Automobile Engineers was formed about four years ago. The lack of a proper support of this organization by many of the engineers of this country has been chargeable to several causes, notable among which may be cited the existence of the Mechanical Branch, and later the hope on the part of many of our leading engineers that the Mechanical Branch work might be again taken up under the auspices of the Licensed Association. Coker F. Clarkson has now been engaged as secretary and general manager of this society, and its work will be made a decided value, both to the individual member and to the motor car business as a whole. In the Mechanical Branch days, Mr. Clarkson, then acting as secretary, carried upon his shoulders the administration of that organization in all its details, and all of you are sufficiently familiar with his work to know how good it was."

Tire Men and Makers Will Wait

New York City, May 23—Builders of automobiles and tire manufacturers met in conference at the headquarters of the Association of Licensed Automobile Manufacturers Tuesday, and after a full discussion and consideration of the tire question as it affects the owner, dealer and the automobile manufacturer, decided that the situation, so far as it relates to the purchase and sale of tires, need not be so pessimistically considered as some recent reports would indicate.

In fact, a more optimisitic view can now be taken. The manufacturers of cars in America are not in the position where it is necessary for them at this time to contract for the next season's requirements of tires, and the rubber tire manufacturers seem to be able to handle the present situation along lines that are expected to be in favor of the car owner.

There seems to be an impression that it is necessary for car owners to purchase tires for future use, due to the feeling that there is to be an abnormal advance on this particular product in the near future. While some increase may be expected, car owners should understand the conditions of buying now, and be warned of the disadvantages that might occur in purchasing in advance of current needs. There is hardly any question that the saving at the present time will be largely offset by the deterioration in surplus tires and the passing of the guarantee period.

It was the opinion of the conference that the interests of all will be served by a normal attitude toward future requirements.

All the prominent tire makers were in conference, numbering ten or a dozen, while those representing the Association were: Albert L. Pope, Chairman; L. H. Kittredge, S. D. Waldon, J. W. Gilson, Horace DeLisser and Alfred Reeves, General Manager.

Motordrome Plans Take Shape

With the purchase of 663 acres of land at Clementon, N. J., by the Philadelphia Motordrome Association, plans for the erection of a two-mile automobile speedway in the East have taken definite shape. Clementon is thirteen miles from Philadelphia and is crossed by seven state roads

The concern is incorporated under the New Jersey laws with a capitalization of $2,000,000, and some of the men connected with the project are, S. Boyer Davis, secretary and counsel of the Automobile Club of Philadelphia; A. C. Patterson, H. B. Reed and L. Kuehnle, bankers of the Quaker City.

New Jersey 15-Hour Endurance Run

Newark, N. J., May 25.--Eighteen entries have been made so far for the fifteen-hour endurance run to be given by the New Jersey Automobile and Motor Club on June 11. Full thirty cars are expected to compete. The entries so far in lude a Stoddard-Dayton, three Maxwells, two Mercedes, two Cadillacs, two Hupmobiles, Marmon, Overland, Marion, Auburn, Ford, Paterson and a Buick.

U. S. Motor Company Building

Detroit, Mich., May 23—Details of the United States Motor Company's plans for the development of its Detroit properties were made known to-day by Frank Briscoe. Work on the new buildings has started. A small army of men are breaking ground for the Alden Sampson plant, just north of the Brush. This plant will comprise six large buildings.

Within a month ground will be broken for a new plant for the Briscoe Manufacturing Company. This concern employs 1,500 and occupies an extensive plant at Woodward and Baltimore avenues, where it manufactures auto parts and accessories. On the completion of the new structure, to be erected immediately south of the Brush plant, the old one will be devoted exclusively to the manufacture of radiators.

An extension to the Brush factory will be built, work to start July 1. This will take up the remainder of the 50 acres owned by the Brush.

"There will be another group of buildings in some other part of the city," said Mr. Briscoe. "In the other group, in all probability, will be the new plant of the Gray Motor Company. Plans for the puıchase of more land are brewing.

Entries Revised to Date for the Glidden 1910

That the "National Reliability Run" will attract the notice of makers of automobiles is proven by the number of makes of machines which are officially entered. The list, to date, includes 11 automobiles in the "Glidden Trophy Division," 11 in the "Chicago Trophy Division," 8 in the "unclassified" list, and 3 in the "Non-contestant Division." The list complete to May 23, stands as follows:

Entries 1910 National Reliability Tour

Glidden Trophy Division

1 Premier Motor Mfg. Co.
2 Premier Motor Mfg. Co
3 Chalmers Motor Co.
4 Chalmers Motor Co.
5 Chalmers Motor Co.
6 Cole Motor Car Co.
7 Maxwell-Briscoe Motor Co.
8 Cartercar Company.
9 Parry Auto Co.
10 Bartholomew Company.
11 Staver Carriage Company.

Non-Contestant Division

Two Cadillac Gun Carriages entered by the North Western Military Academy.
Truck entered by the Rapid Motor Vehicle Co.

Chicago Trophy Division

100 Moline Auto Co.
101 Moline Auto Co.
102 Moline Auto Co.
103 Lexington Motor Car Co. (John C. Moore).
104 Cole Motor Car Co.
105 Parry Auto Company.
106 Fal Motor Car Co.
107 Maxwell-Briscoe Motor Co.
108 Cartercar Company.
109 Cartercar Company.
110 Lexington Motor Car Co.
111 Staver Carriage Company.

Unclassed

(It has not yet been decided in which division these entries will compete.)

2 Buicks.
2 Oaklands.
2 Pullman Motor Car Co.
2 Ohio Motor Car Co.

The fear is that some of the makers of high-priced automobiles will not see their way clear to go in; they seem to be laboring under the impression that the country through which the tour is to be made will not prove efficacious from their point of view. What every maker wants is sales; if they are not in prospect, interest languishes.

Itinerary of the National Reliability Tour

Leaving Dates A. M.	Starting Points.	Intermediate Stops.	Miles.	Finishing Points.	Day's Miles.	Arrival Dates. P. M.
June 14	Cincinnati	Lexington	83.8	Louisville	162.0	June 14
15	Louisville	Bowling Green	180.	Nashville	193.9	15
16	Nashville	Columbia	41.5	Sheffield	119.7	16
17	Sheffield	Corinth	62.1	Memphis	161.7	17
18	Memphis	Clarendon	112.2	Little Rock	207.7	18
19	Little Rock			Hot Springs	53.3	19
20	Hot Springs	Prescott	84	Texarkana	138.3	20
21	Texarkana	Paris	97.2	Dallas	217.1	21
22	Dallas	Terral	130.1	Lawton	200.7	22
23	Lawton	Chickasha	64.6			
		El Reno	112.4	Oklahoma City	145.3	23
24	Oklahoma City	Enid	100.1	Wichita	216.0	24
25	Wichita	Emporia	108.8	Kansas City	234.5	25
26	At Kansas City					
27	Kan. City	Maryville	126.5	Omaha	242.2	27
28	Omaha	Guthrie Center	105.8	Des Moines	159.0	28
29	Des Moines	Marengo	96.2	Davenport	219.8	29
30	Davenport	Rochelle	102.8	Chicago	179.7	30

Sixteen running days, average per day, 178.2 miles.

Chicago Motor Club Economy Run Finished

CHICAGO, May 23—Probably no other fuel test ever held in this country was run so true to actual touring conditions or showed as much as did the one promoted by the Chicago Motor Club yesterday, which was won by a Cole 30 driven by A. W. Johnson which averaged 23.6 miles per gallon and gained a percentage of 2.8 over a route 191 miles in length, which had Lake Geneva for its turning point. Because of the long distance of the run and the varying conditions of the highways and the necessity of maintaining the fast schedule provided for by the A. A. A. rules, there was nothing artificial about the test. Carbureters had to be tuned up to meet all conditions, therefore it was impossible to starve the carbureter in order to save gasoline. The DeTamble, a two-cylinder proposition, was the only one which had to do 16 miles an hour, the others being called upon to show 18 and 20. Yet notwithstanding this, all the cars with but two exceptions met the time requirements, which makes the fuel economy showing all the more remarkable. Up around Lake Geneva it was distinctly hilly, and while some of the drivers had to shift gears on grades that ordinarily they would take on high, yet they all kept up to the schedule with great ease. The Overland and Grout were the only ones that did not get in on time.

Originally there were thirteen entries for the trial, but owing to a bad spell of weather two postponements were necessary, and instead of running the affair on April 28 it was May 19 before the event came off. Because of this delay, the Franklin, Moon, Oakland and Welch were scratched, leaving the DeTamble in class 1A, the Hupmobile and Overland in 2A, the Cole and Hudson in 3A, the Falcar and Henry in 4A, the Grout in 5A, and the Knox in 6A, to make the circuit. The Henry got no farther than Maywood on the first leg, where it retired because of magneto trouble. The other side of Elgin the Knox had tire trouble and running out of its supply of inner tubes, it was necessary to lay up along side the road until a fresh supply could be obtained from Lake Geneva. This made the Knox 7 hours and 32 minutes late at the finish, but as time out was allowed for tire trouble the judges gave it a rating, placing it second. Besides wresting with tires, driver Bender was also handicapped by losing the course at Lake Como, and going 8 miles out of his road. This, however, was not recognized by the judges, and his fuel consumption was reckoned as if he had only made 191 miles.

H. E. Halbert driving the Grout, also experienced roadside difficulties but coped with them in a game manner which won him considerable recognition. On the return journey from Lake Geneva, Halbert found he was unable to shift gears, and in an examination disclosed that a steel pin had dropped into his gears and chipped off some of the teeth. To remove this cotter pin he had to take down the entire transmission. Despite this handicap he got going again and finished, but was one hour behind his schedule time so the judges were compelled to disqualify him. The Hudson and the Falcar both broke leaves in the front springs, but luckily for the drivers they were able to make temporary repairs, and get in on time. The Overland was not so fortunate, its broken spring making driver Schillo 20 minutes late, which brought about the disqualification of the car. If the Grout had not been behind time, it would have been

Fig. 1—Typical road scene during the economy run near Algonquin

Fig. 2—Hupmobile, at a point near Lake Geneva, on the run

ranked fourth in the final round up with a percentage of 2.31 and a showing of 14.5 miles to the gallon. The Overland would have been fifth with 1.915 and 17.09 miles to the gallon.

The DeTamble also was handicapped by an obstruction in the gasoline feed pipe, and driver Turgeon had to make at least a dozen stops, remove the pipe each time and blow through the tube. Then he would couple it up again, and resume his journey. In this manner he swung around the 191 mile circuit and got in on time.

A most creditable performance was put up by E. A. Hearne driving the Hupmobile, which carried off the honors in straight fuel consumption, Hearne getting 25.8 miles to a gallon, which was considered remarkably good by those who know the severity of the route and the hills encountered in Wisconsin. Hearne also was bothered some by a feed pipe obstruction, and had to open up his carbureter more than would have been necessary had the line been clear.

In addition to the main prize, a silver trophy certificate of performance were awarded the winners of the various classes. Those to get these diplomas were the DeTamble in Class 1A, the Hupmobile in 2A, the Cole in 3A, the Falcar in 4A, and the Knox in 6A.

Score of the Cars in the Run

Car.	H.P.	Class.	Driver.	Ounces of gas.	Miles per gal.	Weight.	Percentage.
Cole	30	3A	W. A. Johnson	1036	23.6	2950	2.8
Knox	40	6A	J. A. Bender	1761	15.6	4255	2.72
Hudson	22	3A	James Levy	1146	21.34	2780	2.42
Falcar	28	4A	C. F. Van Sicklen	1780	13.7	3390	1.904
Hupmobile	17	2A	E. A. Hearne	947	25.8	1640	1.73
De Tamble	14	1A	G. W. Turgeon	1351	18.1	1970	1.45
Grout*	36.6	5A	H. E. Halbert	1683	14.5	3900	2.31
Overland*	22	2A	A. G. Schillo	1295	17.09	1295	1.915
Henry	27.2	4A	E. C. Haynes	Did not finish.			

*Disqualified for finishing outside time limit.

Complete Score with Penalties for All-Around Connecticut Run

(Continued from page 953)

No. Car	Entrant	Driver	Routes A	Routes B	Routes C	Cl. & Brake	F'l Ex.	Technical Test.
DIVISION 2A—$801 TO $1,200								
5—Cartercar	W. S. Williamson	J. F. Cogswell.......	47	0	37	0	116	1—Carbureter adjustment 3—Water 6—Gasoline 37—Late at noon control 31—Repairing and filling radiator 3—Water 3—Water 25—Spread Front Wheels 10—Spread Rear Wheels 80—8 Broken spokes 1—Loose spring clip
22—Overland	Fairfield Auto Co.	Gates	6	1	14	0	11	1—Motor stop 6—Speed band 8—Magneto 1—Loose spring clip 10—Steering Pivot
DIVISION 3A—$1,201 TO $1,600								
1—Chalmers	C. H. Page & Co.	D. Rankin	0	2	1	0	31	2—Spark trouble 1—Motor stop 10—Steering pivot 1—Loose terminal 20—Commutator
4—Regal	Regal-Detroit Auto Co.	A. Jones	6	3	1	0	3	6—Oil and Water 3—Oil 1—Motor stop 3—Spring clips
6—Cartercar	W. S. Williamson	Williamson	121	0	3	6	8	6—Gasoline 59—Engine stop 56—Late at noon control 3—Gasoline 6—Hand Brake 5—Spread front wheels 3—Loose spring clips
9—Jackson	Kilby & Barrett Co.	Kilby	0	1	3	43	13	1—Motor stop 3—Loose flange 43—Foot brake 10—Loose flange bolts 1—Loose spring clips 2—Fender nut
12—Reo	N. B. Whitfield	Haycock	13	17	23	8	2	10—Motor stop 3—Water 3—Water 14—Gas Pet Cock 12—Hot engine 3—Gasoline 7—Fan belt 8—Hand brake 1—Spring clip 1—Fan belt
DIVISION 4A—$1,601 TO $2,000								
3—Franklin	S. C. Hutchins	W. R. Coughtry	0	0	3	0	5	3—Motor stop 5—Camden boot loose
14—Auburn	LaDue-Carmer M. Co.	Langdon	0	0	0	6	15	6—Hand Brake 15—Steering Connection
17—Inter-State	Holcomb Co.	Ensign	16	0	0	29	2	16—Accelerator 21—Hand brake 8—Foot brake 1—Insulator 1—Oil connection
23—Rambler	T. B. Jeffery & Co.	Foster	30	0	16	59	3	3—Water 3—Gasoline 20—Late at control 4—Clutch 7—Accelerator 5—Motor stops 4—Magneto 23—Hand brake 37—Foot brake 3—Spring clips
DIVISION 5A—$2,001 TO $3,000								
2—Chalmers	C. H. Page & Co.	Knipper	28	5	12	0	1000	1—Motor stop 6—Carbureter 6—Sparker 3—Water 12—Brake band 1—Motor stop 4—Sparker 8—Loose truss rod 4—Spark plug 1000—Car not presented
7—Corbin	Corbin M. V. Co.	Corbett	3	28	0	0	11	3—Carbureter 28—Carbureter 10—Spring leaves 1—Spring clip
8—National	F. A. Law Mach. Co.	Reid	1	0	3	0	0	1—Clutch 3—Gasoline
11—National	Poertner M. C. Co.	McCutcheon	1	0	0	27	1	1—Motor stop 27—Foot brake 1—Spring clip
15—Speedwell	Rantz M. C. Co.	Langdon	0	0	3	0	0	3—Gasoline
16—Columbia	Columbia M. C. Co.	Wagner	0	0	0	0	0	Clean score
18—Franklin	Holcomb Co.	C. S. Lee............	9	1	8	0	0	3—Gasoline 6—Late at noon control 1—Motor stop 2—Motor stops 6—Gasoline
20—Lexington	Nock Auto Co.	F. Brown............	0	0	0	31	2	31—Foot brake 1—Water connection 1—Lamp bracket
DIVISION 6A—$3,001 TO $4,000								
10—Franklin	Franklin Mfg. Co.	Carris	0	0	0	0	1	1—Loose oiling nut causing leaky condition

Norristown Reliability Run

(*Continued from page* 955.)

According to the announcement, Youngs' Selden captures the MacDonald & Campbell Class A trophy, a handsome $350 8 ft. high grandfather's clock; Walls' Maxwell the McCullough Class B prize; Hardesty's Pullman the Kelly-Springfield, Class C emblem, and Fairlamb's Kline-Kar the Class D plaque hung up by the Norristown Chamber of Commerce. There was some talk about the hotel to-night, however, of several protests being filed, mainly on the grounds of misinterpretations of the rules by the technical sharps. The Kline-Kar men aver that a strict interpretation of the A.A.A. rules would put their car ahead of the Selden in Class A. There is but 6 points difference and the "brush" was correspondingly interesting.

Technical Report of Norristown Endurance Run

DIVISION NO. 1

No.	NAME OF CAR	H.P.	Cyl-in-der	Cyl-inder Bore	Pis-ton Stroke	Car Model	Entrant	Driver	PENALTIES Road & Work 1st Day	2nd Day	Brake and Clutch	Tech-nicali-ties	Total	Order of Finish
	Class A—Touring Cars, $2,001 and Over													
1	Pullman	35	4	4½	4¾	1910–K	Longstreth Motor Car Co.	A. H. Bitner	0	0	29	51	80	4
2	Pullman	35	4	4½	4¾	1910–K	Pullman Motor Car Co.	Norman Gallatin	0	0	50	49	99	5
23	Selden	36	4	4¾	5	1910	Selden Car Co. of Penn'a.	Chas. Youngs	8	0	16	14	38	1
13	Franklin	28	4	4⅛	4	D–1910	H. H. Franklin M. C. Co.	John Burns	0	0	47	7	54	3
3	Matheson	45–50	4	5	5½	1909	Norris City Garage	Alvin Hall	Withd	rawn				6
4	Kline-Kar	40	6	4 3/32	5	1910	B. C. K. Motor Co.	Robert L. Morton	0	0	28	16	44	2
	Class B—Touring Cars, $2,000 and Under													
5	Regal-Detroit	30	4	4	4	E–1910	T. M. Twining	Frank Hosmer	Withd	rawn				
6	Inter-State	40	4	4½	5	1910	Norris City Garage	D. F. Templeton	52	2	10	10	74	4
7	Enger	40	4	4½	5	40	Enger Motor Car Co.	H. L. Brownback	9	2	86	18	115	5
8	Regal-Detroit	30	4	4	4	B–1910	Jos. Coulston	Jos. Coulston	Withd	rawn				6
9	Maxwell	30	4	4¼	4¼	1910–E	Max.-Bris. Phila. Co.	H. E. Walls	0	0	1	25	26	1
10	Ford	18	4	3¾	4	T	Keystone Auto Sup. Co.	J. A. Cherry	36	0	Withd	rawn		7
11	Buick	30	4	4½	5	16–1910	Buick Motor Co., Phila.	T. Wilkie	0	0	48	12	60	2
12	Inter-State	40	4	4½	5	1910	Inter-State Auto Co.	W. W. Vandergrift	0	0	29	38	67	3
	Class C—Runabouts, $1,601 and Over													
14	Alco	60	6	4¾	5½	1910	Longstreth Motor Car Co.	W. C. Longstreth	0	0	9	63	72	3
15	Jackson	50	4	4¾	4¾	1910	Brown Auto Top Co.	Ira L. Brown	Withd	rawn				6
16	Palmer-Singer	60	6	4⅞	5½	1909	Palmer-Singer Dist. Co.	Geo. P. Parker	117	0	56	59	232	5
17	Knox	38	4	4⅞	4¾	1909–O	E. C. Meier	Frank Gamble	Withd	rawn				7
18	Premier	40	4	4½	5¼	4–40	Norris City Garage	W. G. Dyer	0	0	81	50	131	4
19	Pullman	40	4	5	5¼	4–40	Pullman Motor Car Co.	H. P. Hardesty	0	0	18	31	49	1
20	Kline-Kar	40	6	4 3/32	5	Meteor–1910	B. C. K. Motor Co.	J. A. Kline	0	0	47	12	59	2
	Class D—Runabouts, $1,600 and Under													
21	Warren-Detroit	30	4	4	4½	10–A	Taylor Motor Distrib. Co.	Tom Berger	Withd	rawn				
22	Mitchell	30	4	4¼	5	R	Robt. A. Jackson	Robt. A. Jackson	12	0	88	28	128	4
24	Ford	18	4	3¾	4	T	Keystone Auto Sup. Co.	John Leonard	11	38	18	75	142	5
25	Ford	20	4	3¾	4	T	G. S. Wrightnour	Louis C. Block	Withd	rawn				6
26	Overland	25	4	3¾	4½	No. 38	Norris City Garage	D. McDermott	4	1	31	38	.74	2
27	Maxwell	28.9	2	4¼	4¼	G	Max.-Bris. Phila. Co.	A. D. Rea	11	0	42	43	96	3
28	Parry	36.4	4	4½	4½	32–36	Keystone Auto Sup. Co.	Donald Stroud	Withd	rawn				7
29	Black Crow	25	4	3⅞	4½	C	Mercury Auto Co.	Chas. C. Blind	Withd	rawn				8
30	Kline-Kar	24	4	3¾	4¼	1910	B. C. K. Motor Co.	C. C. Fairlamb	9	4	33	24	70	1

DIVISION NO. 2 (Membership)

No.	NAME OF CAR	H.P.	Cyl-in-der	Cyl-inder Bore	Pis-ton Stroke	Car Model	Entrant	Driver	1st Day	2nd Day	Brake and Clutch	Tech-nicali-ties	Total	Order of Finish
	***Class A—Contestants**													
31	American Traveler	....	....	....	....	....	John Mountain	John Mountain	Did no	t start				
32	Cadillac	....	....	....	....	....	J. Ellwood Lee	J. Ellwood Lee	22	0	..	..	22	3
33	Overland	....	....	....	....	....	W. H. Detwiler	W. H. Detwiler	Withd	rawn				4
34	Selden	....	....	....	....	....	Fred Dyer	Fred Dyer	2	0	..	..	2	1
35	Inter-State	....	....	....	....	....	Clement Eckrode	Clement Eckrode	Withd	rawn				5
36	Chalmers	....	....	....	....	....	W. Guy Miller	W. Guy Miller	Withd	rawn				6
37	Pierce-Arrow	....	....	....	....	....	P. V. Hoy	P. V. Hoy	14	0	..	..	14	2
	***Class B—Non-Contestants**													
38	Packard	....	....	....	....	....	J. P. Boyer	Wm. Thompson	..	..	..	..	..	..
39	Inter-State	....	....	....	....	....	F. R. Heavner	F. R. Heavner	..	..	..	..	..	..
40	Buick	....	....	....	....	....	T. V. Smith	T. V. Smith	..	..	..	..	..	..
41	E-M-F-Flanders	....	....	....	....	....	Norman Cassell	Norman Cassell	..	..	..	..	..	..
42	E-M-F-30	....	....	....	....	....	W. R. Gordon	W. R. Gordon	..	..	..	..	..	..
43	Pennsylvania	....	....	....	....	....	J. Ellwood Lee Co.	Alonzo Mancil	..	..	..	..	..	..

*Cars in these classes not examined technically.

1910 Blue Books Are Fresh From the Press

Just in time for the opening of the touring season, the four volumes of The Automobile Blue Book are fresh from the press; they cover situations as follows:

Volume No. 1

New York State complete, including all the passable roads through the Adirondacks, lower Canada, including three routes between Niagara Falls and Toronto to Detroit (Windsor) and Port Huron (Sarnia) Erie to Lake Huron and trunk lines to the Middle West.

This section will contain over 800 pages, an increased number of city and route maps and directions for approximately 40,000 miles of highway.

Volume No. 2

New England, covering New Hampshire, Vermont, Maine, Massachusetts, Rhode Island and Connecticut, with extensions itno the Canadian provinces. The Red Book Automobile Guide has been consolidated with this volume and the purchaser of this section has all the information heretofore contained in two books. This volume covers a most beautiful touring section of the country, including the White Mountains and the Maine Woods.

Volume No. 3

New Jersey, Pennsylvania, and South, including Maryland, with the extension routes into the Virginias, Carolinas, Georgia and Florida. This section takes the tourist to all the popular seaside and mountain resorts, and the historic battlefields of the South, districts replete with touring interest.

This section will contain over 750 pages, an increased number of city and route maps and directions for about 27,000 miles of highway.

Volume No. 4

The Middle West with through lines to Omaha and Kansas City. There are 350 routes with a total of 35,000 miles, more than double that of last year.

An Efficient Book For the Busy Roadbuilder

In road engineering the latest word is the best, and it comes from a reliable and well-informed source, since all conscientious road builders are anxiously compiling knowledge which will permit them to meet the new road requirements which automobile traffic and the increasing demand for luxurious intercommunication between city and country have called into existence. This latest but not last word is given in "Dust Preventives and Road Binders," a new book by Prévost Hubbard, which places at the disposal of the road engineer practically all the facts which have been ascertained at the Department of Agriculture in Washington on the subject of materials for modern roads and the best methods for distinguishing between good, bad and indifferent, not only in the materials offered the road builder in commerce but also in the ways of using these materials. As chemist in the Office of Public Roads in Washington and secretary of the committee on road materials of the American Society for Testing Materials, the author has had practical as well as laboratory experience with all varieties of road binders under varying conditions in many parts of the United States, and it is the information and insight gained through this work which he now places at the disposal of others. Many of the bituminous hydrocarbons used as binders lose a considerable percentage through the evaporation of volatile constituents, and the loss leaves the residuum too brittle for its purpose. The methods outlined by the author for determining the fitness of these and other materials are given with such completeness as to be of especial value to the technical reader, and while the penetration treatment of old roads largely employed in France and England, where the question of new construction does not arise so frequently, has not been treated as exhaustively as the mixing system, descriptions and illustrations of the machines employed abroad for forcing coal tar or water gas tar into the roadbed by means of pneumatic nozzles supply a line of information which will be highly appreciated in many progressive quarters. Published by John Wiley & Sons, New York, and Chapman & Hall, Limited, London.

New French Rating Formula Considers Stroke

(*Continued from page 965*)

As a source of comparison of all formulas now in use, a review of all the formulas given in a recent issue of *Machinery* by Mr. E. Hubendick is given herewith. In these formulas, the characters in common use will be employed as follows:

D = diameter of cylinder,
N = number of cylinders,
S = length of stroke,
n = number of revolutions per minute.

The French Automobile Club's formula is:

$H.P. = 0.07\,D^2N$, when the diameter is given in centimeters,

$H.P. = 0.45\,D^2N$, when the diameter is given in inches.

In this formula the mean pressure has been assumed to be 5.3 kilograms per square centimeter (75 pounds per square inch), and the piston speed 5 meters (16 feet 5 inches) per second.

The Royal Automobile Club's (British) formula is:

$H.P. = 0.0625\,D^2N$, when the diameter is in centimeters.

$H.P. = 0.405\,D^2N$, when the diameter is given in inches.

Mr. Arnon's formula is:

$H.P. = 0.0061\,D^3N$, when the diameter is in centimeters.

$H.P. = 0.1\,D^3N$, when the diameter is given in inches.

Mr. Faroux's formula is:

$H.P. = 0.0074\,D^{2.4}\,S^{0.6}$, when the diameter is in centimeters.

$H.P. = 0.121\,D^{2.4}\,S^{0.6}$, when the diameter is given in inches.

Another French formula is as follows:

$H.P. = 0.02562\,D^{2.4}\,N$, when the diameter is in centimeters.

$H.P. = 0.24\,D^{2.4}\,N$, when the diameter is given in inches.

Mr. T. Thornycroft's formula is:

$H.P. = \frac{D^2\,S^{0.75}\,N}{35{,}000}$, when the diameter is given in centimeters.

$H.P. = \frac{D^2\,S^{0.75}\,N}{2{,}700}$, when the diameter is given in inches.

Prof. H. L. Callender's formula is:

$H.P. = 0.0875\,D\,(D - 2.5)\,N$, when the diameter is given in centimeters.

$H.P. = 0.565\,D\,(D - 1)\,N$, when the diameter is given in inches.

In this latter formula the mean pressure is assumed to vary in the same proportion as $\left(1 - \frac{2.5}{D}\right)$ if the diameter is given in centimeters, and $\left(1 - \frac{1}{D}\right)$ if the diameter is given in inches.

The Royal Automobile Club's (Swedish) formula is:

$H.P. = \frac{D^2SnN}{250{,}000}$, when the diameter is given in centimeters.

$H.P. = \frac{D^2SnN}{15{,}240}$, when the diameter is given in inches.

Licensed Automobile Manufacturers' formula is:

$H.P. = \frac{D^2N}{2.5}$, when the diameter is given in inches.

$H.P. = 0.062\,D^2N$, when the diameter is given in centimeters.

Glidden Tour and Hoosier Meet

ENTRIES for Glidden Tour may be made until June 1. The list will be closed, according to announcement made from A. A. A. headquarters.

Nearly all of the classes in the National Championship races, to be run on the Indianapolis Motor Speedway, May 30, are filled. Indications point to a very successful meet. Workouts have been begun by the National, Marmon, Fuller, Herreshoff and other cars entered.

In addition to the championship medals, several side trophies are offered by the Prest-o-lite and Wheeler and Schebler Companies. Entries for the championship races, embracing all divisions of stock cars in this year's contest rules, closed May 25.

Blanks Are Out for Quaker City Event

PHILADELPHIA, May 23—Blanks are out for the first of the Quaker City Motor Club's series of track races, which will be held June 4 at Point Breeze. The races will be Class C events, according to the new A. A. A. rules—Division 1, five miles, piston displacement 160 inches and under; Division 2, five miles, 161 to 230 inches; Division 3, five miles, 231 to 300 inches; Division 4, 10 miles, 301 to 450 inches; event 6, at 25 miles, will be open to Divisions 1, 2 and 3; event 7, at 50 miles, to Divisions 4 and 5. Indications are that the events will be well patronized. The club is schooled in work of this sort, and the event is looked forward to with interest by those who appreciate well-managed contests.

The Little Tots Were Taken for a Joy Ride

LAST week twenty-five owners of Stearns cars placed their automobiles at the disposal of Wyckoff, Church & Partridge, of New York, for the Fourth Annual Outing given to the pupils of the Free Industrial School for Crippled Children of West 57th Street.

A slight change was made in the program this year, the little ones being given the privileges of Dreamland by Mr. Gumpertz, the kind-hearted manager of that famous recreation resort.

The happy children were given badges and silk flags, stopping at Broadway and 56th Street long enough to be snap-shotted at that point, after which the parade continued down Broadway and Fifth Avenue, and across the new Manhattan Bridge, through Brooklyn and the shore drive to the ample grounds and club house of the Crescent Athletic Club at Bay Ridge, overlooking the bay.

Here a rest of two hours was taken to allow the pupils to romp on the grass and try out the toy aeroplanes which their hosts had provided for them. A liberal luncheon was served them in the club house jointly by the club and Wyckoff, Church & Partridge.

Continuing the trip the party, numbering about 120, arrived at Dreamland at 2 P. M., where all the various amusement features were thrown open to them through the liberality of Manager Gumpertz. The water chutes, Venice, the alligator farm, Bostock's animals, etc., received full patronage. Heretofore the rides have always terminated at Luna Park, the new attractions of Dreamland being distinct novelties this year for the entire party.

The reloading of the cars was begun at 4.30 P. M., the party starting for the Reisenweber's Casino on the Ocean Boulevard, where Manager Fischer served ice cream and cake to the ladies and children.

The return was made over the Williamsburg bridge, up Broadway, without a hitch, arriving at the school at about 6 o'clock. Each little tot, though tired and dusty, was happy and full of enthusiasm at the wonderful sights.

A perfect line was maintained throughout the entire trip, thanks to the kind help of Sergt. Casey and his aiders, Officers Howe, Faber and Culbertson, who accompanied the party throughout the entire day.

The ladies who accompanied the party were Mrs. Arthur Elliott Fish, Mrs. E. B. Archer, Mrs. M. E. Bullard, Miss Robin, Miss Demarest, Miss Wherry, Mrs. E. A. Hoffman, Mrs. J. E. Demar, Mrs. E. S. Partridge, Mrs. Williams and Mrs. Loomis.

Among those who kindly loaned their Stearns cars for the trip are Mr. Fred Stone, Mr. David Montgomery, A. W. Lesser, Aug. Luchow, Geo. H. Wumschell, Edgar Gibbs Murphy, Mr. McKeever, C. F. Wyckoff and others.

Weather conditions were perfect and the Stearns owners who loaned their cars were amply repaid for the small sacrifice when they saw the happiness this Annual Outing gave the children of the Free Industrial School.

Stearns Automobiles Assembled in Front of Wyckoff, Church & Partridge Broadway Establishment before the Start

Ready For Big Hoosier Races

INDIANAPOLIS, May 23—Everything is in readiness for the opening of the grand circuit automobile races on the Speedway Friday and Saturday, and the National Championship races, which will be held Monday.

Entries have been liberal in all the events listed on the program and a spectacular and successful meet is promised. The entries are as follows:

FRIDAY, MAY 27.

Event No. 1—Cars, class D—Record trials from ¼ mile to 1 kilometer. To lower world's speedway records. Free-for-all cars. Each car will be permitted to make two trials, electrically timed.

Event No. 2—Stock chassis cars, class B, division 1—160 cubic inches piston displacement and under. Minimum weight, 1,100 pounds. Distance, 5 miles.

Event No. 3—Stock chassis cars, Class B, division 2—161 to 230 cubic inches piston displacement. Minimum weight, 1,400 pounds. Distance, 5 miles.

Event No. 4—Stock chassis cars, class B, division 3—231 to 300 cubic inches piston displacement. Minimum weight, 1,700 pounds. Distance, 10 miles.

Event No. 5—Stock chassis cars, class B, division 4—301 to 450 cubic inches piston displacement. Minimum weight, 2,000 pounds. Distance, 5 miles.

Event No. 6—Stock chassis cars, class B, division 5—451 to 600 cubic inches piston displacement. Minimum weight, 2,300 pounds. Distance, 10 miles.

Event No. 7—Cars, class D—Free-for-all handicap. Open to all cars entered at this meet. Cars will be handicapped in accordance with their performances at this meet by the board of official handicappers. Distance, 5 miles.

Event No. 8—Stock chassis cars, class E—Open only to registered amateur drivers in accordance with definition of racing rules of the A. A. A. Distance, 5 miles.

Event No. 9—Cars, class D—Free-for-all open race. Distance, 5 miles. Conditions of deed of gift for the Indianapolis motor speedway helmet. This prize is to be competed for by free-for-all cars of class D. at the May, July, August and September meets, 1910. The winner of this race and the successive races for which this prize is offered, shall be entitled to $50 per week from Decoration day, May 30, until Thanksgiving day, 1910, provided he successfully defends and wins same at each meet. The speedway helmet is to be worn by the winner while defending same. In case of postponement or the declaring off of any of these meets, or discontinuing this event, then the last holder of this trophy shall receive the sum of $50 per week for 60 days after such notice has been published. The holder of this trophy at the end of the season is entitled to permanent possession of same.

Event No. 10—Stock chassis cars, class B, division 4—301 to 450 cubic inches piston displacement. Minimum weight, 2,000 pounds. Distance, 100 miles. For the Prest-O-Lite trophy.

SATURDAY, MAY 28.

Event No. 11—Cars, class D—Record trials for 1 mile. Free-for-all cars. To lower world's speedway records. Each car will be permitted to make two trials, electrically timed.

Event No. 12—Stock chassis cars, class B, division 4—301 to 450 cubic inches piston displacement. Minimum weight, 2,000 pounds. Distance, 10 miles.

Event No. 13—Stock chassis cars, class B, division 5—451 to 600 cubic inches piston displacement. Minimum weight, 2,300 pounds. Distance, 5 miles.

Event No. 14—Cars, class D—Free-for-all handicap. Open to all cars entered at this meet. Cars will be handicapped in accordance with their performance at this meet by the board of official handicappers. Distance, 10 miles.

Event No. 15—Stock chassis cars, class E—Open only to registered amateur drivers in accordance with definition of racing rules of the A. A. A. Distance 10 miles.

Event No. 16—Stock chassis cars, class B, division 6—601 to 750 cubic inches piston displacement. Minimum weight, 2,500 pounds. Distance, 5 miles.

Event No. 17—Cars, class D—Free-for-all open race. Distance, 10 miles.

Event No. 18—Cars, class E—600 cubic inches piston displacement or less. Minimum weight, 2,300 pounds. Distance, 200 miles. For the Wheeler & Schebler trophy.

MONDAY, MAY 30

Event No. 1—Stock chassis cars, class B, division 1—160 cubic inches piston displacement and under. Minimum weight, 1,100 pounds. Distance 5 miles.

Event No. 2—Stock chassis cars, class B, division 2—160 to 230 cubic inches piston displacement. Minimum weight, 1,400 pounds. Distance, 10 miles.

Event No. 3—Stock chassis cars, class B, division 3—231 to 300 cubic inches piston displacement. Minimum weight, 1,700 pounds. Distance, 5 miles.

Event No. 4—Stock chassis cars, class B, division 3—231 to 300 cubic inches piston displacement. Minimum weight, 1,700 pounds. Distance, 10 miles.

Event No. 5—Stock chassis cars, class B, division 4—301 to 450 cubic inches piston displacement. Minimum weight, 2,000 pounds. Distance, 5 miles.

Event No. 6—Stock chassis cars, class B, division 4—301 to 450 cubic inches piston displacement. Minimum weight, 2,000 pounds. Distance, 10 miles.

Event No. 7—Stock chassis cars, class B, division 5—451 to 600 cubic inches piston displacement. Minimum weight, 2,300 pounds. Distance, 5 miles.

Event No. 8—Stock chassis cars, class B, division 5—451 to 600 cubic inches piston displacement. Minimum weight, 2,300 pounds. Distance, 10 miles.

Event No. 9—Stock chassis cars, class B, division 6—601 to 750 cubic inches piston displacement. Minimum weight, 2,500 pounds. Distance, 5 miles.

Event No. 10—Cars, class D—Free-for-all open race. Open to all cars entered at this meet. Distance, 5 miles.

Event No. 11—Cars, class D—Free-for-all open race. Open to all cars entered at this meet. Distance, 10 miles.

Event No. 12—Cars, class D—Free-for-all handicap. Open to all cars entered at this meet. Cars will be handicapped in accordance to their performances at this meet by a board of official handicappers approved by the contest board of the American Automobile Association. Distance, 5 miles.

Event No. 13—Stock chassis cars, class B, division 3—231 to 300 cubic inches piston displacement. Minimum weight, 1,700 pounds. Distance, 50 miles, for the G & J trophy. Valued at $1,000. This event shall be competed for twice during the season of 1910.

Event No. 14—Stock cars, class E—For the John A. Wilson trophy. Valued at $150. Donated by John A. Wilson, of Franklin, Pa., to be awarded to the stock touring car that first makes a full mile in 1 minute or less under regular touring conditions and carrying four passengers; the contest to be confined to cars of not more than 50 horsepower, A. L. A. M. rating; regular touring bodies—not baby tonneaux or torpedo bodies—tanks full, top on but may be down; mud guards on and regular supply of tools; passengers to weigh not less than 160 pounds each and to sit upright in the car; to ensure there is no down grade, the mile to be made both ways of the track; if more than one entry in the contest, then the car making the fastest time to be awarded the cup, provided said fastest time equals a mile-a-minute.

N.Y. Taxicab Rates to Come Down

John Drennan, 74 West Eighty-ninth street, has been appointed taximeter inspector in New York under the provisions of the new law which goes into effect in sixty days. The law requires a maximum rate of thirty cents a mile for the first mile in a two-passenger machine and ten cents for each additional quarter mile with $1 an hour for waiting time.

The four-passenger machines may charge forty cents a mile for the first mile and ten cents for additional quarters with waiting time of $1.50 an hour. Hand baggage is free and so is the transportation of children under the age of five years. It will be part of Mr. Drennan's duties to inspect the mechanism of the meters and if they should prove to be too fast, the law provides heavy penalties. It is expected that this new plan will work to the entire satisfaction of the patrons of taxicabs.

Reo Wins Cup in Drawing Straws

RICHMOND, VA., May 25—Drawing straws was resorted to to determine which of the four cars that finished the Virginia Endurance Run with clean scores should gain possession of the cup offered as first prize. The Reo, driven by F. E. Nichols, was the lucky one, but the names of the three losers will be engraved upon the cup and each will receive a class cup. Miss Anne Dunlop, the only woman to take part in the race, was given a special prize for driving her car, a Maxwell, from start to finish without masculine assistance.

More Autos for the Orphans

One hundred more cars are needed by the Orphans' Day committee in order to make the annual celebration in New York an unqualified success. More money is also required, although contributions are coming in at a good rate.

Edward Steindler has donated the use of four sight-seeing automobiles, and during the past week many owners of private cars have offered them to the committee. Half a dozen great trucks have been given to the committee for the occasion and the motor wagon division will be notably large.

Races Likely at Lowell This Fall

BOSTON, May 23—The committee on roads and bridges of the Massachusetts legislature this afternoon voted to report the bill allowing the selectmen of Tyngsboro and the aldermen of Lowell to close the roads in that vicinity when necessary between Sept. 15 to 22 next in order that there may be more automobile races.

Now that the bill has been reported to the legislature, it is expected that Senator Hibbard will push it along, and then the Lowell men will get busy arranging for the race with those who are going to put it on.

Delaware Club to Tour June 18

WILMINGTON, DEL., May 23—The executive committee of the Delaware Automobile Association, at a meeting held this evening, decided to have the annual roadability run June 18, but as several routes have been suggested by the pathfinding committee, the matter of selection of the route was left open for a few days.

This is likely to be the only big run of the year for the Delaware Club, and the indications are that it will attract probably 50 entrants.

At the executive committee meeting a request was received from Rev. D. M. Cleland, pastor of the United Presbyterian Church, this city, for the co-operation of the members in a proposed automobile outing to poor children of the city on June 10, and the committee agreed to co-operate. It is expected that from 75 to 100 cars will be required.

"Lady Overland" at Cleveland

CLEVELAND, May 23—In excellent condition, the Overland car, bearing Miss Blanche Stuart Scott and a woman friend reached this city Sunday night after accomplishing the first leg of the transcontinental tour to San Francisco.

Miss Scott was accorded hearty receptions all along the way, particularly so at her home city, Rochester. The weather has been trying so far for heavy rains have fallen frequently, making ordinarily good roads quite boggy and uncertain. Through the Mazuma swamps, near Syracuse, chains had to be used constantly. The only troubles encountered so far have been carbureter difficulties and two punctures. The car left for Erie Tuesday morning and is scheduled to arrive at Cleveland this afternoon. A number of entertainments have been arranged for the tourists in the Forest City and they will remain there for two days.

Buffalo Club Increases Activity

The Automobile Club of Buffalo will conduct, during this summer, a four, or five days' reliability touring contest of not less than two hundred miles each day, starting and finishing each day at Buffalo.

Make Parts and Accessories

INDIANAPOLIS, May 23—The Pyle Spring Tire Company, of this city, and the Bimel Spoke and Auto Wheel Company, of Portland, have been recently organized. The former has a capitalization of $50,000, and will make a spring tire and motor parts for the trade.

The latter concern has $100,000 capital, and will manufacture spokes and wheels of an advanced type. Both companies plan to enter business actively in the immediate future, employing full forces of men.

South Stirred by Carolina Run

RICHMOND, VA., May 23—Few occurrences in automobile circles of Virginia or North Carolina have attracted as much interest as the approaching Carolina Endurance Run. The run will be held on June 7, 8, 9, 10, 11, and the course will be as follows:

First Day—Richmond to Littleton, N. C., by way of Petersburg and Emporia.

Second Day—Littleton to Raleigh, by way of Warrenton, Henderson and Wake Forest.

Third Day—Raleigh to Clarkesville, by way of Apex, Durham, Chapel Hill and Oxford.

Fourth Day—Clarkesville to Richmond, via the old Boydson plank road, Boydson and Petersburg.

The run is being given by the *Times-Dispatch* of Richmond, in the interests of good roads. It is under the rules and auspices of the American Automobile Association, members of which will be present and traverse the route.

Entries for Good Roads Tour

Forty-three entries to the Atlanta-New York tour under the auspices of the New York *Herald* and Atlanta *Journal*, have been received up to May 25. The box closes June 1.

OFFICIAL CARS (NON-CONTESTING)

Entrant's Name and Address	Make of Car
R. H. Johnston, the White Company, New York	White Steamer
Matheson Automobile Company, New York	Matheson "Silent Six"
Ray M. Owen, for R. M. Owen & Co., New York	Reo Roadster
Columbia Motor Car Company, New York	Columbia
James R. Gray, Atlanta	Pierce-Arrow
Ajax-Grieb Rubber Company, New York	Lozier (Briarcliff model)

CONTESTING ENTRANTS

Beaumont Davison, Atlanta	Packard
W. J. Stoddard, Atlanta	National
Colonel J. J. Woodside, Atlanta	Thomas
R. E. O'Donnelley, Atlanta	Packard
Joseph F. Gatins, Jr., Atlanta	Knox
Edward M. Durant, Atlanta	Pope-Toledo
W. S. McNeil, Jr., Atlanta	Lambert
Regal Motor Car Company, Detroit, Mich.	Regal
W. T. McNinch, Atlanta	Lambert
Atlanta Motor Car Company, Atlanta	White Star
Jackson P. Dick, Atlanta	American Traveler
Maxwell-Briscoe Motor Company, New York	Maxwell Touring Car
Edward H. Inman, Atlanta	Simplex
C. W. Dupre, Marietta, Ga	Maxwell
Charles I. Ryan, Atlanta	Columbia
W. E. Wimpy, Atlanta	Buick
J. H. Marsteller, Roanoke, Va	Chalmers-Detroit
Forest Adair, Atlanta	Stevens-Duryea
E. M. Willingham, Atlanta	Ford
N. W. Wallace, Charlotte, N. C	Hupmobile
P. S. Arkwright, Atlanta	Pope-Hartford
A. Burwell, Jr., Charlotte, N. C	Firestone-Columbus
Brush Automobile Company, Atlanta	Brush
Kelly-Knight Motor Car Company	Kissel-Kar
Arthur T. Smart, Atlanta	Speedwell
Georgia Motor Car Company, Atlanta	E-M-F
Mrs. Elizabeth A. de Giers, New York	Thomas
E. D. Crane & Co., Atlanta	Firestone-Columbus
W. D. Alexander, Atlanta	Stoddard-Dayton
Asa G. Candler, Jr., Atlanta	Lozier
Maxwell-Briscoe Company, Tarrytown, N. Y	"Baby" Maxwell
John W. Grant, Atlanta	Locomobile
E. D. Crane & Co., Atlanta	Hupmobile
T. H. Cooper, Salem, Va	Corbin
C. H. Johnson, Atlanta	Stevens-Duryea
Georgia Commission Company, Albany, Ga	Halladay
John Moore & Co., New York	Brush

The cars will be divided into seven divisions or classes, regulated by their prices, under A.A.A. rules.

A silver cup is offered to the winner of each class, while a large silver cup, engraved with the name of the contest, is up as the sweepstake prize, and will go to the winner over all divisions, which has the cleanest score.

About thirty entrees are expected for the run.

Prepare Tour Around Long Island

All around Long Island will be the course of the two-day reliability tour which will be run June 14-15 under the auspices of the Motor Contest Association. The course will be about 200 miles the first day, starting at the western end of the Island and traversing it to Montauk Light, with night control at Orient Point. The second day's route will generally follow the North shore. The cars will run in two divisions, one for contestants and the other for amateurs. Twenty-five prizes have been offered. The run is sanctioned by the A.A.A. The pathfinding car in charge of Raymond Beck left last Saturday to pick out the route.

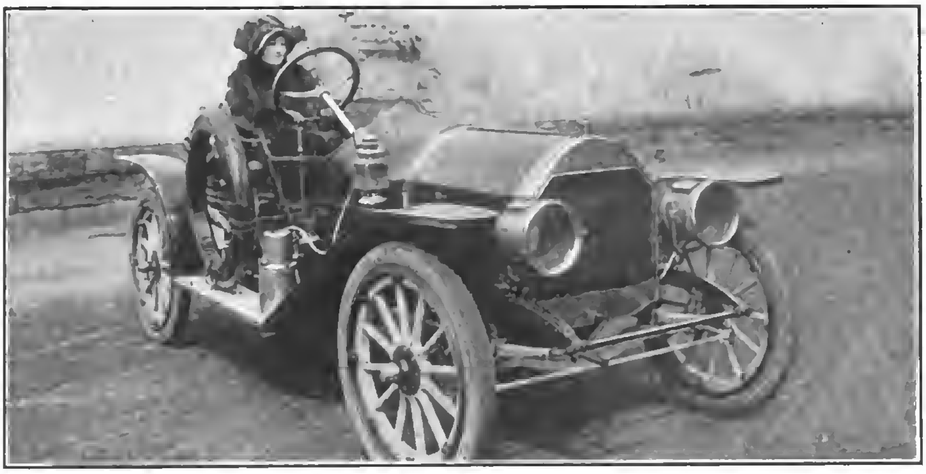
Star Pathfinder Has Rough Trip

ST. LOUIS, May 23—The Buick pathfinder "Red Wing" (Model 17), sent out by the St. Louis Automobile Manufacturers' and Dealers' Association to chart a route for the Star trophy finished its trip Saturday, arriving in St. Louis at 12.30 p. m. The car, in five and a half days made more than 500 miles, much of the distance through mud, which it was almost impossible for a team of mules to pass through safely, and the car was stuck only once and stopped only once for repairing. The route was a circuit of Northeast Missouri and Eastern Central Illinois.

DETROIT, May 23—Organization of the Gaylord Motor Car Company has been perfected in Gaylord, Mich., and the company has engaged Guy Hamilton, of this city, to act as manager. Mr. Hamilton is now making arrangements for the purchase of machinery and other equipment for the factory. Construction work will begin at once. The new company is capitalized at $100,000.

The company, it is learned here, will manufacture an entirely new type of car, designed especially for the use of farmers, and one that will take readily to the country roads. It is also planned to manufacture a farm truck which the farmer may use in hauling his produce to market.

The Regal Motor Car Company, of this city, is ready to start work on its Canadian branch in Windsor, Ont., as soon as the taxpayers of the municipality vote on the question of selling the company the site.



Cole "Thirty" known as a Torpedo Roadster as it appears on the highway

In the Realm of the Makers

The Ramsay - Alton Manufacturing Company, of Portland, Mich., has decided to manufacture auto tops. J. Hayes, of Detroit, has invested $10,000 in the new enterprise, which is expected to give employment to about fifty men.

Plans are being prepared for the erection of a large plant by the Sommer Motor Car Company at Bucyrus, O. L. A. Sommer is president of the concern, which will make several types of motor cars. It is expected to have the plant completed by fall.

Findlay, O., is to have a third automobile plant. L. E. Ewing, of Cleveland, a few days ago purchased the North Side plant of the Findlay Axe & Tool Co., which will be converted into a motor car factory as soon as the building can be prepared for it. Present plans contemplate the organization of a company capitalized at $300,000.

The E-M-F factory announces that it will establish a branch in Omaha and will start construction at once on a new building. N. P. Bergers, of the Bergers Automobile Company, which has been handling the E-M-F cars, will be the Nebraska and Iowa manager. It is planned to build a large two-story structure with garage, showroom, repair shop, etc. Manager Bergers is now looking for a site.

The Briggs & Stratton Company, of Milwaukee, has just completed its new plant. The building is of concrete construction, fireproof, and is equipped with everything in the line of modern machinery and tools to make the B. & S. igniter. In addition to the equipment of special tools and machinery for manufacture of the mechanical parts, a complete vacuum impregnating apparatus for the special treatment of spark coils has been installed.

The Electric Goods Mfg. Co., of Canton, Mass., is offering fifty $10 prize cups free to motorboat clubs if the clubs will enter into a contest involving "Prefex" Ignition System, in such a way as to bring out the waterproof qualities of same in comparison with the waterproof qualities of ignition systems in general. This offer is to be held open for thirty days. The judge must be the editor of some magazine to be chosen by the competitors.

George Westinghouse, of Pittsburgh, has invented an air spring for automobiles which he says will decrease the expense of running rubber-tired vehicles about 60 per cent., and which he hopes ultimately will cut down prices materially by doing away with rubber tires. The device is based upon the idea of the plunger elevator. One of the springs is placed under each of the corners of the body, and they are said to take up shocks with much greater facility than rubber tires. The idea of the inventor is to use steel tires with the air springs.

Among the Various Agencies

John M. Weaver, of the Pittsburgh Speedway Motor Company, has secured the Pittsburgh agency for the "Henry 35," which is manufactured by the Henry Motor Car Company, of Muskegon, Mich.

The Greenville Motor Car Company, of Greenville, S. C., has been added to the list of Selden agents in the South. Alvan H. Doty, Jr., of Staten Island, is another new Selden agent.

The Brush Runabout has invaded the Seattle territory, the agency just having been established by Samuel Polacheck, who has been associated with the Brush Company at the Detroit plant. The location is at 305 East Pike street.

Michael Abol, of Columbus, has taken the Central Ohio agency for the Baker Electric. He has joined with H. E. Evans in the agency and a location will be found for the salesroom in the business section of the city.

The Babcock 30, which sells for $2,250, is another car to enter the Baltimore field. It is handled by the company's local office at 107, 109 and 111 West Fayette street, H. Davis Coulson being the manager of that establishment.

James A. Hill, of Lafayette, Ind., has taken the agency for Halladay cars in Lafayette and vicinity, and will start the erection of one of the largest garages in northern Indiana. He will look after the agents in North Central Indiana for the factory.

Jesse C. Stewart, Pittsburgh agent for George C. Christian Milling Company, of Indianapolis, has bought one of the finest sites in the city on Centre avenue near Morewood avenue, and will build an eight-story garage at once.

A new company has been formed at Monessen, Pa., to distribute the Lyon motor car throughout five counties of western Pennsylvania; namely, Westmoreland, Washington, Fayette, Allegheny and Beaver. The officers of the company are: President, George H. Stevens; vice-president, J. J. Cushing; treasurer, William Herron; secretary, J. B. Culler.

H. E. Wilcox Motor Car Company, of Minneapolis, has appointed the following agents: Russell Motor Car Company, at Duluth; Pioneer Auto Company, of San Francisco; John Deere Plow Company, Omaha; McGee-Huckell Motor Car Company, of Kansas City, Mo.; Wilcox Motor Car Company, Chicago. Trucks are being delivered all over the Northwest.

New Iowa Agencies are: Iowa Auto & Tire Company, Davenport, Ia.—Thomas, Cadillac, Pierce-Arrow, Babcock Electric, H. W. Meier Company, Davenport, Ia.: Reo, Jackson. Bernhard & Turner, Des Moines, Ia.—Columbus Electric. Musgrave Auto Company, Des Moines, Ia.—Black Crow. Harding & Blenkinson, Sioux City, Ia.—Everett "30." Capital City Automobile Company, Des Moines, Ia.—Columbia. Buick Auto Company, Des Moines, Ia.—Packard. Cruzan, Des Moines, Ia.—Interstate.

Coker F. Clarkson, Secretary of the Society of Automobile Engineers

Richmond, Va.—The City Council recently passed an ordinance governing the speed limit for autos and vehicles, which raises the limit from eight to fifteen miles per hour.

The Belle Terre Club, of Port Jefferson, L. I., will open its clubhouse for the season on June 11. Elaborate arrangements, including a luncheon and other entertainment, are being made.

G. W. Bennett, Eastern manager of the White Company, has resigned to take the position of general sales and advertising manager of the Willys-Overland Company, of Toledo. He assumes his new duties June 1.

Information received in Lansing is to the effect that the General Motors Company will take over the plant of the Seager Engine Works. The report has not been officially confirmed, but it is said to be on good authority. The supposed merger, it is said, is to take place about June 1 of this year.

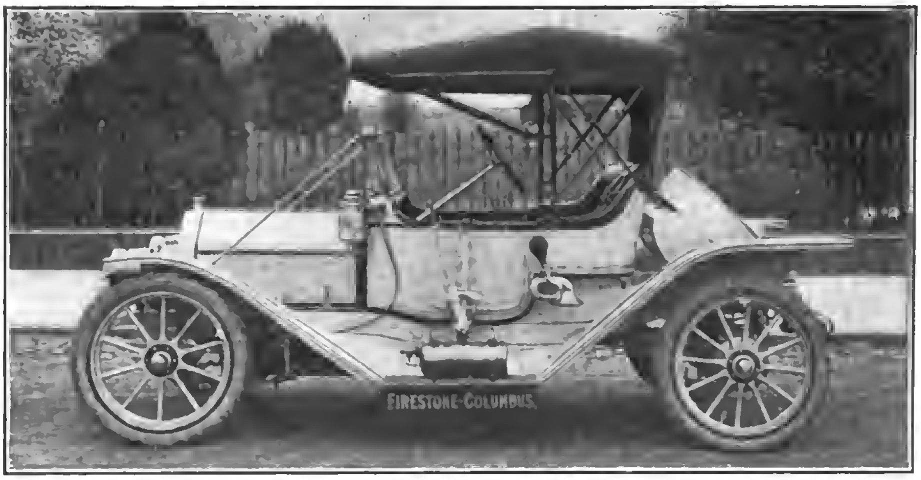
The United States Circuit Court at Chicago has handed down a decision through Judge Sanborn which is of marked importance to the automobile public. Parsons patent No. 723,299 covering chain grips for automobiles is sustained.

Demand for cars has brought several new machines into Omaha during the past few days. The Sweet-Edwards has brought out the R. A. C.; F. C. Henry has introduced the Henry; the Standard Auto Company is showing the Westcott; the Omaha Auto Company has the Demot, and C. F. Louck the Abbott-Detroit.

The Michelin Tire Company, 1344 Michigan avenue, has removed to 1449 Michigan avenue, Chicago, Ill., taking over the building which was formerly occupied by the Tennant Motor Car Company of that city.

Spokane automobile dealers are planning a speed contest early in June, to be run from Spokane to Lewiston, Idaho, and return. The roads between these points will soon be in excellent condition.

W. L. Velie, President Velie Motor Co.



Firestone-Columbus roadster type with top ready for the road.

Frank H. Cross, manufacturer's agent, has recently associated himself with several others and is now doing business under the name of the Frank H. Cross Distributing Company at 1777-1779 Broadway, New York City. The company is the sole distributor of several accessory and parts manufacturers, including complete chassis, and only sells to automobile manufacturers and accessory jobbers.

Doings in the Garage World

F. C. Caldwell, formerly connected with the Missouri Valley Auto Co., expects to open a garage in Kansas City.

The Gordon Motor Car Company will enter its new garage in Richmond, Va., within a few days.

William W. Pope & Sons, Netcong, N. J., have completed a garage at that place. They have 1,500 square feet of floor space and an adequate plant for doing all kinds of work.

The Fourth Street Auto Garage Company, of Barberton, Ohio, was opened recently by G. E. Gardner. The concern acts as agent for the De Tamble and Halladay lines in three counties.

Work on the S. H. Lewis garage at Binghamton, N. Y., is progressing rapidly. The structural work is of steel and concrete, and it is intended to have the building completed in the course of a month.

The Fawkes Auto Company, of Minneapolis, is beginning the erection of the new garage and sales building at Erie street and Hennepin avenue. It is planned to complete the structure January 1.

The Metropolitan Motor Car Company at Wenatchee, Wash., is erecting a garage to cost $36,000. The building is of reinforced concrete, 120 by 160 feet, and two stories in height. Captain C. C. Griggs is manager of the Wenatchee branch.

William H. Lee is building a garage in Thirtieth street, Indianapolis, and expects to take on one or more lines of cars. At present Mr. Lee is chief clerk of the city building inspection department.

Fred A. Wing, of the Broadway Automobile Company, Seattle, announces that work will commence on an exclusive electric garage for the Detroit electrics, the building to be 50 by 128 feet on Broadway, between Olive and Howell streets.

August Zander will build a garage in Stanton, Neb. The building will be of cement construction and will be 25 x 80 feet with all modern appliances. A number of Stanton people who have held back because there was no garage in town will now purchase autos.

Carl Mielcke and Fred Kunz, of Pittsburg, has purchased, through the Baker-Herbig-Royer Company, the garage formerly operated by Siegrist & Sons, in Coshocton, O. The new company, in addition to operating the garage and repair shop, will take the following agencies: White (gasoline), Maxwell, Columbia, Speedwell, E-M-F and Rauch-Lang.

Brief Personal Mention

E. T. Elder and C. W. Struve have bought the interests in the Parsons, Kas., Motor Company formerly controlled by Kimball & Delay.

W. H. Argabrite has been appointed assistant secretary of the Louisville Automobile Club, to succeed E. J. Bohannon, who resigned last month.

John Ryan, formerly of the Factory Sales Corporation, selling Schebler carbureters, has been engaged by A. R. Mosler & Company.

J. L. Barker, of Racine, Wis., inventor of a puncture-proof tire, is now at work on a self-starting device for motor cars. The experiments are being made on a Mitchell.

Prominent Automobile Accessories

SINGLE SECTIONAL MOTOR TRUCK TIRE

An interesting thing in the rubber tire world at the present time is a sectional tire for trucks which has but a single row of rubber sections. Heretofore most tires of this kind have been made in the twin form, the sections being staggered to make, as nearly as possible, a continuous tread. This new single sectional tire is a "Kelly-Springfield" made by the Consolidated Rubber Tire Company of New York, and Akron, Ohio, and has the good construction and high grade composition that characterize all tires bearing that name.

The clever feature of this new tire is the peculiar shape of the segments, which, as you will see from the illustration, are narrower at the rim than at the outside edge, so that under the weight of a load the ends of the sections meet at the outside edges.

The jar and vibration common to most sectional tires of the staggered variety is entirely absent where this single sectional tire is used, and actual experience has proved that engines do better work and last much longer where this resilient, smooth running tire is used.

AUTO DRAFT IS A HANDY DEVICE

The illustration here given of the "Auto Draft" made by the Auto Draft Company, Lake City, Minn., is shown with its parts complete, ready to use on an automobile. In practice, the drum part is bolted to the hub of the rear wheel, one on each side, if it is desired, although it may not be necessary, and with the "spike" which, in practice, is driven into the ground, an anchorage is afforded by means of which the steel cable is held. When a car gets stuck in the mud all that is necessary is to attach the cable to the spike, take a turn around the drum, start the motor, and "out she comes."

HIGH DUTY HYATT ROLLER BEARINGS

The fundamental feature of all Hyatt bearings is its distinguishing flexible roller. By "flexibility" is meant its adaptability to irregular conditions that are always present to a more or less extent in the practical manufacture and operation of any mechanical device. This is made possible by the character of the Hyatt roller, which is not solid, but made from rectangular steel wound in a suitable manner and in such a way as to form a spiral.

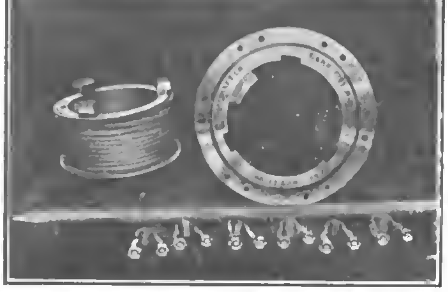


Fig. 1—Auto Draft and Parts, which is Used to Pull an Automobile out of the Mud

Such rollers are not flexible in the sense that they cause the shaft or axle to spring or vibrate, or the gears to lose their alignment. They simply serve to cushion or relieve the shocks to which all parts of the car are subjected. In this manner they greatly reduce the liability to breakage and increase the life of the bearing and the car as well. Those who have experimented with such matters realize what an infinitesimal amount of give, or elasticity, will effect the result.

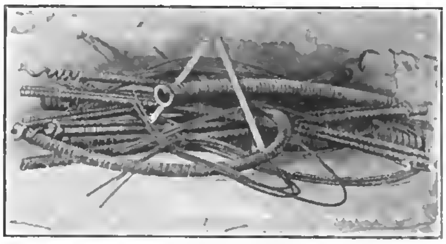


Fig. 2—Early Process in the Manufacture of Hyatt "High Duty" Roller Bearings

The rollers being hollow, they carry an unusually large amount of lubrication. The spirals in the rollers alternate from left to right, thus insuring perfect lubrication at all times. If there is any of the lubricant in any part of the bearing it will be evenly distributed.

There are two separate and distinct types of the Hyatt Roller Bearings, the commercial type and the High Duty type. The High Duty type involves the substitution of alloy steel properly treated, for the carbon steels in the commercial type rollers. This necessitates properly prepared inner and outer surfaces on which and in which the rollers operate.

This design enables a greatly increased load to be concentrated on the same section, or the same load on a smaller section. It makes this bushing particularly adaptable where the available space for a bushing is limited, and as all designers are now striving to do, make a small compact bearing.

Only selected alloy steels are used and all material is carefully checked by both mechanical and physical tests before it is accepted. The physical tests include the carrying of the material through all the necessary heat treating, in order to insure the maintenance of certain prescribed standards set for this particular type of bushing. The completed rollers are ground to size and inspected to within suitable limits.

THE USE OF THE BRAKES

Use the brakes with judicious care and motor tire mileage and general service will be greatly increased. This advice to automobile owners, says the Diamond Rubber Company, is well worth careful consideration, and, while not as important as ample tire inflation, perhaps is given heed by most drivers. Each application of the brakes causes some strain on the tires as well as in the transmitting parts of the machine. This strain, if constantly recurring, will, of course, result in the more rapid wear of the tires.

"The best drivers use the brakes very little," says Theo. Weigele, of the Diamond Company, "and their tire service is better because of it."

In ordinary road running—save in emergency cases—the engine may be employed to do the work usually required of the brakes. It is surprising how smoothly and efficiently a car can be handled without the use of the brakes after a little practice.

PERFECTION BATTERY CHARGER USES

The illustration here given is of the "Perfection" battery charger, made by the Economy Manufacturing Company, Park Building, Pittsburg, Pa. The charger is used for the purpose of charging ignition batteries as used in automobile work, and it has the virtue of solving what the average autoist calls a rather serious problem. The construction of the charger is along the usual lines, involving permanent magnets and an armature with a commutator, so that the current delivered is of the required voltage for charging work, hence the use of a commutator instead of collector rings. The magnets are of tungsten steel and the armature windings are carefully proportioned for the work.

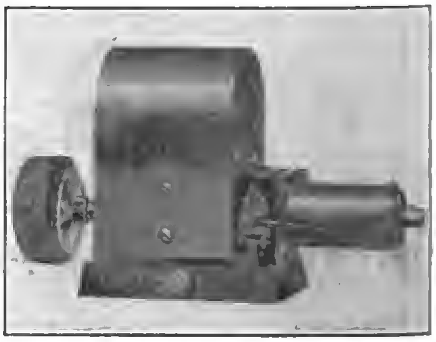


Fig. 3—Perfection Battery Charger which Takes the Place of a Troublesome Process

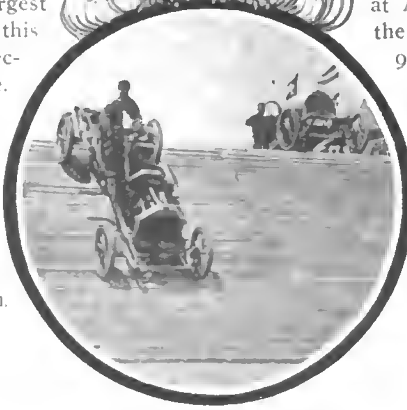
VOL. XXII. NEW YORK—THURSDAY, JUNE 2, 1910—CHICAGO No. 22

THE AUTOMOBILE

Records Fall at Indianapolis—W. & S. Cup to Marmon

On the Straightaway at the Indianapolis Speedway

INDIANAPOLIS, May 31.—The three-day racing carnival on the newly-surfaced motor speedway was brought to a conclusion yesterday afternoon, when probably the largest crowd that ever attended a similar event in this country watched the sport. Fully 60,000 spectators sat out the interesting programme. The feature of the carnival was the 200-mile event for the Wheeler & Schebler trophy for Class E cars, of 600 cubic inches piston displacement or less, and of a minimum weight of 2,300 pounds. Ray Harroun, driving a Marmon Six, was the winner; Lynch, Jackson, second; Aitken, National 40, third; A. Chevrolet, Buick 16B, fourth.



Making the Hurdle

Records went by the board all along the line. Kincaid, National, took 24.88 seconds off the 100-mile record of 1:24:08, made by Chevrolet at Atlanta. Aitken's (National) 8:08:36, made in the 10-mile event for 301-450 cubic-inch cars, was 9.16 seconds better than Chevrolet's best previous. Kincaid (National) lowered the 301-450 5-mile figures by 40 seconds, and Chevrolet, himself, took a hand in the general onslaught, the big fellow sending his Buick over the line 49.10 seconds better than the record in the Class B 160-230 10-mile race on the last day. National, Knox and Marmon each won two championships.

(*Continued on page 1022.*)

Bridgeport Hill Climb

Fig. 1—Rankin in Chalmers having a say
Fig. 2—National doing its expected work
Fig. 3—Mullins in Buick free-for-all
Fig. 4—Correja car driven by Taylor

Bridgeport, Conn., May 30—While hundreds of people lined the winding ascent of Snake Hill, Fairfield, Conn., the hill climb of the Bridgeport Automobile Dealer's Association was held this morning. Notwithstanding the injunction brought against the association by Frederick Sturges, New York millionaire, the climb was successful in every sense of the word. Although the steep hill was well soaked with the early morning rain the cars made good time. "Billy" Knipper, piloting a Chalmers, made the best time of the day, covering the seven-tenths mile course in one minute and eight seconds. Sixty members of the Coast Artillery guarded the course and no accidents marred the contest, although many narrow escapes occurred at "Deadman's Curve," which was the most perilous of the course. Dean Rankin in a Chalmers took the curves very fast, it was said, but lost time on the steep grades. Thomas H. MacDonald, of the Automobile Club of Bridgeport, acted as referee, while C. H. Gillette, president of the Automobile Club of Hartford, was the A. A. A. representative. Members of the Automobile Club, including F. T. Staples, F. W. Blolande, F. A. Rantz and R. M. Sperry, acted as the other officials.

The climb started promptly at nine o'clock with Events Nos. 1, 6 and 7 scratched on account of not filling, leaving seven to be contested. The first car over the finish line in the $851-$1,250 event was a Warren-Detroit, driven by J. H. Brooks which covered the course in 1:59.

A Correja, driven by J. Taylor, won the $1,251 to $1,600 event in 1:41; H. P. Hardesty's Pullman finishing second in 1:48 1-5.

The event for $1,601 to $2,000 stock cars was easily won by a Pullman driven by J. J. Schenck, in 1:34 4-5; the Stoddard-Dayton driven by H. B. Griffin, finishing second in 2:06.

Dean Rankin in a Chalmers had no trouble in winning the $2,001 to $3,000 stock car event in 1:18. He drove one of the finest races of the day, and took the curves beautifully without slowing down.

The free-for-all furnished the real excitement of the day, and the crowds went frantic when "Billy" Knipper piloted a Chalmers over the course in 1:08 3-4, making a new record for the hill. Rankin in another Chalmers won second honors in the event. His time was 1:15.

New Haven men won both motorcycle events, G. A. Wildman, Indian, that for single-cylinder machines in 1:26 1-5, and P. H. Cox the second in 1:13 1-5, also on an Indian. The summary:

$851 TO $1,250 STOCK CARS

No. Car	Driver	Time
1—Warren-Detroit	J. H. Brooks	1:59

$1,251 TO $1,600 STOCK CARS

1—Correja	J. Taylor	1:41
2—Pullman	H. P. Hardesty	[illegible]48 1-5

$1,601 TO $2,000 STOCK CARS

1—Pullman	J. J. Schenck	1:[illegible]
2—Stoddard-Dayton	H. B. Griffin	2:[illegible]

$2,001 to $3,000 STOCK CARS

1—Chalmers	Dean Rankin	1:[illegible]

FREE-FOR-ALL

1—Chalmers	"Billy" Knipper	[illegible] 3-4
2—Chalmers	Dean Rankin	[illegible]
3—Correja	J. Taylor	[illegible] 4-5
4—Buick	J. McMullin	[illegible]

Harbach Asks Recognition

Secretary Harry C. Harbach, the wide-awake official [illegible] Quaker City Motor Club, has entered a protest against [illegible] of the "secret time schedule" devised by him for the road [illegible] runs of the Quaker City Motor Club by other clubs a[illegible]ganizations unless due credit is given his club. Mr. H[illegible] suggests that promoters planning runs under a secret [illegible] schedule insert a line in the captions of their literature a[illegible]ing credit.

Sheridan Hill Climb

BUFFALO, N. Y., May 29—With the low and winning score, a small-powered Ford touring car finished first in the hill-climbing contest held on Sheridan Hill, near Forestville, under the auspices of the Dunkirk (N. Y.) *Observer*, yesterday afternoon. A Marion Roadster of 35 horsepower was second, while a Buick surrey, 18 horsepower, was third. Behind these placed cars ten others finished, many of them possessing more engine power than the winners.

Such a result was made possible by an original and ingenious plan of handicapping, which was devised by E. D. H. Caldwell, chief engineer of the Chautauqua Motor Company, and approved by Dr. A. Wilson Dods, H. J. Thompson and other officials of the contest.

The plan in brief was as follows:

The cylinder volume of each contesting car was multiplied by the number of seconds required to make the run up the hill in a first contest; then, from that was subtracted the total points gained by the same car in a second contest, the hill being divided into sections, so that a car was awarded 500 points for covering the first 500 feet, on high gear, three points for each foot in the second section, five points for each foot in the third section, eight points for each foot in tne fourth, ten for each foot in the fifth and 25 points for each of the remaining ten feet at the top of the hill. The car which, at the end of the two contests, bv subtracting the points gained in the second contest from those awarded in the first, had the smallest score was the winner and was awarded the cup for first prize.

The contest was unlike the usual hill climb, by reason of the fact that the smaller cars, instead of being placed at a disadvantage, had if anything, a little the better of the argument. Some slight alterations in the plan might make it a fair basis upon which similar contests may be held in future.

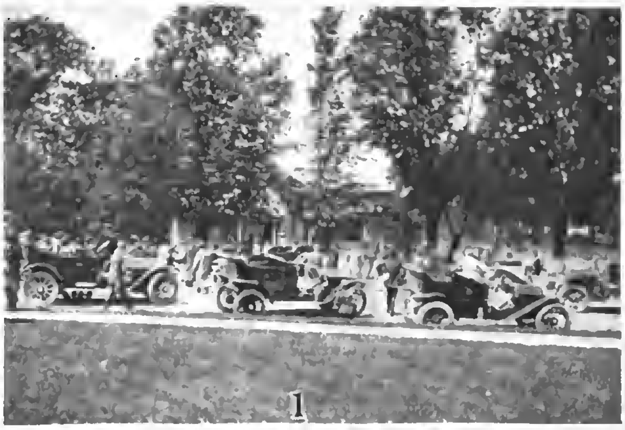
The contest was up the steep Sheridan Hill, just outside of Forestville, N. Y., a hill which is conceded by motorists to be one of the most difficult to ascend in this part of the country. The hill is about half a mile long and at different points the angle of its rise is said to be greater than 45 degrees. The contest was limited to gasoline motor cars that were either sold by agents or owned in northern Chautauqua County, N. Y., all of the cars being required to be equipped ready for road use with the exception that the tops and the glass fronts, usually carried, were allowed to be removed.

Under the original plan the contest was to have been conducted last Thursday, but owing to the treacherous condition of the hill, because of the heavy rains during the early part of the week, the event had been postponed until yesterday. There had been 22 original entrants for the contest, but of the number only thirteen actually competed, some cars being withdrawn previous to the day and others because of minor derangements which would have delayed the event had time been taken to make the necessary small repairs.

An added feature of the afternoon's sport was an exhibition of climbing the hill by James C. Barclay, of Buffalo, in his Model K, 70-horsepower, Thomas racer. This feature had no bearing on the actual contest, but was given to demonstrate the ability of Mr. Barclay's car, which was recently built for him by the E. R. Thomas Motor Car Company. The racer went up the hill without any difficulty in 55 seconds, which was more than ten seconds better than the fastest performance of any car in the actual contest.

The officials of the contest were: Judges, H. J. Thompson, Dr. A. Wilson Dods, Walter Record, F. R. Wilson, P. F. Valentine, E. D. H. Caldwell, Dr. M. S. Coxe; Starter, G. B. Williams, editor of the Dunkirk *Observer;* Timers, Dr. A. Wilson Dods and E. D. H. Caldwell; Clerk of Course, G. E. Frey. The tabulated result of the contest follows:

(*Continued on page* 1026.)



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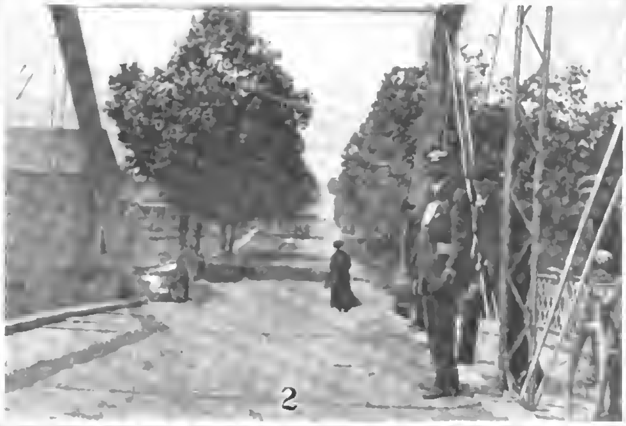

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Fig. 1—Just before the start
Fig. 2—Looking at Sheridan Hill
Fig. 3—Buick No 17 doing high gear work
Fig. 4—Ford Model T distinguished itself

Amateurs' Hill Climb Held in Westchester

A—J. D. Hooker third in fourth event with Stearns car. B—Simplex 90 driven by G. B. Lambert, who took away the record. C—Speedwell driven by H. A. Weatherbee. D—National driven by L. M. Rutherford, which made excellent time and performed excitingly.

WITHOUT a single hitch in the program and favored by every natural condition of advantage, the first scheduled event of the Amateur Automobile Contest Association, a hill climb staged on Anderson's Hill, near Harrison, New York, was held Saturday afternoon.

There were four fixed events and a motorcycle contest for which policemen in that branch of the service were eligible to enter. Aside from the four officers who took part in that event, the participants in the racing were all wealthy young men who drove their own cars.

The scene of the contest is a beautiful spot about two and a half miles from White Plains. The course was laid out over a splendid roadway, exactly a measured mile. The start was on a straight, level bit of ground about 300 yards long where it swerved to the right and climbed a long hill whose stiffest grade was 11.25 per cent. The average grade of the whole mile was 5.81 per cent. At the top of the hill there was another swerve to the right and, passing a series of reviewing stands, the contestants dropped down a short, sharp grade to the finishing line.

The course led past the Oliver Harriman and Whitelaw Reid estates, and in the crowds of spectators were many persons of national importance and prominence.

The motorcycle race was decided first, and of the thirteen original entries, four accepted the issue. The winner turned up in Patrolman Ruggiero, of the Scarsdale force, who drove an Indian machine across the line in 1.07 1-5. Officer Ball, of Rye, came second with another Indian in 1.16 2-5. In addition to the medal and purse offered by the association for the winner of this race, George W. Quintard 3d, presented a beautiful medal.

The other races were strictly for amateurs and all of them proved to be stirring contests.

The fastest time made during the afternoon was by G. B. Lambert in his Simplex 90, who won the free-for-all event in 1.03 flat. Mr. Lambert's performance won him two valuable cups, the regular first prize offered for the winner of the event and a special cup, hung up by President Northrup Fowler of the contest association for the fastest time made during the meeting.

George W. Quintard 3d, in a Simplex 50, captured the Vice-President's cup for the high average made in two or more trials. This trophy was given by Richard M. Jesup. In addition to that prize, Mr. Quintard was second in event No. 3 for Class C, Subdivision 5, cars, with piston displacement of from 451 to 600 cubic inches.

The Class Cup, presented by C. A. Fowler, Jr., for the fastest time made in Classes 1, 2, 3, 4 and 5, was taken by S. E. Wishart in a Mercedes, who won the preceding race in 1.05 flat.

The "Git a Horse" cup, presented by J. G. Wilson for the slowest time made by any car in the racing, was won by Mr. Wilson himself, in his Lancia car in 1.44 1-5 in the free-for-all.

The officials of the meeting were as follows:

Referee, W. A. Whiting; Judges, William Bruce Brown, Robert L. Chamberlain, Claude D. Sterling, Charles D. Lanier, Bradford Ellsworth, Edwin N. Chapman, Robert McC. Butt, William W. Heaton, Louis P. Fish; Starter, John D. Chapman; Clerk of the Course, Edwin Moore; Scorers, Reginald M. Johnson and Chauncey B. Griffen; Timers, The New York Timers' Club; Technical Committee, A. L. McMurtry, Chairman.

The officers of the association are as follows: President, Northrup Fowler; Vice-presidents, Richard M. Jesup, Henry H. Law and John M. Rutherford; Secretary and Treasurer, J. Gilbert Wilson; Board of Directors, C. M. Chauncey, C. A. Fowler, Jr., Northrup Fowler, R. M. Jesup, H. H. Law, J. M. Rutherford, J. Thompson, J. D. Tooker and J. G. Wilson.

The event was one of the most interesting of the season thus far, and that it will be repeated is to be hoped at least. The participants all agree that the good of the industry was well cared for.

(Continued on page 1026.)

Central New York Run Was a Pleasant Jaunt

A—Cars Checking in at Binghamton. B—Whiling Away Time at the Ithaca Game. C—Messrs. Ritchie and DeWitt in car; Commissioner Lyon standing. D—Official Thomas Car; Commissioner Lyon in front and William Pierrepont White at the rear.

UTICA, N. Y., June 1—The third day of the Central New York Relay Run was made in a hard rain, which lasted most of the day. It had been intended to stop over night at Richland Springs, but on reaching Five-Mile Point Inn the officials decided to change the itinerary and the night was spent at the Inn, after a banquet and dance. At Oneonta a luncheon was provided by the local club.

The third day brought out the first accident of the run. In coming around the turn in Oneonta from the country road onto the paved main street, an Oakland 24, driven by T. F. Willis, skidded forward into the curb on the opposite side of the street. The right front wheel was bent clear around and under the car till its diameter was parallel with the street. In this position the car swung clear around and across to the opposite curbing. Apart from the bent axle there was no damage done, Willis and his companion holding their seats and alighting unhurt. The axle was taken off, bent straight and the car continued the run in good shape.

The run here this morning found the roads in splendid shape. Even the hard rains have not spoiled the pleasure of the tour. This afternoon Rome and Oneida will be visited, and the run will finish in Syracuse this evening, where a Dutch lunch will be served. Fourteen cars started from Syracuse Saturday morning over roads which, as a result of almost continuous rains the preceding week, were in anything but first-class shape. Additions made to the list of entrants at Auburn and Cortland brought the number up to an even score. Unfortunately an escort of twenty cars sent out to meet the travelers and show the way through Cortland failed to make connections through some misunderstanding of road orders. At Ithaca the local motorists turned out in force and escorted the travelers to the Dutch Inn, where a tasty luncheon was set out, following which the entire party took in the Cornell-Michigan baseball game, the cars being parked along the left field foul line. After the game, still under the escort of the Ithacans, the journey was continued to Watkins Glen, where the night was spent at Glen Springs Hotel.

Sunday morning, following a thoroughly enjoyable trip through Watkins Glen, the journey was resumed to Elmira, an escort of seven cars meeting the tourists about ten miles out, and leading the way to the Hotel Langwell, where dinner was served. In the afternoon the route was taken for Binghamton. At Owego fully a hundred cars were found drawn up along the road waiting to escort the tourists to the night stop. Binghamton fairly outdid itself in welcoming and entertaining the visitors. At dinner J. E. P. Clark acted as toastmaster, and among those who responded to toasts were William Pierrepont White, the "Father of Good Roads" in New York State; Frank T. Lyon, of the State Highway Commission, and J. Arthur Ritchie. Letters were read from S. Percy Hooker, Commissioner of Highways of New York State; Lewis E. Speare, president of the A. A. A., and Frank G. Webb, president of the State Association.

As a demonstration of the perfection already attained in good roads works in Central New York the run is an undoubted success. Barring the first day, when the roads were heavy in many places as a result of the continuous rains, the route selected has been over a literal boulevard—beautiful macadam and hard-rolled earth roads throughout. The promoters considered also the scenery in laying out their itinerary, and the route taken has included many of the beauty spots in the central section of the Empire State. Add to this the stimulating effect upon automobilists generally in the cause of good roads and fair laws, and it may be gathered that this unique outing has exceeded the most sanguine expectations of its promoters.

Fully 200 cars participated in the run during the first three days, dropping in and out at will, and this fact alone seems to demonstrate that cross-country tours, properly managed and conducted under rules, eliminate uncertainties.

Twenty Cars in Washington Post Run

Staunton, Va., May 27—At the conclusion of the first day's run of the Washington *Post's* touring test run from Washington to Richmond and return, it was found that 10 of the 20 cars participating had perfect road and mechanical scores. Although the first 55 miles of the route furnished about as rough and rocky going as could be found anywhere, there is no finer route in this country than that found in the Shenandoah Valley, excellent roads and beautiful scenery combining to make it a favorite touring ground.

The contest is being run under Grade 3, rules of the American Automobile Association, which provide for road and mechanical penalties, but eliminate the outdoor tests at the conclusion of the run. The following are the cars that started, with the names of the drivers:

Fig. 1—Contestants having their photograph taken in front of the Washington Post building

Division 1A—Hupmobile, I. C. Hamilton, driver; Maxwell, A. D. Reh; Paige-Detroit, E. Selby.
Division 2A—Ford, C. E. Miller; Buick, Stanley Mortimer; Ford, E. J. Drake.
Division 3A—Regal, Frank Hosmer; Overland, Clayton Graff; Moline, E. H. Wine; Maxwell, Harry Walls.
Division 4A—Washington, Frank Carter; Washington, W. D. Arrison; Marion, Herbert M. Hall; Buick, "Ted" Johnson.
Division 5A—Oldsmobile, Taylor Pollock; Mora, John J. Fister; Columbia, Bert Robertson; Elmore, Frank Hardart, Jr.
Division 6A—Amplex, Robert Reed.
Division H—Buick truck, Ward Angle.

Most of the small towns situated on the valley pike have strict laws limiting the speed of motor cars passing through them to 6 miles an hour. In every instance but one this law was suspended for the day. The one exception was Mount Crawford. Word had been sent ahead that this hamlet had a speed trap in operation and that preparations had been made for a great haul when the tourists passed through. The timely warning was heeded, and when the village was reached each car passed through at a snail's pace.

Fig. 2—Harry Duckstein, Automobile Editor of the "Post" and Maxwell car

The Regal was the first car to sustain an accident. About 30 miles out of Washington a nut was sheared off the differential, necessitating the boring out of a bolt. This was an all-day job, and when it was finally completed it was nearly dark. The driver made up his mind to reach Staunton and drove all night to do it. The car sustained a penalty of 760 points for being late into Staunton, but its mechanical score has not been determined.

The Elmore entered by Frank Hardart, winner of the Munsey sweepstakes trophy last fall, and driven by his son, had ignition troubles and withdrew from the contest. The car will continue in the tour, however, as a non-contestant.

The Hupmobile has a perfect road score, but lost a point for stalling the motor, 3 points for replenishing the water supply and 6 points for work on the gasoline pipe. For stalling the motor 1 point was marked against the Marion. The Mora lost 3 points for an adjustment of the motor. One of the Ford entries lost a point for tightening one of the lamps and 2 points for stalling the motor. Five points for an adjustment to the carbureter and 6 points for motor stops was the penalty laid against the Paige-Detroit. One of the Buick entries lost a point for work on the hood, while a Buick truck lost 38 points, 31 of which were for being late in the noon control, 3 points for replenishing the fuel and 4 points for work on the car. The Amplex has a perfect mechanical score, but lost a point for being late leaving the noon control.

Richmond, Va., May 29—One-half of the touring test run was completed when the contestants checked in here last evening after a strenuous trip from Staunton. The route was through Rock Fish Gap, one of the hardest roads to negotiate to be found in seven States. A new road is being cut through the gap and is only half completed, but this was the route selected and the tourists had to take it. When completed this will be an excellent road and the private citizens who have contributed money to build it are to be congratulated on their public-spiritedness.

Fig. 3—Just started, the run is taking departure from in front of the Washington "Post"

Washington, D. C., May 31—The finish of the *Post* touring test run found the Overland eliminated from the perfect score class by reason of loose spring clips, a penalty of 25 points being inflicted. The Marion lost a point for a motor stop. The Buick truck lost more points yesterday, a total of 111 being marked against it. For stalling the motor another point was placed against Paige-Detroit. The technical committee last night gave the Regal a total of 1,145 points for its first day's troubles, and also placed Maxwell runabout back in clean score class by lopping off the 2 points penalty imposed on the second day for work on the oil regulator. The 1 point marked against the Buick the first day for work on top of the hood was also lifted. The run was a great success.

Automatic Stability in Aeroplanes

ADAPTED FROM THE GERMAN OF R. CONRAD BY MARIUS G. KRARUP.

MEANS for imparting automatic stability to aeroplane machines are considered in a series of articles in *Der Motorwagen* by the editor of this publication, the civil engineer Robert Conrad. He shows by a large number of photographic reproductions the many different ways in which aeroplane machines have lost their balance in the air and have been precipitated to earth, now in one position and now in another. An extract of the reasoning which he offers on the subject of the available mechanical expedients for avoiding similar downfalls in the future is presented in the following:

By automatic stability is sometimes understood the stability resulting from the relative positions given to the various immobile surfaces and weights. The automatic stabilizers here to be considered are something different, viz., apparatus which, by operating control surfaces, automatically rights the aeroplane when it threatens to upset, either laterally or longitudinally. The following stabilizers may be mentioned: pendulums, klinographs, feeler-areas and gyroscopes, the latter acting either on control surfaces or direct on the main planes.

The pendulum principle is most logical when the weight of passengers and motor is used as the pendulum weight. A heavy weight is necessary in order to have it operate front or rear tilters, ailerons or a main-plane warping-device. Light pendulums could be used only as a means for releasing a more powerful apparatus and making its forces operate in the right direction. A diagram indicating how the pendulum might be used for adjusting ailerons is shown in Fig. 1A.

At a turning movement of the machine the pendulum acts, of course, unfavorably, and it has been tried to lock the pendulum during a turn by pedals arranged for this purpose. A drawback to the pendulum plan is that sudden gusts which affect the whole machine and merely push it sideways in the atmosphere, parallel with itself, also make the pendulum swing. This would be a source of danger. To use the pendulum for correcting the longitudinal balance seems very difficult, as any ordinary pendulum reacts for accelerations and retardations the same as for changes of poise. Every retarding wind would cause the pendulum to swing forward, producing the same control action as if the front of the machine had dipped, consequently retarding the machine still more and producing an exaggerated rising effect, since the contrary wind in itself has a tendency to make the machine rise. On the other hand, under the influence of a gust of wind from behind, the pendulum would have the effect of helping to produce a headlong fall. Fig. 1B illustrates these shortcomings of pendulum control, the upper diagram showing the action in case of a sudden increase of headwind resistance, and the lower one the same pendulum action, but due to a forward dip of the machine. In both cases the pendulum is assumed to operate the tilt rudder.

In other words, the free pendulum acting on control apparatus, is not in itself a good automatic balancer. A mechanism is conceivable, however, by which the pendulum would no longer act the same way for changes of inclination as for changes in speed. The pendulum could be suspended free to swing in a circle and connected with a horizontal pendulum. In that case, the angle of the pendulum with the vertical would not be changed, or very little changed, by accelerations of the machine.

But from all points of view the pendulum leads to complications, unless it is merely employed to indicate in what manner the control apparatus shall be operated.

To indicate the many possibilities which exist theoretically for automatic balancing apparatus, the klinograph or angle indicator may be mentioned. It would be possible to arrange a disk on a horizontal axle and protected against the wind with so little frictional resistance that it would remain stationary, whatever the change in the position in the air of the whole machine, and it would therefore show directly any deviation in angle from the previous direction of the latter. The problem of translating into control movements the relative changes between the axle of the disk and its frame by means of electrical, frictionless contacts, may be a difficult, but future solution.

Still farther in the future lies the employment of what might be called sense organs for the flying machine, meaning thereby light and mobile surfaces, so arranged that if one of a pair is affected by the wind its movement—or the differential movement of the two feeler-planes—is communicated to a control apparatus, not so as to operate this control apparatus, but so as to indicate at a very early moment of the disturbance in what manner the control apparatus should be operated. By means of a compressed-air device, steam or other intermediating element of releasable power, a very slight difference in the pressures communicated from two feeler-areas could readily be made to actuate a counter movement of the real control areas almost before the machine as a whole had felt the effect of the gust of wind or other disturbing factor against which the feeler-organs reacted. The flexible uprights in the Wright tilt-rudder may indicate a conception of this nature on the part of the Wrights, though probably only in a subconscious state.

The gyroscope is probably the best but also the most expensive stabilizing device for the present stage of the development. As heavy and complicated as in the Scherl-Brennan monorail car it would not be applicable to flying machines, but such a heavy

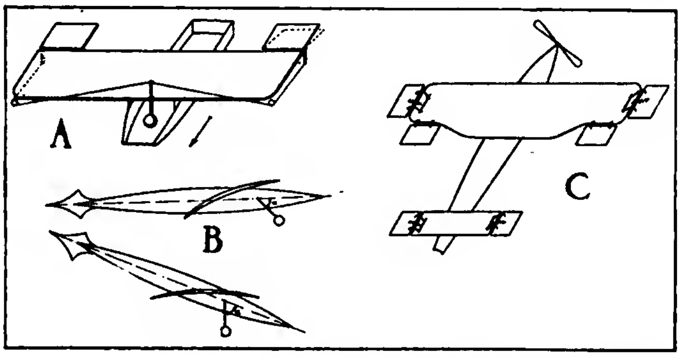


Fig. 1—A, automatic control of ailerons by pendulum. B, pendulum reacts for retardation, upper diagram the same as for pitching, lower diagram. C, feeler-areas, spring-attached, easily deflected, a possibility of the future.

and complicated apparatus is also not required for the work to be done.

The rotating Gnome motor is considered such a gyroscope, and Farman claims that he can detect the righting effect of this motor very plainly, but the true merit of this type of motor is probably much more the flywheel action of the cylinders, by which stalling of the motor from poor carburetion or faulty ignition is obviated, the momentum giving the motor a chance to recover. In the Gnome motor the weights are also not peripherally located, nor is the speed very high. It would be possible to obtain a 16 times higher gyroscopic effect with a much smaller weight rotated at a four times higher speed, if it were desirable to employ gyroscopic action of such force. But it is preferable to get along with much smaller weights and forces. It might be considered to place the axle of the gyroscope vertically, so as to avoid resistance against side-steering, but the vertical position of the shaft would oppose the natural canting of the machine in the curve, and an oblique ascent or descent would also be hindered.

(To be continued.)

How About Starting on the Spark?

AUTOISTS, when they are wont to represent, in the most convincing way, the excellence of their respective makes of automobiles, use as one argument the fact, as they say, "it will start on the spark every time." The real question is, will it? If not, what is the percentage of the total number of times that the average automobile will start on the spark? If it will start in this way, with great reliability, then, let us take up the question of the desirability of doing so. Salesmen, considering the class who rely upon "selling points" for their results, will be glad to have every prospective purchaser believe that starting on the spark is only possible every time with the particular automobile they are interested in, but will it?

Just how much of a twist the crankshaft will receive when the start is made by the spark from a dead standstill, is a matter that can not be disposed of in the abstract. It depends upon the weight of the flywheel, radius of the rim of the same, and such considerations. Fortunately, single cylinder motors, with their large flywheels, cannot be made to start from the spark. It is highly improbable that the crankshaft of the average single cylinder motor would survive the shock for long.

Some Expressions of Opinions From Autoists

The following are expressions of opinion from autoists, who, in protest of an answer which was made to a letter of inquiry in relation to this question of starting on the spark, offer the evidence of experience to show that starting on the spark is not only perfectly feasible, but a very regular proceeding:

(A) "In regard to your letter number 2201 entitled 'Starting on the Spark,' your reply says that you doubt if the experiment spoken of, in which the spark plugs and other parts were removed from the cylinder, leaving them open to the atmosphere, and that then after replacement the engine was started on the remaining mixture, on the spark ever happened, or could be made to happen.

"For your information I would say that, after running my engine one day last summer and having a skip, I removed my four magneto plugs. I cleaned these plugs, adjusted the points, put the plugs back, threw on the spark and my engine started. My brother went me one better. He has the same kind of a car and removed both his battery and magneto plugs, cleaned them, put them back, threw on his spark and his engine started.

"Both of us will be willing to swear to the above statements before a Notary Public.

"Your answer to letter No. 2201 would lead people to believe that it was necessary to have gasoline under compression to get an explosion, but the general public know from items in the daily papers that gasoline often explodes when it is not under compression. I wish you would state these facts in your 'Letters Answered and Discussed' and would appreciate having a personal reply with your views on this subject."—Harold W. Pierce.

(B) "Referring to letter No. 2201 appearing in your issue of March 24, and your answer thereto, I think you are astray when you make the statement you do as to the doubtfulness of the experiment spoken of being successful, as I have proved many times that this can be done, and that compression has very little if anything to do with the possibility of starting on the spark. In a number of instances I have removed completely the spark plugs from my car and after replacing them, started the engine on the spark. My theory is that if the cylinder is filled with an explosive mixture of gas, and the engine runs freely, there will be sufficient force to start same."—M. J. O.

(C) "In your issue of March 24, on page 599, we notice that in your answer to the question asked by the subscriber signing himself 'Amateur,' in the last paragraph thereof, you say it is doubtful if an automobile was ever made to start on the spark when the spark plugs had been removed, since the engine was run. This seems to be a common-sense view of the matter theoretically, but practically, it is dead wrong. The writer has done this many times, not only accidentally, but has done it intentionally with five or six people watching. In fact, if the engine and the mixture are carefully adjusted, the car will start on the spark at least nine out of ten times immediately after stopping. It will start about one-half the time if all four plugs are removed and then put back."—Waterman Brothers Company, Incorporated.

(D) "Regarding your answer and information to letter number 2201 in your issue March 24 (starting on the spark) you are entirely incorrect in your answer.

"I know that motors that have a very low compression start best from the switch, in fact, it is not unusual for an old motor to start from the switch the next morning after having been used the evening before say up to six or seven o'clock. The writer also remembers that in 1906 a car was put in a freight car, shipped and when this car was unloaded the motor started from the switch after being in transit for 5 days. Where was compression after such a length of time and after such a jar and jolt that a motor gets in transit?

"I also well remember that in 1906 I overhauled and thoroughly cleaned a 1905 motor, having the cylinders, pistons, and piston rings removed, reground the valves, and really had the crankshaft out of its bearings. Now, after reassembling this motor, setting valves and time of ignition, I injected a little gasoline through the pet cocks into each cylinder, and on throwing on the switch the motor started away beautifully, to my utter astonishment, without ever touching the crank. Where was compression in this instance?

"When I know facts like the above, I cannot let it pass by unnoticed, especially while you are telling your correspondent publicly that his informer was not quoting the truth, or rather, put it in such a way as to make readers believe that advice received had been a story. Trusting you will pardon me for butting in, I remain," Jas. D. Reber.

(E) "Have been a subscriber of THE AUTOMOBILE for some time and take a great deal of interest in 'Questions Answered and Discussed.' In the issue of March 24, 1910, I notice an article on starting on the spark in which 'Amateur' states that a manufacturer told him that he (the manufacturer) had removed his spark plugs from his engine, replaced them, and then started on spark. You express doubt as to the occurrence of this, or even its possibility. I noticed that my engine was missing, this morning, and placed the cause of it to dirty spark plugs, which I knew had not been cleaned for some time. About half an hour ago I took out the plugs and cleaned them one at a time, and replaced them in the engine; turned on the switch, and to my utter surprise, the engine started off on spark as nicely as it always does within two or three hours standing. The car has the same engine and ignition as when bought.

"I would like to hear further from you, through the columns of THE AUTOMOBILE in regard to this. I can prove the above assertion to any one so desiring."—Herbert L. Noll.

Some Facts in Relation to Gasoline Performance

The letters as here reproduced are representative of quite a number which were received in relation to this matter, and, without any exception, they all held to the same conclusion. It is proper that they should be published, and the facts should be brought out. The only remaining question is, are the facts brought out?

It is believed that the answer (number 2201 in "Letters Interesting and Discussed") handled the matter rather too briefly, considering the responses it since brought out, and, while it is the necessity in these columns to be brief, there is nothing to prevent enlarging upon the subject elsewhere in The Automobile whenever the occasion demands, as it seems to in this case.

Gasoline Will Not Burn Except Under Compression

Just to show that there is a considerable chance for mistake and that an autoist can be laboring under a misapprehension, attention is called to the letter marked (A) in this series. This letter, among other entertaining statements, is made to state: "I removed my magneto plugs; I cleaned these plugs, adjusted the points, put the plugs back, threw on the spark, and the engine started." This statement would not be very unusual, were it not for the fact that magnetos are so made that, to realize a spark, it is necessary to rotate the armature to get the spark. In this, is an example, according to the language of the letter, of gasoline which "went off" without a spark. Of course, nothing of the kind happened. Either the car was provided with an auxiliary sparking mechanism, or the signer of the letter owes further explanation to the readers of The Automobile.

Disregarding the imperfections of language; coming down to the strictest interpretation, and to the facts, gasoline will not burn unless it is under compression. If this is so, then it is true that a motor cannot be started on the spark, if there is no compression. This compression does not have to be generated by cranking the motor; it will be induced when gasoline boils. Gasoline will boil at its boiling temperature to which it will be heated up; in the cylinders of a motor, if they are warm enough.

Starting on the spark, so-called, is easy enough, perhaps, after a motor has been run, due to the fact that the gasoline is then subjected to a temperature sufficient to cause the liquid to boil, and, as before stated, as the liquid boils, it generates pressure. It is not even the pressure alone that is at the bottom of the ignition of the mixture; it is the gasoline, in gas form, in the presence of sufficient oxygen that makes it inflammable.

If, when a motor is shut down, there is some gasoline present, the heat of the cylinder walls will transfer to the gasoline, and it will be changed in its state of aggregation from liquid to gas. To bring about this result there must be present the set of conditions as follows:

(A) The temperature of the walls and surroundings must be above the boiling point of the gasoline.

(B) The latent heat of evaporation of the gasoline must be equalled by the heat stored in the walls of the cylinders, counting only the heat that may be taken from the walls, before the temperature (sensible) of the walls falls to the boiling temperature of the gasoline which is to be vaporized.

The very fact that the heat stored in the walls of the cylinders is transferred to the liquid gasoline, and it, in turn, is vaporized, is a guarantee that a pressure will be generated. It is this pressure that is in some measure the equivalent of the compression which is induced by cranking the motor, and it is this compression which makes it possible to start, sometimes, on the spark, without previous cranking.

Pumping Losses Interfere With the Process

What are pumping losses? They are all the losses which have to be coped with when a motor is put into motion. They detract from the force of the power stroke. Were there no pumping losses, the motor, were it to be put into motion, would keep on running forever, or, until it assumes the form of a mechanical wreck. The losses, taking them as they come in general practice, are best indicated in the diagram as shown in Fig. 1, which chart was built for the purpose of determining the magnitude of the respective divisions of losses in a motor.

If the pumping losses are very great in proportion, it is then that the motor would start on the spark, so called, with great difficulty, or to put it in language more in keeping, with far less certainty. The pumping losses increase with the speed, but they are sufficient in poorly made motors to defeat starting on the spark, so called, owing to the feebleness of the force which it is possible to realize when the compression is limited to that which comes from boiling gasoline in the presence of enough air to provide the oxygen to produce a burning mixture, excepting in a motor's cylinder. Likewise, in a motor which is well made, even assuming that all the parts are so nicely fitted that friction is reduced to a very low point, if the cold compression is high, as it will be, that is to say, the compression which will come as soon as the motor begins to rotate, due to the fact that one piston will make its compression stroke, while another is on the power stroke, the power required to equal the force of the generating compression will be greater than the power which can be wrung out of a feeble explosion such as that which comes from igniting the mixture, residuum in character, as it will be found in the cylinders after the motor is shut down and allowed to stand until the temperature falls to the level of the surrounding, especially if the weather is below, in point of temperature, that which checks with the boiling point of gasoline.

Residual Compression Not Very Dependable

The briefly put discussion (number 2201) which precipitated a flood of replies, may be regarded as in accord with the facts, or not, just as point of view is taken. Confining the further discussion, for the moment, to the performance of a motor, allowing that it will, or will not start on the spark, assuming that residual compression is the source of the force available, then, it is believed, certainty of action is cast to the four winds, and speculation reigns. But it will fail to reach even the level of speculation, just so soon as the temperature falls below the boiling point of gasoline, for, even if the gasoline is in the vapor state, and present in sufficient quantity to permit of starting when the motor is shut down, the gasoline will condense in the course of a little time, when it will remain in the liquid state just so long as the temperature keeps below the temperature of boiling of the gasoline.

As a rather far-fetched illustration of the true situation then, let it be taken for granted that "earthquakes" are of the phenomena which human beings accept as possible, and even regular occurrences. Let it even be assumed that they do, at times, manifest the force sufficient to raise the habitations of man. Despite this threatening situation, even in view of the formidableness of the force, man goes right on putting up "skyscrapers." Transferring this simile to motor work, is it not reasonable to

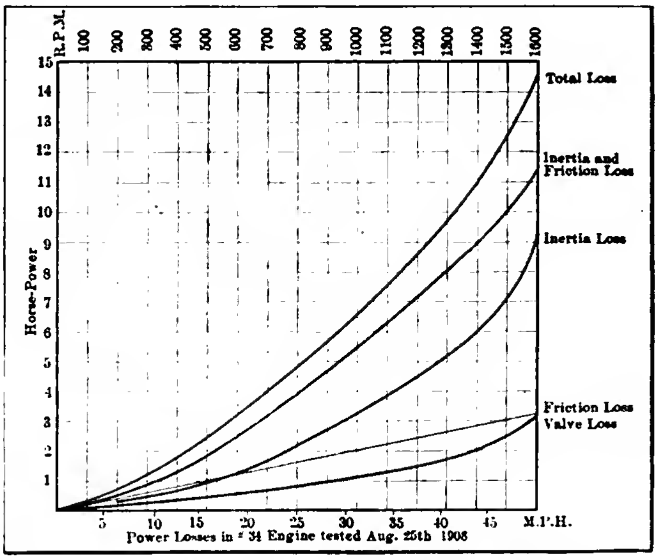


Fig. 1—Curve plotted to represent pumping losses in gasoline motors and subdivisions of such losses

inquire as to the reason why automobile builders provide cranks without fail; is it not a fact that starting on the spark, so called, like earthquakes, is just a little uncertain?

Since it is true, undeniably so, that starting on the spark is dependent upon the temperature, and temperature is a variable depending upon the seasons of the year, altitude, and local weather manifestations, then, in the light of cold hard facts (let us admit) unalterable facts, why say that a motor has the facility of starting on the spark?

Is it not better to stick to the main truth and merely remember that, if the weather is warm, or if the motor is in a heated condition, starting on the spark, so called, will be possible if the "pumping losses" of the motor are not excessive? Were it possible to so design motors that they would be independent of the condtions which respond to natural phenomena, then, and then only, would motor builders be justified in claiming that their motors would start on the spark, but does anyone think these motor builders would go to the expense of furnishing a starting crank, if they could control the acts of God, subdue the elements, and reverse the law of the conservation of energy?

For the time, space will not admit of going into the question of the characteristics of gasoline further than to conclude by reiterating the mere declaration, as has been made, that gasoline will not burn until it is vaporized, and that it will not vaporize (boil) unless it is heated to its boiling point, and supplied with enough heat to balance its latent heat of evaporation. The further elucidation of these characteristics of the fuel used in automobile motors, in view of the apparent lack of understanding of the same, will be as an agreeable task, to be undertaken at an early moment, as a supplemental statement to what has been said here in support of the fact that "an occasional occurrence is not entitled to the distinction of being termed a rule," nor can the user of an automobile rightly make the broad claim that his automobile will start on the spark, unless he can overcome Natural phenomena and the Laws, which, more than 95 per cent. of the whole time, prevent him from making good his claims.

No Spark Start for These 65 Cars

The futility of depending upon "starting on the spark" was conclusively demonstrated on broad, practical lines at the St. Nicholas Garage, New York City, on May 26.

In the garage there are 65 automobiles of all kinds and descriptions in daily use. Before they were taken out, the chauffeurs, were requested to start their motors on the spark. They all failed to get any result. The cars used for the experimental test comprised the following:

Car	Ignition System	Car	Ignition System
Lozier	Dual	Jackson	Double
Rambler	Double	Pope-Toledo	Coil
Franklin	Coil	Stevens-Duryea	Double
Autocar	Coil	Thomas	Coil
Pierce-Arrow	Double	American Mors	Double
Garford	Double	Pope-Hartford	Coil
Corbin	Coil	Grout	Coil
Selden	Dual	Reo	Coil
Buick 40	Dual	American Roadster	Double
Chalmers 30	Dual	Lozier	Double
Olds 40	Double	Pierce-Arrow 48	Double
Fiat 25	Magneto	Pope-Hartford	Dual
Packard 18	Double	Studebaker	Double
Maxwell	Coil	Aster	Double
Chalmers 30	Dual	Thomas 60	Double
Haynes	Dual	Simplex	Magneto
Garford	Magneto	Ford 6	Coil
Stearns 30-60	Dual	Maxwell	Double
Mercedes 50	Magneto	Elmore	Double
Olds	Coil	Locomobile	Dual
Chalmers	Dual	Studebaker	Magneto
Olds	Dual	Chalmers	Dual
Autocar	Double	Pope-Toledo	Double
Pullman	Dual	Pierce-Arrow	Double
Rainier	Double	Pierce-Arrow	Double
Thomas	Double	Reo	Coil
Stearns	Dual	Studebaker	Coil
Mercer	Coil	Buick	Dual
Stevens-Duryea	Dual	Buick	Dual
Peerless	Double	Marion	Dual
Thomas 50	Double	Cadillac	Double
Winton	Dual	Olds	Dual
Cadillac	Double		

In conclusion, let it be understood that there is no question of the practicability of starting on the spark, no matter which make of automobile is considered, provided the conditions are ripe, but it is not a dependable way of starting, nor is this method to be relied upon at all unless the temperature obtained is that which will boil gasoline.

New Type of Racing Magneto Is Being Used

IF for any reason, such as poor gas, improper spark plug location or a half-dozen possible causes, the flame propagation in a high-speed motor becomes sluggish its efficiency decreases surprisingly as is well understood.

In tests made abroad the arrangement of two spark plugs, operated simultaneously, is found to have a marked effect on the output of the motor, and with this idea in view, a number of foreign racing machines were fitted with two magnetos, each operating a set of spark plugs. But it was found that the very slightest variation in the time of operation of the two magnetos rendered the system useless, because the spark which occurred first ignited the charge and the spark which came at an infinitely small space of time later, still came too late to be of any assistance in starting the flame propagation from two separate points of the combustion chamber. And it was found practically impossible to time two magnetos so that they would operate both plugs at the same instant. Even assuming that the original setting of the magnetos produced the desired result, it was impossible to keep the setting correct, owing to the wear of the mechanism driving the magnetos and also the wear on the interrupter points.

To avoid these difficulties, the well-known German ignition specialists, Unterberg & Helmle, who make the U. & H. type of magnetos, developed a new model of magneto which meets the requirements of racing motor service. In this new U. & H. racing magneto two armatures are employed mounted tandem, and running in the same armature spindle on one shaft. These armatures are fitted with two complete sets of windings, each set consisting of a primary and secondary winding. The most unusual feature of the magneto lies in the employment of but one interrupter to break the primary circuit of both armature windings, this arrangement producing the high-tension current in both armature windings at precisely the same instant. The magneto is equipped with a compound distributor, to which each armature winding is connected by conventional means. One set of plugs is connected with one distributor and the other set of plugs, of course, is connected with the other. Two safety spark-gaps, one for each circuit, eliminate danger of damaging the windings should the cables leading to the plugs be accidentally broken, which is not impossible.

This arrangement overcomes the objections heretofore found abroad and with this new type as shown the principle of operation proves worthy. In this double magneto is also employed the U. & H. non-adjustable interrupter, which eliminates ignition difficulties otherwise due to breaking or sticking of pivots, springs and insulation of the replating parts.

U. & H. magneto with double armature and single interrupter

Elastic Limit of Manganese and Other Bronzes

(Continued from last week.)

pounds per square inch. Had ordinary dividers been used, the values for the cast metals would have been placed between 30,000 pounds and 40,000 pounds per square inch. The strain diagrams from the extensometer tests show the general shape of the elastic curve of the metal, and permit the accurate fixing of the point of inflexion of the curve; the autographic diagrams, however, show not only the actual shape of the curve, but also why there is the uncertainty in the locating of the yield point or point of rapid increase in rate of stretching.

For comparison, the autographic diagram of a piece of commercial "structural medium" steel is shown as No. 1 in Fig. 3. At the scale of the diagram, no inflexion of the curve is seen until it suddenly breaks sharply, actually drops and remains practically horizontal until it finally picks up again. This jog is entirely characteristic of mild steel, and is found to a more or less marked extent in all steels, save perhaps the very hard varieties. There is, however, no break of any sort in the curves obtained from bronze; they are entirely smooth. Somewhere along the knee of the curve, the tester notes that the material is stretching faster; just where he notices it will depend upon the sensitiveness of the means employed to indicate stretch, and upon his skill and sharpness in observation. The jog in the steel curve is indicated simultaneously by the slipping of the dividers and by the dropping of the scale beam of the testing machine driven at constant speed. The scale beam does not drop when testing bronze; the operator finds the poise gradually traveling more slowly to maintain balance, but who can say when the change in rate began?

TABLE 6—HALCOMB STEEL COMPANY TESTS

Autographic Tests All Specimens 1 In. (Approximate) Dia. by 8 In. Long

Mark		9902A	9908A	Q2992A	Q6434A
Number on Curve Sheet......	1	2	3	4	5
Sample	Steel	Cast	Cast	Hot-Rolled	Cold-Drawn
Reduction of area, per cent....	58.6	8.3	14.1	53.2	38.6
Elongation, per cent..........	36.3	27.2	6.6	34.4	25.2
Elastic limit, lbs. per sq. in....	38,000	21,400	22,900	22,800	25,200
Tensile strength, lbs. per sq. in.	60,140	69,700	63,940	71,820	68,500

Commercial Tests (Made at Schenectady) All Specimens 0.5 In. Dia. by 2 In. Long

Sample	Cast	Cast	Hot-Rolled	Cold-Drawn
Reduction of area, per cent............	54.8	22.4	44.9	39.9
Elongation, per cent..................	42.0	14.5	37.5	34.0
Yield point, lbs., per sq. in............	25,000	26,000	30,000	44,000
Tensile strength, lbs. per sq. in........	67,940	70,900	74,780	74,260

It is customary to find the yield point in mild steels, and in fact, in annealed steels generally, at about 50 per cent. of the maximum strength. The yield point in mild steels corresponds, for all practical purposes, with the elastic limit. As the steel becomes harder, due to increase in carbon or the addition of alloying metals, or to heat treatment, the yield point rises rather more rapidly than the elastic limit, although the difference between the two is not so great but that the former may be used in calculations, and the yield point itself is less sharply marked, though still observable if sufficient care is taken. The yield point in steel is accepted as a safe guide to the engineer, in deciding upon the maximum stresses that may safely be permitted in parts designed to carry load.

That no such dependence can be placed upon the so-called yield point, as it is determined upon bronzes, is evident; rather, recourse must be had to the slower but more accurate determination of the true elastic limit if safe data are desired. It is especially noteworthy that the sets found at the minimum values of yield point as usually reported are a very considerable proportion of the total stretch that has taken place in the metal at those stresses, and that sets are found at stresses which are but 40 to 50 per cent. of these reported yield points. Under certain conditions of dead load, a stress of 75 per cent. of the elastic limit is sometimes considered at least not unsafe; if such a load were calculated for bronze, upon the basis of the usual commercial test for yield point, instability of the part so designed would be inevitable.

Hot working of the metal has not materially improved its elastic properties, but has greatly increased its toughness, and probably in an extended series of tests, would have been found to impart uniformity. It is well known that this particular alloy is relatively difficult to handle in the foundry because of its sensitiveness to temperature of pouring and to changes in composition, at least in the sense of impurities in the constituent metals, and because of its great shrinkage, requiring large feeders and sink heads. As in other copper alloys, many of the ill effects of this sensitiveness may be largely overcome by hot working. The data here presented are too meager to warrant lengthy discussion of the effects of cold working of the metal; it is shown that in the case of bars of 1 1-2-ins. diameter, the effects of the cold drawing may have largely disappeared when 1-4 in. of metal is removed, except as shown in a lessened elongation. Neither hot nor cold working cause any change in the elastic curve of the metal; it remains a characteristically smooth curve. In other cold-drawn copper alloys, when tested without removal of surface, the elastic curve usually presents a much sharper bend at the knee than is found in the cast metal, or in the same metal when annealed; the same would probably be found with manganese bronze if tested as drawn, without turning. Cold-drawn metal, except wire, is seldom used without removal of the surface to provide means of fastening, and it surely is safer to test it as it is used rather than in the perhaps fictitious condition of strength due to skin hardness.

These results do not constitute a new discovery. In the literature of testing engineering, references may be found with direct bearing on the subject; but in these days of rapid progress and short-cut methods. much that is old, or that may be found only by search, is apt to be forgotten or overlooked. Comparatively few laboratories have autographic machines, and the use of the extensometer with a specimen only 2 in. long is not very satisfactory because of the small extension of so short a length of material under stress. Many otherwise well equipped laboratories have no extensometer. So much of experience in testing materials is based upon work done upon iron and steel that it was perhaps a natural assumption that the characteristics of these metals would also be found in bronzes and similar alloys and hence that methods of testing used successfully with one would yield equally safe results when applied to the other. Test results which are misleading are exceedingly dangerous; they induce a false sense of security which may result in the failure of structures and lead to the condemnation of a material which would be perfectly satisfactory if properly applied and not unwittingly abused.

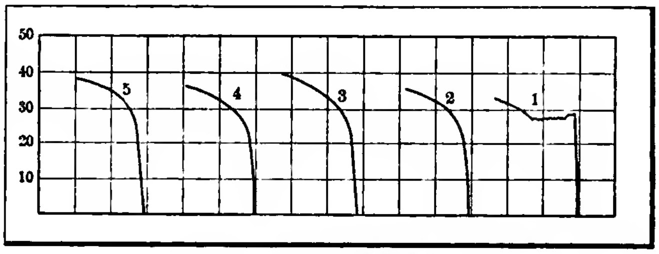


Fig. 3—Curves resulting from plotting Halcomb Steel Company's tests, Table 6

Engineering Digest

A carefully abstracted digest of accounts of engineering activities as they are reported in society transactions and technical papers throughout the world.

An Imaginary Automobile for 1915.—So as to convey gently a hint to manufacturers with regard to the improvements which might be incorporated in the productions of the industry at any intervening time, the author presents his idea of the supposedly standard automobile chassis of five years hence. All side levers have disappeared, so as to leave the entrance to the driver's seat at both sides of the vehicle entirely cleared of obstructions. The steering column carries the speed lever and a finger piece, which serves only to block the rear wheel brake pedal. There is also a front wheel brake pedal, but no brake on the transmission, such being required only by "scorchers," says the author. The dashboard is converted into a gasoline tank, giving sure-enough gravity feed to the carbureter, which is placed in a warm spot between the two batteries of the eight-cylinder motor, so as to require no water heating. The wheels are wire spoked, with large pneumatic tires, which the prophetic designer contemplates to operate with pressures of 9 pounds per square centimeter, viz., 58 pounds per square inch. The drive is by a rigid shaft from the speed change box, through torsion tube, to a single flexible joint connecting with a worm meshing with a helical gear, the rear end of this drive being suspended from two cross members of the chassis in a casing also inclosing the differential gear, which drives the rear wheels through a suspension consisting of universal joints *V* on the inner ends of the wheel drive shafts, and the braces *X* which are hinged to the differential casing, and with their outer ends form collars supporting the drive shafts close to the wheels. The suspension, which takes the place of the "rear X," is the real novelty in the author's conception. It is readily understood with reference to the side and plan views shown in the illustration. *O* is the fixed axis of this suspension. *P* are bell-lever struts, the horizontal arms being radius struts for the wheel shafts, while the vertical arms transmit road shocks and motions to the extension-springs *R*, whose tension is adjustable by a screw at *T*, where the springs have their front support through the member *S* mounted on the torsion tube enclosing the drive shaft *N*. (The author's conception seems a little hazy at this point.) The brake rods or wires *j* are balanced in action by the sleeve on the suspension axle *O*. The rear portion of the frame is arched over the rear driving system to give room for the spring action, but it seems that the author is willing to accept a somewhat peculiar participation of the rear wheels in all spring movements, or else he has overlooked this consequence of his design.

The motor is conceived as an 8-cylinder, 45 degree V-mounted, valveless creation supporting the radiator above it, on the thermo-syphon plan; and a centrifugal blower is on or in the radiator. The illustration shows other points. *Ja* stands for an oil gauge which is the only external evidence of the oiling system, excepting *Pa*, which is the cover of the internal oil pump. *Vi* is the drain. *E* is the tubular radiator, *Co* the tubes holding ignition wires. *Mg* is the high-tension magneto, *Ca* the carbureter with two independent jet chambers. *Se* are the supports and water connections for the radiator. Instead of the customary curved under-pan, the sheets *To* connect the false chassis *Fc*, on which the motor is mounted, with the frame reaches *Lo*.—L. Baudry de Saunier in *Omnia*, May 7.

The Ageron Self-Starter Mechanism, also adapted for inflating tires and blowing alarms, contains features worth noting. Apart from the main purpose of the device, the shape of the extension spring *c*, Fig. 2, attracts attention by the rounded ends, produced by diminishing the diameters of the terminal convolutions. This shape is seldom seen in American automobiles, though neat in appearance and rather well calculated to convey to the beholder an impression of finished and deliberate design, partly because it cannot be connected up so readily as the customary extension spring with the single-wire hooked ends, and therefore presupposes that the connections are shaped and placed in their position at the same place where the spring is made. The twice-wound pulley *a* in Fig. 2 would not be practicable, if it were intended to be rotated for more then about two-thirds of one revolution, as the cable would be practically certain to climb the pulley flanges, unless some remarkable material were found permitting the cable to slide readily transversely of the pulley-face while yet pulling without slip tangentially. But comparison of the length of the compressed-air piston stroke with the diameter of the pulley shows that the cable is not expected to turn the pulley much more than two-thirds of one revolution.

Fig. 2 shows the principle of operation for the self-starter mechanism, while Fig. 3 shows a complete installation, including an air-compressor to be connected with the motor, the air-conduits of seamless copper tubing, which is of 9 millimeters interior and 12 millimeters exterior diameter, and the "distributor" *I*, affixed to the dashboard, which is essentially a multiple air-switch, containing the check valve for the compressor, the pressure gauge, the safety valve with whistle alarm, the self-starter cock, the general release cock, a turn cock for tire inflation and another to the alarm siren or horn *K*, in Fig. 3.

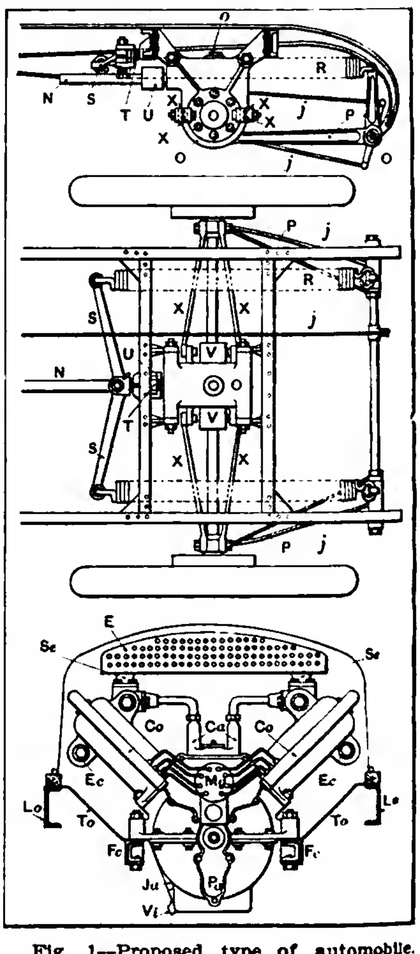


Fig. 1—Proposed type of automobile which the designer thinks will hold sway in about the year 1915

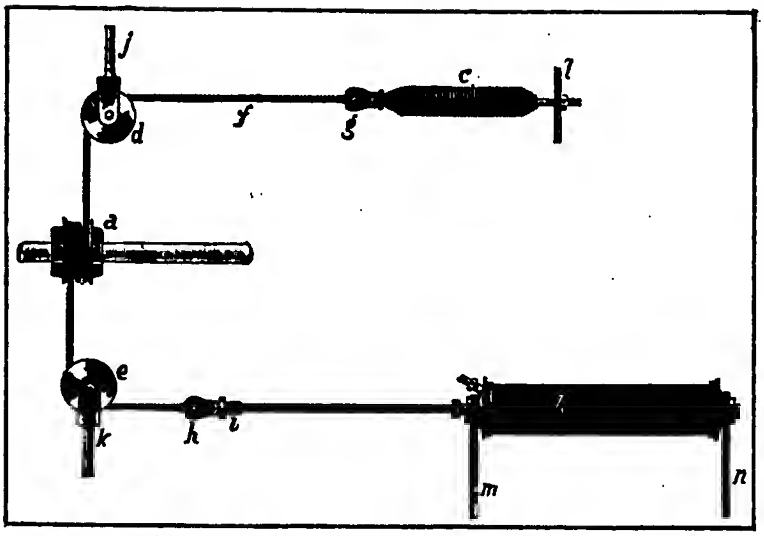


Fig. 2—Diagram of self-starter mechanism acting upon clutch shaft by means of compressed air

The pulley *a* in Fig. 2 is secured to the intermediate shaft between the clutcb and the speed change and is provided with an interior free wheel. The cable *f* is secured at one end by the clip *g* to the retractor spring *c*, at the other end by clip *h* to the piston rod of the cylinder *b* and is guided by idlers *d* and *e*. The letters *j*, *k*, *l* and *mn* represent the means for securing the various parts to the chassis. For starting the motor, air is admitted to cylinder *b*, which pushes the piston toward the bottom of the cylinder; the cable pulls the pulley and the intermediate shaft around, and the motor is started, if the clutch has been previously engaged. The spring *c*, which has been extended by this action, thereafter pulls the piston back to its starting position and the mecbanism is ready for operation again. In order to economize on compressed air, a special device, unexplained by tbe author, and designated as a regulator-economizer, forms part of the air tube leading to the cylinder *b*, as shown at *J*, Fig. 3. It regulates the admission of air from the tank *B* to the cylinder *C*, apparently by check valves.

In Fig. 3, *A* is the compressor, *B* the air tank, *C* the self-starter cylinder, *D* the free-wheel pulley, *E* the steel cable, *F* the retractor spring, *G* the clips for attaching tbe cable, *HH* the idler pulleys, *I* the "distributor," *J* the "regulator-economizer," *K* the siren and *L* tbe lever for operating the compressor. The compressed air may also be used for operating a jack of special design in case of necessity. It is unfortunate that it is not explained how the compressor is disconnected. As shown in Fig. 3 it is operated by sprocket and chain from the intermediate shaft, the same on which the free-wheel pulley is mounted. No mean are indicated in the article for applying the device to a shaft-drive automobile.—*La Vie Automobile*, April 9.

Superficial optical tests of metals, especially steels, forms one of the subjects in a series of articles by Jules Vinsonneau concluded in the April number of *La Technique Automobile et Aérienne*. As a critical and analytical review of the methods employed in France in the steel mills and in the laboratories, and a summary of the defects which may occur in materials, the article repays perusal in its entirety, the author advocating a much higher degree of uniformity in the dimensions of test pieces than is usually insisted upon. With regard to superficial optical tests which are frequently recommendable, especially when the more thorough methods are unavailable for one reason or another, the author dwells on tbe value of tbe darkened chamber in which the fragment of metal is subjected to scrutiny under strong ligbt, and also on the need of examining tubes interiorly as well as on tbe outside. Only a few quotations can be offered. "They speak of silicon bronzes, of manganese bronzes; tbey praise special aluminum bronzes, etc., which give results in tensile and bending tests, comparable to those obtained with irons and steels!!!"

"Wbat kind of tests were they? Were they made with thin and long test pieces or with thick and short ones? With what irons and what steels have these various bronzes been compared. Were the comparative tests made with test pieces of the same dimensions? Were the same prisms used for the bending and for the shock tests? Were the tests of fragility conducted with the same lapses in accuracy? A day will come, no doubt, wben these uncertainties will be removed," nor will it be surprising if the progress desired is rapid.

"Cornut says: 'If we suppose that a piece of steel or iron is subjected to a continuous stress, slow and progressive, it is well understood that this stress is transmitted successively from molecule to molecule, in such manner that all the molecules are practically subjected to the same stress. On the other hand, if the stress is sudden, instantaneous, it is understood that all tbe molecules of the body cannot get time to communicate and distribute this stress, and that the first molecules affected may be loosened right in the beginning, while other molecules have borne no stress at all. The metals consequently may present very different qualities accordingly as they are subjected to slow or sudden stresses in the tests.'"

"In his note to the *Académie des Sciences*, Frémont expresses the following thesis on fragility: 'A steel is fragile, brittle, or not brittle, accordingly as the ratio between the tensile elastic limit and the elastic limit for compression is smaller or larger than 1.'

"At the congress of mechanics in connection with the Exposition of 1900, when it was demanded that the optical test of metals should be made obligatory, the matter was put to the test of a vote, after the theoretical and practical reasons for the proposition had been thoroughly discussed. Both the novelty of the method proposed and the fear of encouraging rejections of metals from the mills militated against it, and nevertheless it obtained a vote of 15 for and 19 against it. Under the circumstances this vote may be considered proof positive of the genuine interest attached to optical test methods."

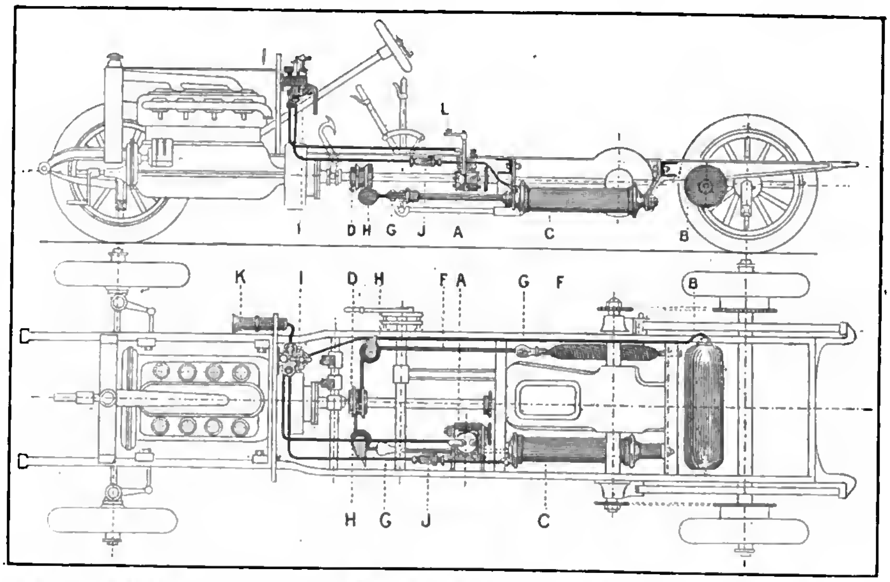


Fig. 3—Installation of air compressors and air tank in connection with self-starter mechanism acting upon clutch shaft and devices for inflating tires and operating alarms

Questions That Arise

A series of practical questions relating to the automobile, its parts, and their functions, which arise upon various occasions, together with easily understood answers to the same.

[42]—Why introduce such a complicated device as a differential gear system if the difference as above found is so slight; surely it would not damage the tires so very much to allow of this amount of slipping when a turn is being made?

True, the amount of slipping is not nearly so great as that which is likely to follow reckless driving with its skidding and the slipping which comes in every time the brakes are locked, or when the power is applied suddenly. But this continual skidding does damage the tires, and in the same way they would be rapidly depreciated were there no differential gear. On the other hand there is a more important reason for having a means which will prevent skidding when a car is going around a curve. The condition designated as "inertia" can not be ignored; according to the first law of Newton, when a car is at rest, it will remain at rest; or if in motion, it will move uniformly in a straight line until acted upon by some force.

When an automobile is in motion, if it is diverted from its straight path, it tends to travel in the straight line with the same force as that which its inertia represents, and if one of the wheels must skid, which will be true if there is no differential, it follows that the force of inertia will be more likely to overcome the tractive ability of the remaining wheel (at the rear end of the automobile), which, if it does, will cause the automobile to behave badly; an accident may follow.

[43]—How may this force of inertia be estimated?

If it is assumed that the tractiveability of the wheels with the ground is destroyed, it follows that the centrifugal force of the mass will be a proper estimate of the inertia component.

Centrifugal force is determined as follows:

Let

R = radius in feet of the curved path:

F = centrifugal force in pounds;

W = weight of the body in pounds;

N = number of complete revolutions the body must make in its circular path in one minute of time;

v = linear velocity of the center of gravity of the body in feet per second;

g represents the force of gravity = 32.16 as taken.

Then,

$$v = \frac{2\pi RN}{60}$$

$$F = \frac{Wv^2}{gR} = \frac{Wv^2}{36.16R} = \frac{W4\pi^2RN^2}{32.16 \times 3600} = \frac{WRN^2}{2933} =$$

$$= 0.0003410\ WRN^2.$$

[44]—What is the numerical value of the force of gravitation? Is it the same everywhere over the surface of the Earth?

The force of gravity, designated in text books as g, increases with the latitude, and decreases with the altitude. At Paris, France, the latitude is 48° 50′ N., and the value of g is 32.181; the altitude taken being that of the sea level, which is 0.

According to Everett, the constant g may be determined as follows:

$g = 32.173 - 0.082 \cos 2$ lat.—0.000003 height in feet.

In the United States it is common custom to take 32.16 as the value of g.

[45]—What is the reason for considering the force of gravity in connection with automobile work?

Everything that moves is retarded or accelerated by the gravitational force; going up hill it is retarded; going down hill it is assisted; on the level it is still under the influence of gravity and the force exerted must be reckoned with.

[46]—In what way does the force of gravity interfere with the travel of an automobile when the road is level?

Since, through the action of the force of gravity, a body will fall to the ground if it is free, the same force will act when the body is resting upon the ground, and with the same force; the body tends to fall all the time, and if the surface of the earth interferes with its further migration, a pressure will be exerted between the surfaces; if there is a pressure there will be friction; if there is friction it will take an effort to move the body against the resistance offered.

[47]—But an automobile is equipped with wheels; it rolls along the roadway; why should gravity have anything to do with it?

For the very simple reason that the rolling of the automobile along the roadway does not destroy the force of gravity. Were there no force of gravity, on the other hand, the automobile would not go either up hill or on a level. The reason for this is that there would be no traction; the wheels would slip and spin around, but the automobile would not go ahead. Traction, at it is termed, is but a manifestation of the force of gravity; when it is said that there is a certain number of pounds pressing on each traction wheel, which, considering the coefficient of friction, or adhesion, enables the motor to spin the wheels and cause the automobile to roll along the roadway, it is all due to gravity and involves the value of g at the time and place.

[48]—To what extent does gravity aid in the process of running an automobile?

As a practical example of the value of the force of gravity in the propulsion of an automobile, it is first necessary to determine the weight resting upon the traction wheels and then learn the value of the adhesion of the tires to the roadbed. Adhesion is variable, depending upon the nature and condition of the tires, also the nature and condition of the top dressing of the roadway.

It is common practice to assume that 60 per cent. of the weight of an automobile rests on the two rear wheels; weighing the automobile. then, is the first requisite, when the following will hold:

$T = W \times 0.60^2$

Which, for a 2,000-pound automobile, represents:

$T = 2000 \times 0.60 \times 0.60. = 720$ pounds on two wheels, 1-2 of which, 360 pounds, will represent the traction of one-half of the total weight.

Knowing the value of T (the traction), the power which may be utilized at the point of contact of each road wheel may then be determined at any speed of rotation which does not alter the tractive ability. Unity may be taken for the speed, in revolutions per minute, and the following will hold:

$$\text{H.P.} = \frac{2\pi RST}{33{,}000} = \frac{6.28 \times 1.5 \times 1 \times 360}{33{,}000} = 0.1028 \quad \text{horsepower}$$

per revolution of the traction wheel, up to the point where traction is diminished by the conditions which increasing speed interposes.

In the above:

$\pi = 3.1416$;

R = radius of the road wheel in feet = 1.5 foot in this example;

S = speed of rotation of the road wheel in revolutions per minute = 1 revolution as taken;

T = traction in pounds, taken as 360 in this example;

33,000 = foot-pounds per horsepower.

[49]—This seems like a small amount of power; is it enough for the purpose?

It must be; automobiles do run; it is all the power that can be utilized in view of the force of gravity and the coefficient of friction of the materials used, considering the tires and the roadbed. Assuming that the road wheels travel at the rate of, say, 300 revolutions per minute, the power which can be utilized under these conditions will be as follows:

$$\text{H.P.} = \frac{6.28 \times 1.5 \times 300 \times (360 \times 2)}{33{,}000} = 61.66$$

[50]—How fast will the automobile go under these conditions?

It is extremely difficult to predict. The 1.5 foot radius taken in the formula demands the use of 36-inch tires in the wheels, and $36/12 = 3$ feet diameter, which, multiplied by $3.1416 = 9.42$ feet travel of the automobile over the roadbed for each revolution of the wheels. $9.42 \times 300 = 2{,}826$ feet per minute, and,

$$\text{miles per hour} = \frac{2{,}826 \times 60}{5{,}280} = 32.11.$$

[51]—Would it take so much power to drive a 2,000-pound automobile at the rate of 32.11 miles per hour on a hard level roadway?

No. There is no statement made in relation to the amount of power it will take to drive the automobile; what was ascertained is the amount of power which could be utilized in view of the traction available, and at the speed named.

[52]—How much power would it take?

Primarily, were it to take more than the amount above named, the automobile would not run; this is the point which is brought out by the above discussion, not forgetting that it explains something of the relation of gravitation. Just how much power it would take to drive a 2,000-pound automobile at the rate of 32.11 miles per hour on a hard, level road is difficult to state. If the internal loss, due to friction in the transmitting mechanism, etc., is 33 per cent, then, $61.66 \times (1 - 0.33) = 41.21$ horsepower is left to drive the automobile.

Having deducted the friction and other internal losses in the transmitting mechanism, it remains to account for "wind resistance," and such other factors as will add to the power requirement, after which it will be possible to fix upon the power the automobile will use, in which it will be necessary to include:

DISTRIBUTION OF POWER REQUIRED TO DRIVE

(a) Wasted at the point of contact of the tires.

(b) Used in deflecting the chassis springs in the process of affording good riding qualities.

(c) Dissipated in vibrations, deflection of all the members in the composition of the automobile.

(d) Dissipated in the deformation of the tires; molecular work in the compressed air in the tires, and in deflecting the roadbed.

(e) At every bearing in shearing the lubricant which is placed there to lower the power requirement, and prevent seizing of the metals which compose the bearing surfaces.

(f) In overcoming the force of gravity.

(g) Wind resistance is separate; increases with the extent of surface; is more or less dependent upon the form of surface, and is markedly affected by speed.

In view of all of the above factors, it is quite possible to state the power required for all automobiles; they do not all perform exactly alike; there is a marked difference between them, but it may be a fair estimate, considering average conditions, to put the rate of power required as approximately 150 watts per ton-mile (1 watt is equal to 1-746 of a horsepower). This would be the draw-bar pull, to which must be added the losses which come as the increasing speed brings on its quota of losses from all the sources as above set down.

There must still be a reserve of power in order to compensate for the effect of gravity on a hill; if a weight will fall to the ground, as it will under the action of gravity, it follows that to elevate the weight demands the expenditure. It is all the same whether the weight is in the form of a ton of coal or an automobile; it makes no difference whether the weight is lifted in an elevator or rolled up a hill in the form of an automobile or other vehicle.

METHOD OF LUBRICATION

[53]—What is friction?

According to Rankine, it is that force which acts between two bodies at their surface of contact so as to resist their sliding on each other.

[54]—How is friction characterized; is it designated in more than one way?

Yes. There is friction of rest and of motion, and further subdivisions as follows: (a) rolling friction, and (b) friction of solids.

[55]—What is friction of rest?

The force required to start a body sliding is called the friction of rest.

[56]—What is friction of motion?

The force required to continue a body in motion at a constant rate after it is started is called the friction of motion.

[57]—What is rolling friction?

The force required to roll a cylinder or sphere on a plane surface is called rolling friction.

[58]—What is friction of solids?

It was Rennie, in 1829, who experimented on the friction of solids, mostly under conditions of unlubricated (dry) conditions, from which the conditions as follows were reached:

(a) The law of solid friction differs with the character of the bodies rubbed together.

(b) The friction of fibrous material is increased by increasing the extent of surface and by time of contact, and is diminished by pressure and speed.

(c) With wood, metal, and stone, within limits of abrasion, friction varies only with pressure, and is independent of extent of surface, time of contact, and velocity.

(d) The limit of abrasion is determined by hardness of the softer of the two rubbing surfaces.

(e) Friction is greatest with soft, and least with hard materials.

(f) The friction of lubricated surfaces is determined by the nature of the lubricant rather than by the solids themselves.

[59]—What is the law of unlubricated friction?

According to A. M. Wellington (*Eng. News*, April 7, 1888), a fair expression of unlubricated friction is as follows:

(a) The coefficient of unlubricated friction decreases with velocity.

(b) Is maximum under conditions of minute velocities.

(c) Falls very rapidly with minute increases of minute velocities.

(d) Continues to fall, but at a very much decreased rate, as velocity departs from minute velocities.

(e) At higher velocities the coefficient is more nearly in accord with the conditions which obtain with lubricated friction.

Why Do Not All Use Friction Drive?

Editor THE AUTOMOBILE:

[2,275]—Under this caption THE AUTOMOBILE of April 14 printed four questions as follows:

1. "Why do not all automobile manufacturers use the friction transmission instead of selective or planetary, and do away wtih the disc or cone clutch, etc?"
2. "Is not the friction transmission more desirable on account of obtaining any speed from zero to limit on high gear?"
3. "Does not a car with friction transmission get more power delivered to the wheels than a car with any other kind of transmission of equal horsepower?"
4. "Is it not cheaper as to wear and cost of replacing to have a friction than a gear transmission? R. F. HENRY, Jr.

Palm, Fla.

The reply to this states that you "doubt if the average user of this gear used more than three or four of the speeds available." The very fact that the operator has at all times the exact "gear" or "speed" to give the best results explains why a good friction-drive car can run away from most gear-driven automobiles on steep hills and on bad roads, even though the gear-driven car has the more power. The operator of a friction-drive car can stop on a steep hill and upon starting can gain speed much more rapidly than most gear-driven cars with double the power, for the reason that he can increase his "gear" by such easy stages and with so much facility and promptness that he beats the "other fellow" to it.

You further state that "friction transmission of the simple disc type is never on high gear; that is, in the sense that a car with direct drive on the high can be." We are somewhat at a loss to understand how you arrive at this erroneous conclusion. Further on you state that "the friction disc must be replaced every few thousand miles." Our files contain hundreds of letters which prove conclusively that this is not the experience of the average user. Quoting from a few of these:

"I have run my car 11,000 miles and am unable to see that the disc is worn to the slightest extent. The filler, I believe, will be good for at least 3,000 miles before having it renewed"——

"The disc on my car is in first-class condition and the same filler is still on the car which I purchased from your agent a year and a half ago. The car has run a little over 6,000 miles, and I expect to have to apply a new filler in the near future."

It takes a handy man from thirty minutes to an hour to apply a new filler. The cost of this filler is about $3, so that you were right in your statement that the expense is small.

We feel in justice to the users and manufacturers of the friction-drive cars, that this reply should be put before them with the same prominence you gave the article referred to above.

Is It Right to Run On a Retarded Spark?

Editor THE AUTOMOBILE:

[2,276]—I find that I can slow my motor down by retarding the spark, but the radiator then steams. Should it? SUBSCRIBER.

Erie, Pa.

No. Running on a retarded spark is the best way to induce steaming of the radiator, and it has the further great disadvantage of causing the exhaust valves to warp so that they will have to be ground in. Adjust the spark to the speed of the motor, always in the advanced position if good result is wanted. Retard the spark a little when cranking to prevent a "kick back."

Is Doped Fuel as Good as It Is Said To Be?

Editor THE AUTOMOBILE:

[2,277]—1. Is there any fuel which can be used in automobile motors that will give more power and speed than automobile gasoline?

2. What is an "air lock" in the gasoline piping system?

Great Bend, Kan. SUBSCRIBER.

Composite fuel has been used to some extent; it may give a little more power under well defined conditions; it is dangerous to handle, and it is almost sure to damage the motor. THE AUTOMOBILE does not recommend its use.

An air lock in the piping system of the fuel system is precisely the same as the same trouble in a water system. To avoid it, so pipe the gasoline that there will be a "hydraulic grade." This condition will be present if water, after it is poured into the system (gasoline will do) will all flow out at the other end; there should be no low point where some of the liquid will settle and form a trap.

Method for Amateur to Vulcanize Patches

Editor THE AUTOMOBILE:

[2,278]—Will you please say through the columns of your paper which is the best method for the amateur to vulcanize patches on inner tubes, use raw rubber patches and vulcanizing cement, or use regular vulcanizing patches the same as used in cold patching and vulcanize with vulcanizing cement? W. J. MOORE.

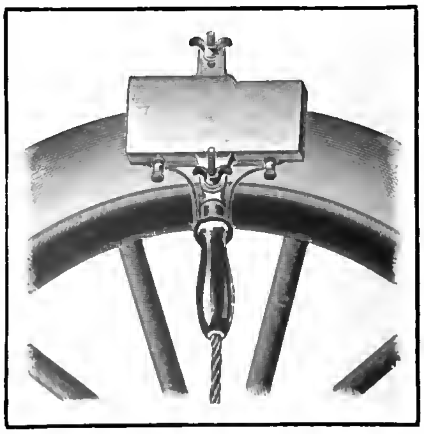
Caro, Mich.

There are two methods available to the amateur:

(a) The acid cure. When the patch is applied in the regular way, it will not stay on, because the cement is "green." Supply men have for sale acid which has the virtue of doing the work of vulcanizing the cement which is used for sticking patches in place, and, from service, it would seem to be efficacious.

(b) The illustrations here afforded depict a type of vulcanizer which works on the principle of heating at the desired temperature (250 to 275 degrees Fahrenheit) for a sufficient length of time to accomplish the purpose. This particular type of vulcanizer is made on the principle of the electrical rheostat, and when the electric current is applied, heat, at the required temperature, is generated, so that the amateur will be in a position to accomplish the vulcanization, if he will but use the vulcanizer, applying it in the manner as herein depicted.

It is not necessary to use electricity as a source of heat; steam, at a sufficiently high pressure to afford the right temperature, is used in the manufacturing process, so that there can be no question as to its capability, but it is something of a problem to use steam under the conditions which obtain when a repair is to be made, and for this reason the electrical equipment is preferred. As to the relative value of the two processes herein described, there is nothing to be said, excepting to point out that the heat method, using electricity, or any other suitable means, is the more natural way, and its best recommendation lies in the fact that it is used in the manufacture of tires, but it is first necessary to prepare the tire for vulcanization.


Vulcanizer in place ready to turn on heat

The remaining important matter is to see that the cement is of the right grade, and that the tire surfaces are scrupulously clean before any attempt is made to apply the patch. In conclusion, it is urged that repair work be started directly a tire shows that it is in need of attention. If the fabric is left uncovered dampness will creep in and "mildew" will follow.

Exact Definition of a High Tension Magneto

Editor THE AUTOMOBILE:

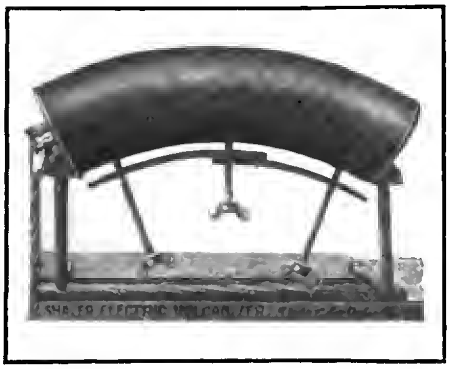
[2,279]—1. Please state the difference between a high and low-tension magneto.

2. What is the relation of a magnetic plug to either of these magnetos? A. P. L. DOHME.

Baltimore, Md.

1. The high-tension magneto is so designed that an auxiliary coil is not necessary; the high-tension current is impressed on a secondary winding which is placed on the armature of the magneto, over the primary winding. In the case of the low-tension magneto, it has but one winding on the armature and a wide-spark mechanism, placed in a cavity connected to the combustion chamber of each cylinder; the hammer and anvil of the mechanism "draws" an arc at the right time by opening the circuit.

2. In the magnetic plug mechanism, magnetism is used to cause the hammer to reciprocate, and the arc is drawn similarly. The advantage derived from using a high-tension magneto, in addition to the energy afforded, lies in the fact that the spark does not have to be advanced so much as when a coil is used; the "lag" is less in the case of the magneto with all windings on the armature of the magneto. It is "lag" which interferes with efficacious work, and in the manufacture of magnetos, the makers employ ways to eliminate time factors.



Healing a wound on the tread of a tire

A Number of Questions Including Block Motor

Editor THE AUTOMOBILE:

[2,280]—Here are a number of questions I would like you to answer. I take this opportunity to let you know how much I appreciate your paper. I think it is the best paper in the field.

1. Is the block construction desirable in a 5 1-4 x 6 motor; if not, why not?

2. What is the matter with a spherical combustion chamber and an overhead camshaft?

3. Are the advantages great?

4. I have a friend who claims that he has a carbureter with an adjustable nozzle, and that he realizes more power by increasing the quantity of gasoline the situation demands. What is the reason for this? I have always thought that it was most difficult to adjust the flow of gasoline.

5. Can splash be relied upon to lubricate a motor?

6. In a book I came across the statement that a radiator can cool too much. Most people believe that a cool radiator is a good thing to have. What is the real situation?

7. I would like your criticism of the motor as follows:

Bore and stroke, 5 1-4 x 6 inches, respectively.
Compression 70 pounds per square inch, absolute.
Horsepower rating (at 1,000 revolutions per minute) 44.
Compression volume 54 cubic inches.
Mean effective pressure 80 pounds per square inch.
Valves 2 1-4 inches in diameter and 9-16 inch lift.
Crankshaft diameter (three bearings) 2 1-4 inches.
Flywheel 16 inches in diameter.
Flywheel weight 66 pounds.

8. What would be the lift of the valves were they 3 inches in diameter?

9. What would be the length of the connecting rod? Would 12 1-2 inches between centers be enough?

10. Would a fan in the flywheel be sufficient, considering thermo-syphon cooling? R. C. GRAHAM.

W. La Fayette, Ind.

1. The block construction would add to the weight, for the reason that the distance between main bearings would have to be allowed for; twin cylinders are used when three main bearings are employed.

2. Nothing the matter with a spheroid combustion chamber; it offers the least flame-swept surface, hence requires the least cooling surface in the radiator for efficient work. The overhead cams will be noisy if the work is not well done. Good work can be done, and some of the makes of motors on the market are satisfactory in this respect.

3. The advantages are great enough to attract a school of designers who are looked upon as alive to the best situation—it is one good choice in motor designing.

4. Your friend may have what he claims; why not examine the carbureter and see if it is any good?

5. The splash system of lubrication is much used, and it works well.

6. It is possible to have a radiator that will do too much cooling; it is rarely ever approximated in actual service. No designer considers the chance of a too efficient radiator as more than a very remote contingency.

7. Bore and stroke are all right. Compression is a little low; add five pounds. Rating is too low. Fix the compression volume to afford a compression (cold) of at least 75 pounds per square inch (absolute).

8. The valves would barely break off of the seats.

9. The length, 12½ inches, would be a little long for the connecting rods, but it would not be objectionable in the presence of good designing; 11½ inches would be a low limit, perhaps.

10. The fan in the flywheel could be made of sufficient capacity to do the work; it would be necessary to have a tight hood, and the under-pan would have to fit also. This is a detail of more than a little importance; if the air leaks through the pan it will do no cooling.

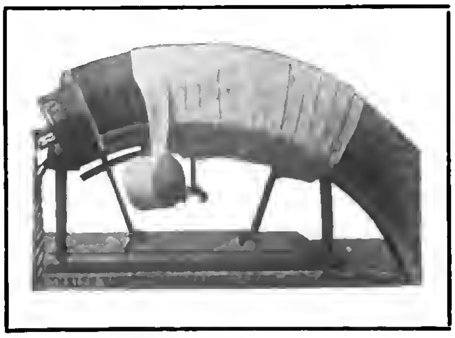
What Is the Best Lubricant for Transmissions?

Editor THE AUTOMOBILE:

[2,281]—Will you state the reason for the use of heavy lubricant in transmission gear systems, rather than cylinder oil?

Rutherford, N. J. F. E. ROGERS, JR.

Cylinder oil is high priced; heavy grease will do the work, and if it costs less it is advantageous to use it. Then, grease or heavy lubricant is more likely to stay in. Cylinder oil will do the work, besides using a sufficient quantity of lubricant, either hard or liquid, according to preference, maintain the parts so scrupulously clean that the lubricant will do the good that it is supposed to accomplish; it may do harm if the parts are not clean. It is well to remember that lubricant oozing out prevents dirt from migrating in, hence it is a good and efficient seal.



Wrapped tread, using tape to hold repair part in shape during vulcanizing

Discussing Features of Various Makes of Magnetos

By HERBERT L. TOWLE

OWING to an oversight, the article of May 19 on "Some Leading Magneto Details" did not contain an explanation of the wiring diagram of the self-contained high-tension type of magneto which appeared in the May 12 issue as Fig. 17. (See Fig. 5-a.) This diagram is accordingly reproduced herewith. The magneto is distinguished by two particulars: First, the high-tension winding, instead of being applied to a separate coil, is wound over the primary coil on the armature itself. It is carefully insulated from the primary except at one end, where both it and the primary coil are grounded on the armature core. The other end is led carefully insulated to a collector ring mounted on the armature shaft, and a carbon pencil rubbing on this collector ring takes off the secondary current and leads it to the distributor. The other respect in which this type differs from that shown in Fig. 16 is that a condenser is employed in connection with the interrupter to suppress the extra current.

Owing to the fact that the secondary coil of the high-tension magneto is located on the armature itself, it follows that it not only receives an induced current, due to the breakage of the primary current, but itself induces a current like that of the primary coil, but smaller in volume.

Let us now examine some of the commercial constructions used in geared magnetos. First, we will take up what may be called the conventional or standard types of (a) low tension, (b) low tension plus separate coil, (c) true high-tension magnetos. Later we shall note a considerable class of magnetos embodying departures more or less striking from the conventional type, and lastly, a group of unclassified magnetos.

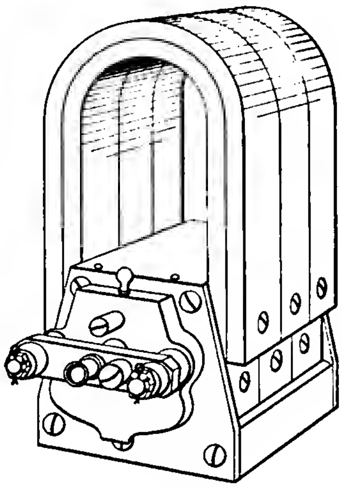
The subject of dual ignition also will be taken up later on. Of low-tension geared magnetos there are at present three given makes, the Bosch, Simms, and Locomobile. Of these the last named is constructed only for use on Locomobile cars.

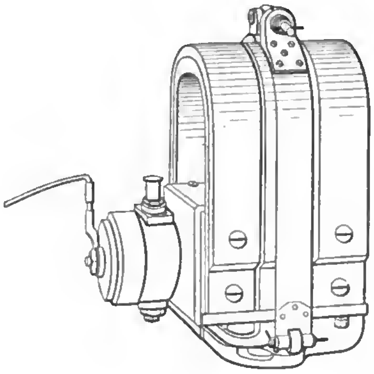
Fig. 1 shows the low-tension Simms magneto in outside view. The horizontal cross-bar at the end is carried by two studs on which it is insulated. This cross-bar carries a central plunger, making contact with the insulated bottom at the end of the armature shaft, as described before. An adjacent screw in the cross-bar serves as a binding post to lead the current to the bus bar and switch.

Fig. 2 shows the Locomobile magneto with the armature removed, thus showing clearly the form of the latter.

Fig. 3 shows the Bosch low-tension magneto in section. This form has plain bearings, but the same magneto is also made with ball bearings. The field magnets 1, armature coil 2, insulated stem 3 passing through the shaft, and insulated terminal 4 containing the spring-pressed contact button 5 are easily recognized. In this magneto the contact portion of the button is carbon instead of steel. The end plates 6, 7 contain little felt oil wicks 8, pressed upward by spiral springs and supplied with oil from the little oil wells surrounding them. These oil wells are filled by removing the covers marked "oil." Leather washers 9 prevent leakage. The ground current is returned from the frame to the armature core through the carbon brush 11, thus rendering it unnecessary for the current to pass through the oil film of the bearings; 16 is the dust cover, and 20 is an insulating washer of steatite or soapstone.

With magnetos of the types shown the spark is advanced or retarded by suitable mechanism acting on the igniters, and there is no advancing device in the magneto itself. The Bosch magneto designed for use with magnetic plugs, however, contains its own spark-advancing mechanism. Fig. 4 shows the end view of this magneto with the cover over the interrupter removed. Lever 10 is pressed by spring 8 into contact with the platinum screw 7, except when the other end of the lever strikes against cams 11. When contact is made the armature is short-circuited. When broken, a momentary extra current goes through the insulating block carrying contact screw 7 and through the spring 14 (turned aside in the drawing to permit removal of the cover plate), and from there through a distributing device, not shown, to one or another of the four terminals 18 18 at the top of the





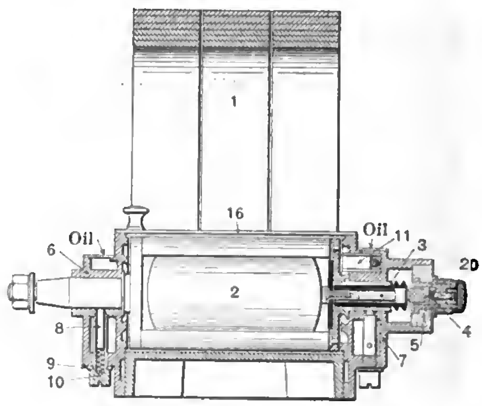
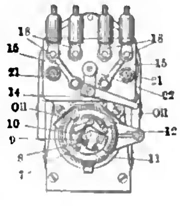
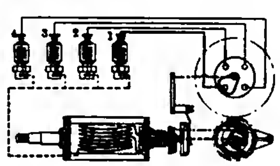


Fig. 1—Outside view of the Simms low-tension magneto. Fig. 2—Locomobile magneto with armature taken off, showing details of construction. Fig. 3—Section of the Bosch low-tension magneto and parts of same





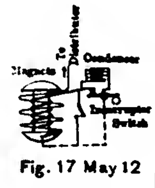
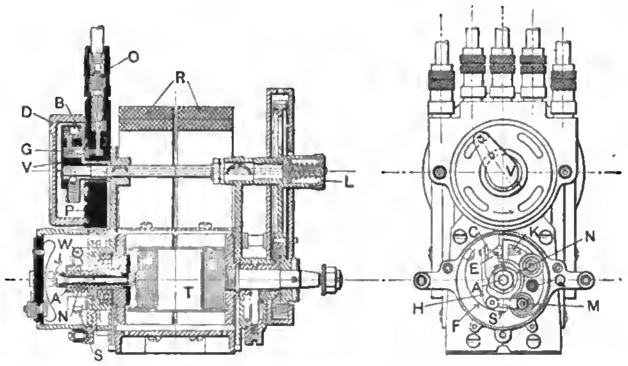


Fig. 4—End view of Bosch magneto containing spark-advancing mechanism. Fig. 5—Showing arrangement of details of same magneto. Fig. 5a—Wiring diagram of self-contained high-tension magneto



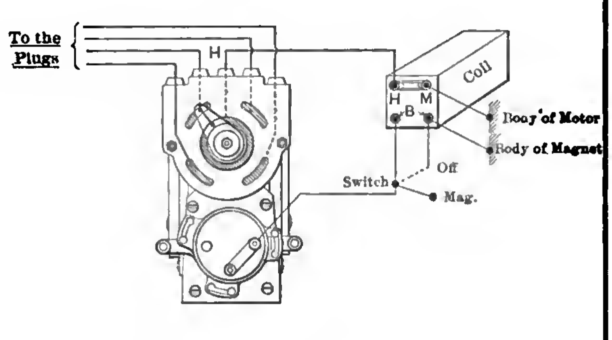


Fig. 6—Eisemann magneto with separate coil for low-tension current and "breaker box" for regulating spark time. **Fig. 7**—Wiring diagram of connections showing also manner of interrupting current

magneto. From the terminal the extra current goes to the magnetic plug screwed into the cylinder. This plug has an electromagnet with fine winding and a delicately balanced contact finger. The electromagnet, energized by the momentary extra current, attracts the contact finger and thereby breaks the magnetic plug circuit, producing a spark at the point of the contact finger. The diagram, Fig. 5, shows the general arrangement. Plug No. 1 is receiving current, and its contact points have just separated. The provision for spark advance alluded to just above is that the barrel-shaped casing from which the lever 12 projects may be rocked through a certain arc in either direction. The cams 11 11 are attached to this casing, and the lever 10 and contact screws turn with the armature.

A modified type of low-tension magneto, known as the rotating screen type, will be mentioned in a later article.

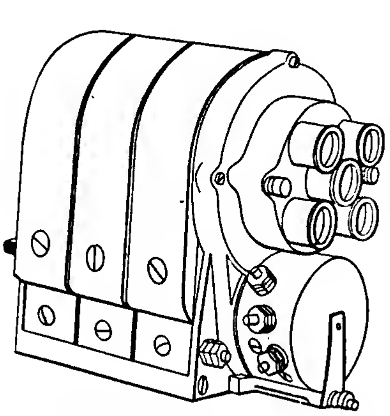
A less simple drawing, but still understandable if closely studied, is that of the Eisemann magneto, Fig. 6, which belongs to the second class in which low-tension current is generated and delivered to a separate coil. The field magnets R and armature core T appear as usual. One end of the armature shaft runs in a ball bearing, the other in a plain bearing similar to those in Fig. 3. The armature current is carried through the shaft by the insulated bolt W to the interrupter whose lever H works against the insulated contact screw E in the usual manner. When the armature short-circuit is broken by separation of the contacts, the momentary extra current passes through the bolt W, through a binding post on the cover plate, to the terminal winding of the outside coil, and thence back to the engine frame and magneto. This extra current induces a high-tension current in the secondary winding of the coil.

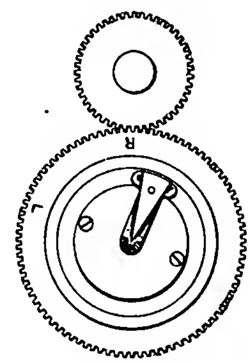
The interrupter is exposed for cleaning by removing the insulated cover plate, and the spark is advanced or retarded by rocking the "breaker box" or casing in which the interrupter mechanism is mounted. This varies the spark time as above explained in connection with the Bosch magneto for magnetic plug ignition.

The high-tension current generated in the coil is distributed to the plugs in order by the distributor running with two-to-one gearing reduction above the armature. The current enters by the terminal O, and is led from there to the revolving carbon brushes G and B, of which the former runs against the inner contact ring in the hard rubber of the distributor, and the second runs against the inlaid brass distributor segments in order. From these segments the current goes to the spark plug terminals. To inspect the distributor the cover D is removed. The hard rubber distributor arm V, carrying brushes G B, is also readily removable, being held on the shaft by a sort of snap clutch, a steel ball engaging a groove in the shaft, as the drawing shows. Fig. 7 is the wiring diagram showing the connections and also showing how the switch interrupts the current by short-circuiting the coil. A condenser built into the coil absorbs the first portion of the extra current and gives it up again in a sudden rush to the coil as soon as the condenser is fully charged.

Fig. 8 shows the Splitdorf magneto in external view. Its principle is that of the Eisemann, but the details are somewhat altered. The high-tension current from the coil enters the central one of the five hard-rubber bushings shown in the distributor cover. These bushings contain carbon brushes, of which the four outer ones receive high-tension current in sequence from a radial arm inlaid into a hard-rubber disc attached to the face of the distributor gear. Fig. 9 shows these distributor details. Fig. 10 shows the wiring diagram, of which the most important feature is that a battery is used for starting, the same coil and distributor serving both magneto and battery. Unlike most battery ignition systems, the battery is not grounded, but both terminals are connected by wiring to the coil.

(To be continued.)





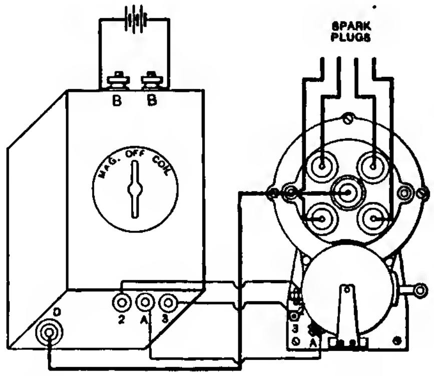


Fig. 8—External view of Splitdorf magneto and distributor. **Fig. 9**—Details of the same. **Fig. 10**—Wiring diagram showing battery used for starting, and terminals connected to coil

When a Body Must Be Purchased—By G. J. M.

This is the second installment of an article dealing with the process of putting a new body on an old automobile for the purpose of bringing the appearence of the automobile up to the most advanced standard, enabling the owner to utilize the chassis until it is worn out in service.

PROGRESS in the solution of this problem will require casual reference to the figures which were utilized in the introductory installment of this article, the idea being to afford the requisite building information.

Style *A* represented a type of runabout body with a clear platform at the rear to accommodate baggage.

Style *B* presented a torpedo stern attachment supplanting the clear platform as shown in Style *A*.

Style *C* depicted a so-called racy type of runabout body with a gasoline tank occupying a position to the rear of the seat, with means for slinging the extra tires in a diagonal position over the rear portion of the platform, clear of the gasoline tank.

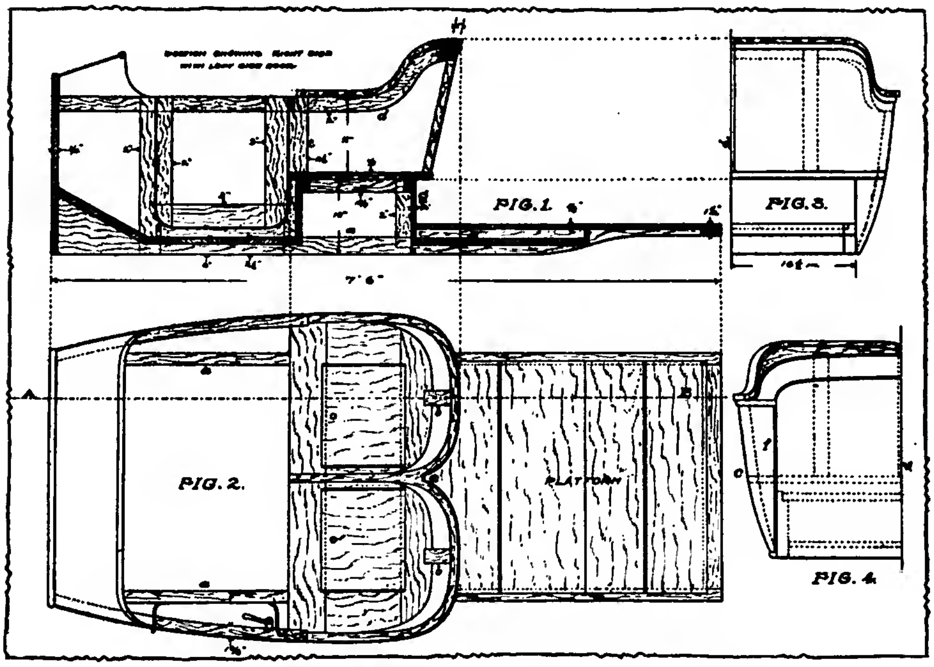
Style *D* showed a toy tonneau with a gunboat characteristic brought about by utilizing doors for all side entrances.

The whole effort has for its scope the idea of following along construction lines which are professional in character, capable of being executed with precision and despatch, enabling the autoist to choose at will, any one of the four styles as above indicated, or to change over from one to the other of the styles when the spirit moves.

In the construction of the Style *A* body, which constitutes the foundation for the whole work, reference may be had to the Figs. 1, 2, 3, and 4, as here given, and it will be understood that Styles *B, C* and *D,* may then be attached at will. Referring to Style *A*, and the figures, with a view to learning how the work is to be done in the construction of the body proper, Figs. 1 and 2 are made of ash in one piece 1 1-2 inches wide by 2 1-4 inches deep at the front, 4 inches deep at the rear of the seat, 8 3-4 inches deep at the toe, and 1 1-2 inches deep at the back end. The next step will be to provide a crossbar, which may be 2 1-2 inches wide, and, as the illustrations depict, it is framed in at a point of vantage.

Both the toe and backboards are made of 3-4-inch ash, but the platform boards, having less responsibility, are thinned down to 5-8-inch ash. Should it be desired to substitute white, or bass wood, for ash, account must be taken of the lack of rigidity of these products to the extent of adding 1-8 of an inch to the thickness. The ironing for the toe and backboards must be done with some care, and it will be a fallacy to undertake to save weight by utilizing flimsy irons which are made by bending strap iron up to the required shape; this product is inferior in its structure, nor will it afford the requisite measure of stiffness, since there will be no body of metal at the junction of the legs of the irons. If the irons are forged up, it will be an easy matter to leave a body of metal at junction points and to taper them away to the ends, so that the distribution of metal will be in accord with the needs, and weight will be saved on a deserving basis. The toe and back boards in this design rest on angle iron supports in stationary relation, using screws for holding. The boards shown directly above are removable, the reason being to afford ample leg room for the tonneau design. All bottom boards, excepting those which are rabbeted into the sills, are removable. The seat framing is of ash 7-8 of an inch thick, the side and cross members are lapped together, and the seat boards are 3-8 of an inch in thickness, made of white wood with cleats on the bottom and finger holes placed near the front edges; the boards rest in rabbets in the frame.

The upper frame *d* is of ash 2 inches deep by 1 inch thick, and is made of several pieces lapped together; it is framed to the posts *c* Fig. 1, and is supported by the posts *bb* Fig. 2, while the center post *e* (of which there are two) is of 7-8-inch white wood and is framed to the post *e*. The curve of the plan, and the shape, considering the side view, are determined on the rail *d*; then, the metal panel, which is of No. 16-gauge aluminum, is rolled to this shape. The top and bottom mouldings or beads are formed in the sheet with a beading former, and stock is left beyond the bead for a distance of 3-4 of an inch in length, which stock is turned at an angle to the sheet, and is used to fasten the panel to the wood frame, a clear idea of which will be gleaned by examining the section at the rear, Fig. 1.



Foundation body work for the four styles of bodies shown

One piece of paneling is used for each seat shape, the fastening at the front being under a half oval solid moulding, or pillow marked *c*. At the pillow *e* the sheets are turned over and nailed, and in this way the joint is covered. In well-equipped body-making establishments, the panels for both of the seats are fashioned in one piece, and at the point *e* the paneling is depressed, but is not cut; this is a cheaper way, and it has the further advantage of affording rigidity, offering the additional inducement of reducing the amount of framing within. Still another method for the sake of economy is employed in large establishments in dealing with the top part. In place of turning the panel above the head of an angle to the sheet, it may be preserved in its original shape in line with the flat of the sheet, and a 3-4 by 3-4 inch bent wood strip is placed on the inside and outside of the metal. These strips are bolted or screwed together, sandwiching the metal between. The advantage to be realized in thus proceeding lies in the fact that the rail *d* is eliminated, and the trimming rail is formed in its absence. Should there be an appearance of flimsiness, which the workman will note, it will be necessary to do a little ironing at this point.

The side framing in front of the seat is symmetrical on both sides with the exception that on the left side, where the rail at the top is cut between the posts to make the door opening, *e*, Fig. 1, which is a section in the vertical plane, to the right side on the line *AB*.

The space between the pillar representing the door opening is shown, and its construction will be readily appreciated. Fig. 2 shows the door correctly placed, and on the right side, the rail at the top is shown. The framing of the door and relating parts are made of 1 3-8-inch wood by the width as given in the drawing; this thickness is used with the idea of affording a certain stability to the door, and the fact must not be overlooked that the thickness changes somewhat, it being 1 1-8 inches at the bottom of the door. The side panels are made of No. 16-gauge aluminum, and are shaped by beating them out on a wooden form under a hammer, so that they fit the winding surface from the pillar *c* to the perpendicular line of the dash *f* (see Fig. 3). The panels so made are fastened under the half oval solid aluminum mouldings at the dash marked pillar *c*, and at the top as well as at the bottom. The moulding should be made to match the rolled moulding of the seat. In the doorway the panel is either bent at an

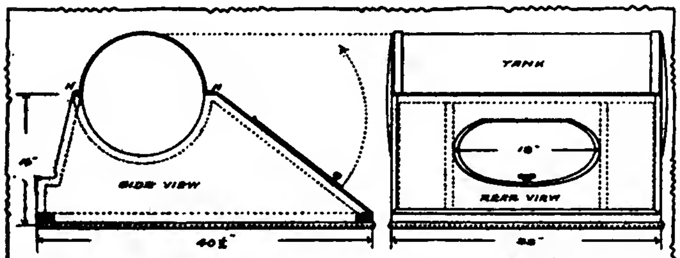


FIG. 8. FIG. 9.

Showing method of proceeding for style C work

angle and secured to the face of the framing, or cut to the edge and fastened on the outside with small wood screws.

The hood is one piece aluminum, using 16-gauge sheets, shaped under the hammer, and, when it is put into place, it is fastened to the dash and to the side frames under the solid moulding. At the rear raised edge, a similar moulding is riveted to the top and to the underside; this forms an oval edge, and it offers the further advantage of rigidity. Body builders take advantage of the presence on the market of the various materials to be had, among which it is believed there is an oval form of moulding, so slotted as to receive the panel.

How the Torpedo Stern Attachment is Made

The torpedo attachment, which is used in the production of the Style *B* body, is illustrated in Figs. 5, 6 and 7, and as Fig. 2 shows, the attachment covers the entire platform back of the seat. This attachment is 12 inches high in the center at the front end; the framing is of wood, the thickness of which is 1-8 of an inch less than the thickness of the wood in the framing of the platform, as shown in Fig. 2 The side and end members are 1 1-2 inches deep by 2 inches wide and frame together. The top metal sheet is a one-piece, No. 16-gauge aluminum product, shaped to the curve, which is substantially a quarter of an ellipse. This shape does not cover the square end of the platfrom at the rear, but the metal is worked out from its normal curvature so that it flattens to the horizontal at a distance 1 1-2 inches up from the base line. This carries the metal over the top of the wooden frame at the corners. The metal is turned over the sides of the framing, and fastened near the lower edge. The effect will be appreciated by an inspection of Figs. 5 and 6 showing the end view, and

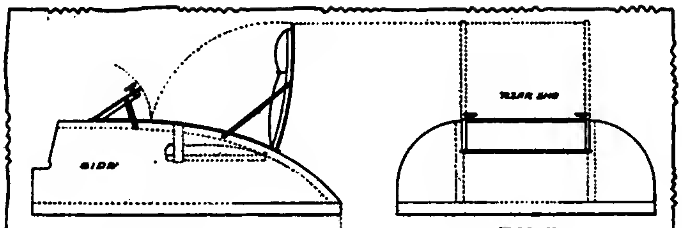


FIG. 5. FIG. 7.

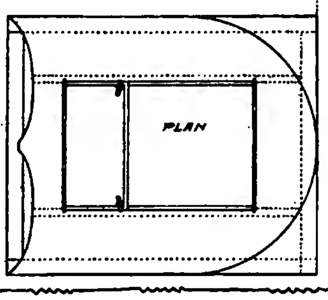


FIG. 6

Plan of the torpedo stern attachment for style B body. It is the idea to either have the body work done so that the attachment can be added at the time or later on. It will also be possible to so design the attachment that it may be detached at will with means for quick removal, when the body becomes a runabout type.

Fig. 7 which presents the 3-4 inch half oval. The next operation is to fasten a T-moulding to the underside of the frame, all around. This moulding will bind the sheet to the frame.

Construction of the Racy Type Attachment

The attachment which is used in the Style *C* body is illustrated in Figs. 8 and 9, and, as shown, this attachment covers the platform completely, and attention is called to the T-moulding which is placed to cover the drawing at the base line, and the metal panel at the front. The height at the front is 16 inches, and the gasoline tank is 15 inches in diameter, with a calculated capacity for 25 gallons of gasoline. In this construction the aluminum panels are No. 16 gauge, the side panels are turned to form an angle which flanges over for 3-4 of an inch. At the front, top, and rear, under the panel flange, an aluminum angle piece, 7-8 by 7-8 by 1-8 inches, is employed, and it is so shaped as to follow the top line of the side panel from back to front, being fastened to the wood frame at either end. Cross members of this same angle iron are shown as *hh* in Fig. 8, and they are riveted to the side angles, using gussets of 1-16 inch thick plate on the underside of the angle pieces, which gussets are all set in the upward direction for 1-16 of an inch, thus bringing the lateral angle pieces flush with the underside of the lateral panels.

Construction of the Toy Tonneau Attachment

The toy tonneau, which is designated as Style *D*, is quite completely illustrated in Figs. 10, 11, 12 and 13. This attachment covers the platform, and the framing of the seat door, and underbody remains as in the preceding example, excepting a difference in length which the drawings give. The seat is made to hold two adults, and the cushion and tonneau dimensions are also given. To this work the body framing and the door posts are framed. The front door post, or lock pillar, is fitted to the curvature of the front seat.

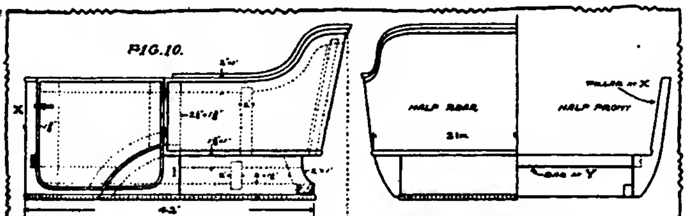
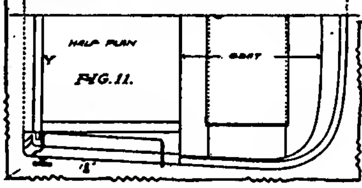


FIG. 12. FIG. 13.



Sections for use in making the Style D toy tonneau. This section is to be used in conjunction with the plan of the foundation body, Figs. 1 and 2, which affords the necessary platform space at the rear.

The Problem of Refinishing Automobile Bodies

By M. C. HILLICK

EACH class of body offers a separate problem. The purchaser when he selects a metal body, for illustration, is inclined to reach the conclusion that he will be entirely free from troubles of every sort. It will be easy to tell him, with the expectation that he will believe it, that a metal body will not check, nor will it, like wood, be more or less destroyed by the force of a blow which would merely put a dent in a metal body. It also looks as if a metal body might be hammered out were it to become damaged. Then, it is a simple thing to point out that wood bodies are much affected by heat, moisture and the other ills of inclement weather.

From the point of view of the repair-man, particularly after the body reaches the paint shop, these nice theories are given but small consideration. It will be found that in hammering out a dent in a steel body it will be almost impossible to bring the sheet of metal back to its original smooth exterior, and it will remain for the finisher to cover up the imperfection by building up with roughstuff and rubbing down with water and artificial rubbing stone. Even this process should include, after the first application of roughstuff, suitable treatment with a hard variety of drying putty. Roughstuff alone will not prove adequate in the process of concealing the dents, and if a bulk of material is required, as it will be if the dents are conspicuous, the drying putty should be used instead.

Before undertaking to refinish a steel body, after it arrives at the repair shop, it is proper practice to carefully inspect every portion of the body, noting the condition of the paint and varnish, observing if there are any fractures, scale, or bruised patches, and having a care to touch up all such imperfections and blemishes, using metal primer and surfacer in equal proportions.

In case a complete refinishing job is to be undertaken, resurfacing with roughstuff comes first, to be followed by touching up with a coat of filler, which should be made of two parts, by weight, of white keg lead to one part, by weight, of roughstuff filler; mix these components to a stiff consistency in equal parts of coach japan and rubbing varnish.

After the application as above, and a lapse of 36 hours, it will then be proper to putty and draw putty all the prominent defects of the surface, stopping off only when there is no longer a foothold for the putty. The completion of this operation should be followed by a period of inactivity for 24 hours, when it will be proper to apply a coat of straight roughstuff which may be either shop mixed or procured ready to use from the manufacturer. From this point on the building up operation may be continued, applying a coat of straight roughstuff daily until the surface is balanced up. This will be the more complete if the process of rubbing, which is alternate with the application of roughstuff, is conscientiously performed. The end will be a uniform level foundation.

After rubbing out, the further processes are quite the same as those which obtain in painting and finishing wood work. In the steel structure the non-porous feature will always have to be coped with, and scale formation is likely to occur. Unless the finishing is very carefully done, the rust and scale problem will be a serious one. In preparing the new steel surface for painting, all rust and scale must be removed. This is best done by means of a sandblast in properly equipped establishments. In refinishing work, the sandblast is also the most effective, but the old burning process is sometimes resorted to, although it is next to impossible to do good work in this way. From the point of view of the owner of an automobile, who, naturally, desires first-rate work at a fair cost, the old burning process is to be shunned, not only on the count that the result will not be very good, but for the excellent additional reason that the cost will be relatively high.

In some establishments not fitted out with sandblast equipment there are solutions to be had which are more or less efficacious in connection with the removal of the old coat, or, if the plates can be removed, the practice which sometimes obtains in car building may be resorted to, in which the plates are immersed in a "pickle" consisting of 20 per cent. solution of oil of vitriol for a time sufficient to accomplish the purpose. After this, the plates are dipped in boiling hot running water, for the purpose of washing away the acid and scale; the plates are then dried, and coated with crude oil, excepting on the inner surfaces, which do not receive final finish, being given a coat of good mineral oil paint.

The plates may then be put back into place, cleaned with benzine, and scrubbed with a wire brush, to be followed with a trustworthy coat of primer. After 48 hours, under proper drying conditions, the surfaces may be re-coated with a mixture of metal primer and surfacer to be followed by a drying period of 48 hours. Puttying and putty glazing is then done, to be followed by two coats of surfacer on two consecutive days. After this, if the surfaces are not in good fettle, additional coats of surfacer must be applied until the desired ground is established. Three days drying will bring the finishing process up to the point where rubbing with artificial pumice stone and water will be in order, and when the groundwork will be sufficiently good to permit of the completion of the undertaking in the customary way.

Aluminum Bodies Are Troublesome

One complaint which is frequently heard in connection with aluminum body finishing takes for its basis the fact that around the edges of the aluminum panels the paint, when made of white lead base, wears off rather too soon. There is no very good explanation for this, but the fact remains that the paint is unseated for some distance back of the edges, although it is well to remember that aluminum oxidizes most readily. In order to get away from trouble of this sort, in so far as it is possible to do so, a reliable mineral primer and surfacer is used in the finishing process, which usually results in a substantial body sufficiently trustworthy to answer the requirement.

Considering wooden bodies, which are usually of white wood or poplar, excepting for the framing, which is of ash, the conditions are much more favorable from the point of view of the finisher. The white wood, or poplar, in the better class of work, is either blocked or canvassed on the inside surfaces, and, next to mahogany, it is the most desirable material for holding the paint and varnish. It is true that white wood and poplar shrink and expand to a considerable extent. This trouble, however, is minimized by chopping down the trees at the proper time of the year and treating the timber in accordance with its characteristics with a view to the elimination of troubles of this sort.

If the best grades of wood are selected for the purpose, thus reducing shrinkage and other troubles to a minimum, an old-fashioned primer may be used with the best result, and the subsequent surfacing materials will lay hold on the wood tenaciously. With the work thus undertaken, the ills of vibration, expansion, and force strains will have but small effect, nor will dampness accumulate sufficiently to change the character of the surface, whereas the work of the painter will be comparatively simple. In the long run, no matter which character of body is sent back to the paint shop to be finished, it will require the exercise of a fair degree of trade skill, the use of excellent materials and rather more time than the average autoist cares to contemplate. The durability of the finish will depend largely upon the skill and the time the artisan takes, but the artistic effect will also involve the use of a wise selection of the color to be applied to the body.

Other varieties of wood are unsuited for good reasons.

American Hubs with Single Ball Bearings

FRENCH technical papers keep a close tab on the doings of American designers, and it is interesting to note that American engineers are in the lead in divers ways, even to the extent, sometimes, of using ideas which are only known to the French school of design through the medium of the technical press. The following translation, which is literal from the well known French technical paper *Omnia*, is made the basis for these remarks:

American Hub with Single Row of Bearing Balls

Thomas J. Fay describes, in the American journal, THE AUTOMOBILE, a hub of which we give herewith a reproduction. We are much inclined to believe that this apparatus has been able to function, but in default of knowing on what vehicles, we are obliged to leave to this author the whole responsibility for its description.

"A very large ball bearing is secured with its inner race member C on the enlarged end portion B of a stationary axle. The spokes E of the wood wheel abut directly with their broadened, wedge-shaped inner ends V against the exterior race member of the ball bearing. Two disks of steel compress the spoke ends by means of bolts U seen in the cut. One of these disks F closes the front of the hub and is provided with a grease cap G. The other forms the brake drum H and the sprocket wheel crown K.

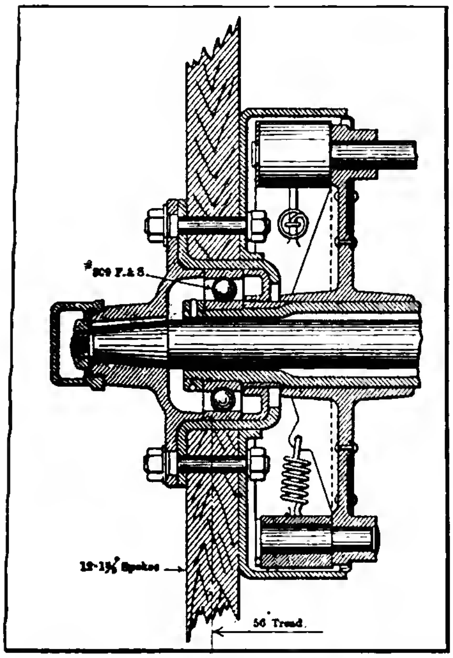


Fig. 2—Abbott-Detroit rear axle construction showing a No. 300 F. & S. annular type ball bearing in the plane of the rear wheel.

"It is undeniable that a single row of balls can easily carry the burden which rests on one wheel of an automobile. But this direc thrust is not the only one to which the hub of a wheel is exposed. The transverse stresses and especially the lateral shocks subject it to ruder tests. It may be a question whether a single row is as well adapted to withstand these forces as a hub formed of two rows placed at a distance apart.

"We do not believe it is impossible; and for this reason we present this original hub to our readers."

In order to show that the single ball-bearing design referred to in the translation from the French, and given here as Fig. 1, is now accepted and in particularly successful practice, it will only be necessary to present one or two samples, and for this occasion reference may be had to Fig. 2 of the Abbott-Detroit rear axle construction, and to Fig. 3 of the Marmon type of rear axle. Referring back to Fig. 2 for the moment, the illustration shows a No. 300, F. & S. type of annular ball bearing, placed in the wheel plane at right angles to the axis of rotation.

Referring to Fig. 3 the Marmon construction, the jack shaft S1 is flanged at its end F1, and a supplementary flange, F2, bolted to the flange of the jack shaft, is faced off and fits against a face on the hub member, H1, of the rear wheel on each side of the car. The hub H1 is bored out to take a single annular ball bearing, B1, and this bearing, while it does all the work, is dead on the center line of the wheel, so that it is in a position to assume all the responsibility. The ball bearing is a sucking fit on the reduced diameter of the bronze sleeve S2, and this sleeve fits over the drawn steel tube T1, which is concentric with the jack shaft.

The ball bearing is held securely in place in the most approved manner by means of a locked threaded shell, S3, and the jack shaft, which is of the semi-floating type, is prevented from floating off by the interference of the petticoat P1 of the hub member H1, acting in conjunction with the flanges F1 and F2, they, in turn, being secured in place by means of the hub flange bolts as shown, and the rivets R1, R2, etc. The hub cap C1 fits over the flange F2, and is held in place by cap nuts N1, N2, N3, etc., and the appearance of the wheel is somewhat unusual, due to the elimination of the conventional hub. The brake drum D1 is fastened to the spokes S3, S4, etc., and the drum, while it is of unusually large diameter, is also very wide, there being room for the two sets of brake shoes S5 and S6, with heat proof facings of a high coefficient of friction.

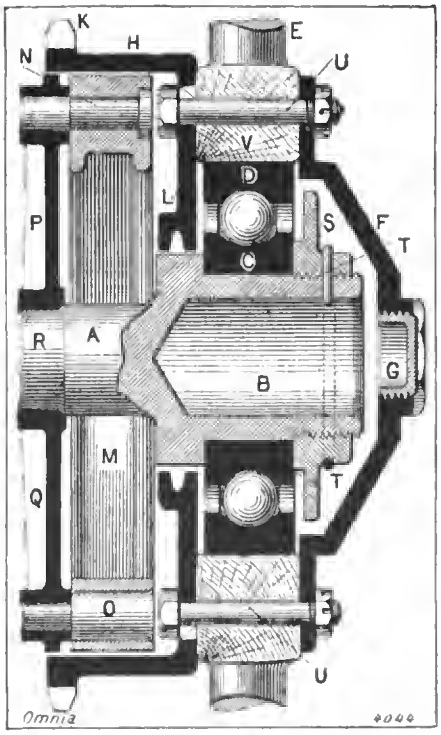


Fig. 1—American hub with a single row of balls. A, stationary axle; B, cavity full of grease; C, inner race; D, outer race; E, wood spokes; F, steel disk; G, hub cap; H, brake drum; K, sprocket chain crown; L, grease retainer; M, brake shoe; N, shaft for the two brake shoes; O, cam for operating brake; PQ, arms secured to the portion R of the axle; S, ball-bearing nut; TT, lock nut for nut S; UU, spoke-fastening bolts; V, inner spoke ends abutting directly against the ball-bearing race D.

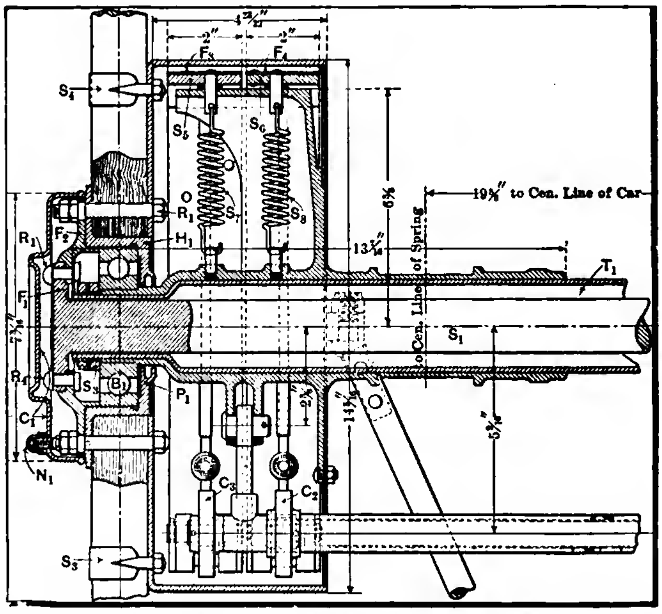


Fig. 3—Marmon type of live rear axle employing a single annular ball bearing in the plane of the wheel

Photographic Insight Into the Mea Magneto

COMPACTNESS in a magneto is second only to an energy spark at the propitious time, not forgetting, however, that the magneto occupies an auxiliary position on one side of the motor, exposed to the silt of the road as it blows in through the interstices of the radiator, part of which passes by and out through slits in the pan, but a goodly portion finds lodgment on the various surfaces under the bonnet, and it has great persistence in that it will creep in through small crevices and mingle with the working parts of the magneto or what not, to the detriment of the fine mechanism concealed within the housing.

In the magneto of the subject, compactness is one of the virtues which will be rendered apparent by glancing at Fig. 1. Moreover, it is shown that the vitals of the apparatus are protected most carefully, and, more, means are afforded for quickly dissembling the magneto, either for the purpose of removing same from its position in the car, or for the lesser intent, should it be desired, to detach a part from the whole. The saddle S1 into which the magneto M1 is placed is bolted down by two holding bolts, one on either side, through lugs L1, and the bottom side of the saddle is planed to a true face, in order that the magneto will securely rest upon a ledge, which may extend out from either half of the crankcase, or upon a shelf, which may be bracketed to the crankcase. The driving gear, if it has a suitable tapered hole in its hub, may be pressed upon the tapered projection of the armature spindle S2, and a nut N1, with a washer W1 behind it, is responsible for the pressure demanded in fetching the gear up against the taper, and holding it in place.

To fully appreciate the niceties of the situation, it will be necessary to turn to Fig. 2, which shows the motor M1 taken out of the saddle S1, and the quick release clamps C1 and C2, which are hinged at H1 and H2, have projections P1 and P2, which engage locking straps S2 and S3, taking advantage of locking cams C3 and C4, which hook over and throw past the center when pressure is applied to the spherical ends of the handles H3 and H4. An adjustment is provided so that if the faces of the cams do not come in the right relation, or if they show wear in time, the distances may be altered to accord with the necessities.

The next step in the procedure is shown in Fig. 3, in which the magneto M1 is partially dissembled, and the cover C1 is taken off, thus exposing the rotor R1, and the distributor shaft S1, also the carbon brushes C2, C3, etc., and the gear G1, which imparts motion to the shaft S1, taking motion from the armature shaft upon which a pinion is placed for the purpose.

Components of the Magneto Shown in Dissemble

The vital parts of the magneto are presented separately in Fig. 4. The armature (rotor) R1, having been removed from the fields F1 and F2 in the housing H1, presents evidences of mechanical refinement, the diameter being made exact by precise machining methods, so that when the armature rotates on its bearings in the end members M1, the air gap distance between the periphery of the rotor and the juxtaposition polar faces is reduced to mere clearance, so that the reluctance of the air gap is minimized, and the flux density of the magnetic field, as measured in lines per unit of area, is the highest obtainable value. The shape of the permanent magnets is shown in Fig. 5. The field piece is formed in dies (hot) from suitable grades of steel, having in view the fact that retentivity is a factor of the first importance. The potential ability of this form of magnet, expressing it in magnetomotive force, is primarily high, due to the careful selection of material and the method of treatment, but the effectiveness of the field is increased materially by virtue of a favorable leakage factor, all of which, in addition to the large polar area in conjunction with

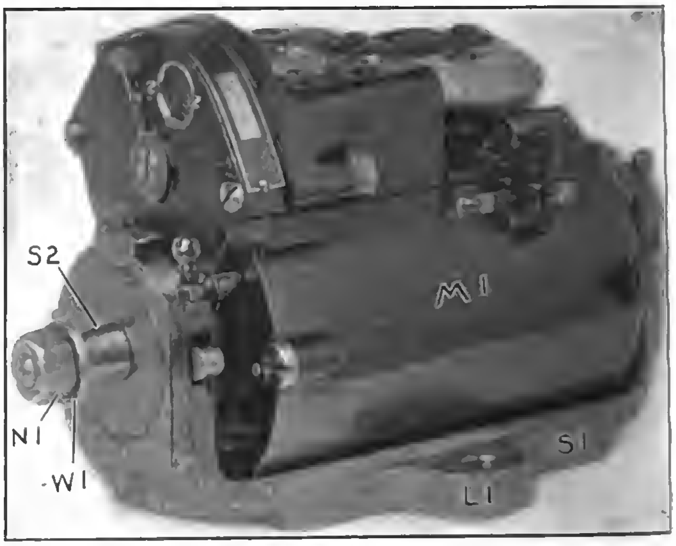


Fig. 1—Mea magneto as it appears ready to go into place on a motor, with means for bolting the same down

a diminished air gap, leads up to the desired result, namely, a high-tension spark possessing a large energy component.

The front plate M1 is held in place by six screws; when they are removed the plate may be taken away also. The armature spindle S1 rotates in ball bearings B1 and B2, at either end, and an examination of the plate M1 will disclose the location L1 for one of the ball bearings, which is duplicated at the other end. The mica-built condenser C1 is concentric with the armature shaft S1, fetches up against the liminæ of the armature R1, sandwiching between it and the insulating spool S2 of the slip-ring S3, thus affording to the condenser a position of advantage, protecting it perfectly from rough usage, and helping materially to maintain compactness of the apparatus as a whole. The breaker B3 on the secondary shaft S4 comprises a suitable spider, and a flat spring carrying the contact point, including a suitable adjustment requiring the use of a screwdriver in the process. The breaker removes together with the armature, and its action in service is promoted by two cams, which are held by screws to the housing of the wheel. Contact is interrupted through the office of a roller

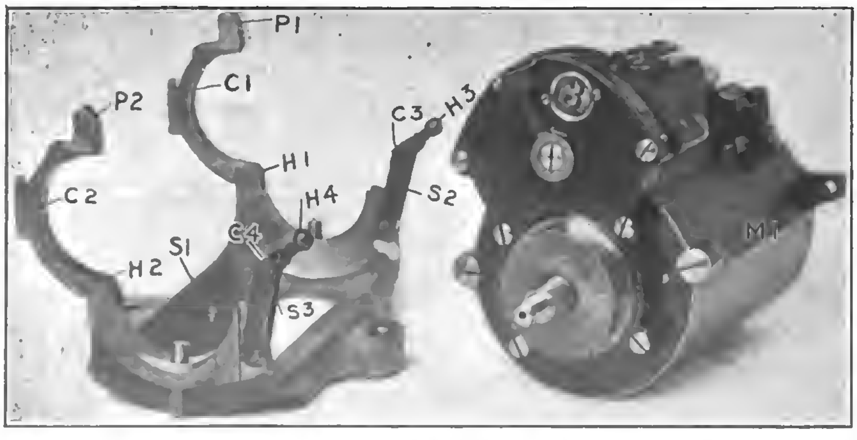


Fig. 2—The magneto after it is separated away from its saddle, showing the details of the saddle

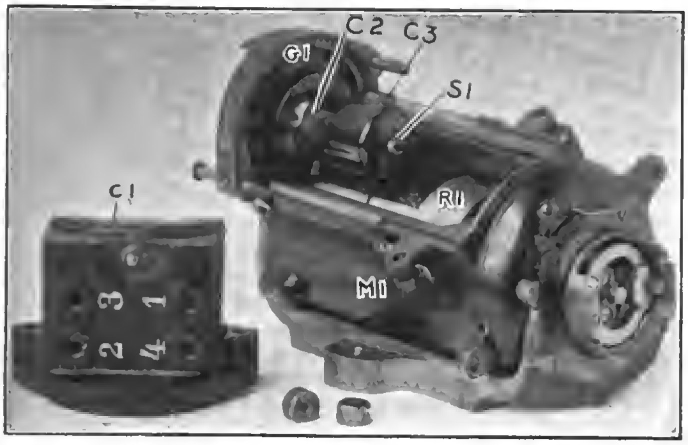


Fig. 3—When the cover is taken off, showing the interior, with a good view of the rotor and other parts

which is timed in view of the requirement. The roller glides on steel discs; they are hard and the motion is easy, so that appreciable wear is deferred.

In the application of the magneto to motors, those with 4 cylinders require that the crankshaft speed of the motor be that of the magneto. For motors with other numbers of cylinders, considering the use of this particular magneto, speed adjustments would have to be made accordingly. The timing levers are attached to suitable lugs, one on either side of the magneto. When the field magnet is run by means of this timing gear a steel disc with two cams, which are held tight by screws to the housing of the field magnet, imparts motion in the required direction to the contact breaker, which is rocked with the field magnets. The breaker will open in all positions between the maximum advance and the maximum retard at the same relative position between armature and field, so that the arc maintains the same intensity. The range of timing is from 60 to 70 degrees, which is quite in excess of the ordinary requirement, but which affords relief from troubles of this character, under the most unusual conditions. There are divers mechanical refinements which take into account the principles which underlie perfected mechanisms, and with a view to merely indicating something of the scientific way in which this magneto was contrived, it is pointed out that the contact breaker opens in the direction of the axis of the armature, hence centrifugal force, which cannot be eliminated, does not act against the good-working qualities of the breaker. The result is that contact is firm, chattering is entirely absent, and the spark produced is entirely free from interfering ways, such as would surely be set up in the electromagnetic couple, should contact be intermittent.

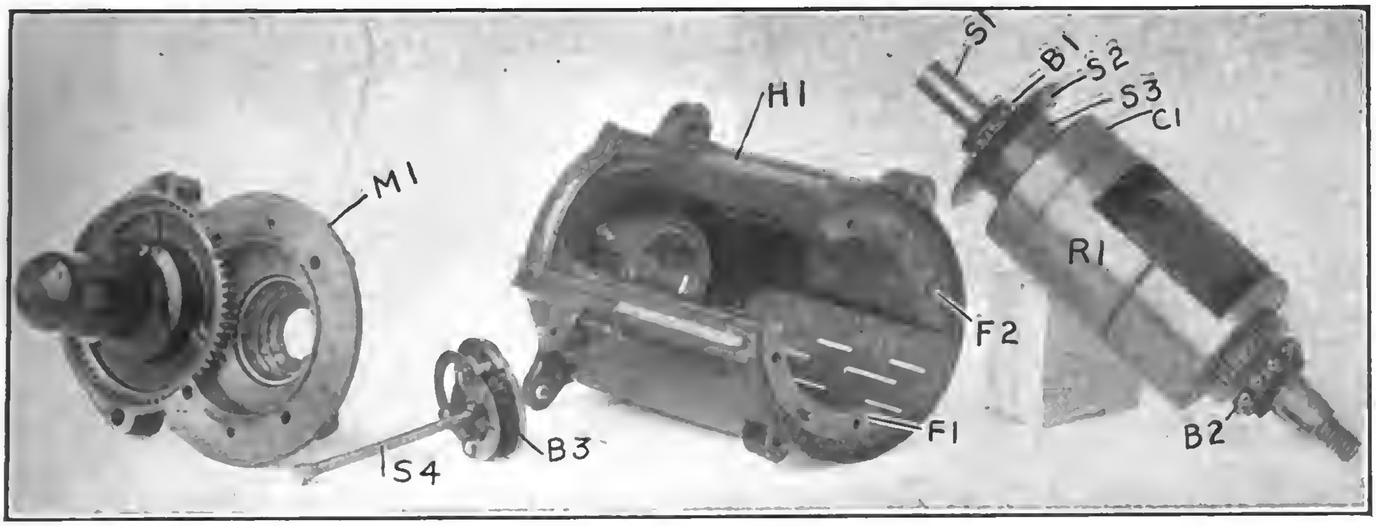


Fig. 4—Components of the magneto after the same is taken apart, presenting the permanent magnets within the housing

Alloys Used As Bearing Metals*

A rather interesting thing about alloys containing sodium is based upon the fact that sodium by oxidation produces a material which will saponify with oil used in bearings.

Investigations have resulted in little progress involving all possible alloys of different materials in different proportions. The recent introduction and placing on the market of a large number of metals, such as calcium, etc., very common in nature, will depress cost, and many of them possess suitable properties for bearing alloys.

COMPOSITION OF BEARING METALS.

Alloys	Lead	Tin	Antimony	Copper	Zinc	Other constituents
Babbitt 1	80.00	20.0	....	....	....	....
Babbitt 2	72.0	21.0	7.0	....	....	....
Babbitt 3	70.0	10.0	20.0	....	....	....
Babbitt 4	80.5	11.5	7.5	0.5	....	....
Babbitt 5	0.5	68.0	....	1.0	31.5	....
Babbitt 6	...	20.0	....	....	80.0	....
Babbitt 7	...	86.0	10.0	4.0	....	....
White metal	82.0	....	12.0	6.0	....	....
White brass	...	64.0	....	2.00	34.0	....
Magnolia metal	80.00	4.75	15.0	trace	....	Bi = 0.25
Car brass lining	80.5	11.5	7.5	0.5	....	....
Ajax plastic bronze	30.0	5.0	....	65.0	....	....
Ajax metal	11.5	11.5	....	77.0	....	....
P. R. R. car brass, B	15.0	8.0	....	77.0	....	P = 0.80
S bearing metal	9.5	10.0	....	79.7	....	....
Delta metal	5.1	2.4	....	92.4	....	Fe = 0.1
Camelia metal	14.8	4.3	....	70.2	10.2	Fe = 0.5
Tempered lead	98.5	0.08	....	0.11	....	Na = 1.30

Bi = bismuth; P = phosphorus; Fe = iron; Na = sodium.

*From *Machinery*.

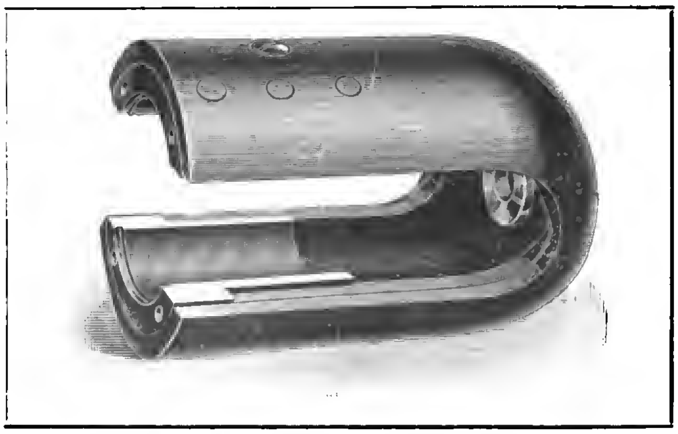


Fig. 5—Showing the shape of the permanent magnet system

Automobile Club of Maryland

Reception Room of Auto. Club of Maryland, Showing Office in the Rear

J H Millikin Pres. — O L Yellott V Pres and Counsel — T. G. Young Treas.

Exterior View Automobile Club of Maryland

H M Luzius Sec — T G Hutchison Asst. Sec

BALTIMORE, MD., May 30.—During the nine years that the Automobile Club of Maryland has been in existence it has steadily grown in importance, not alone to the owners of cars in this city and State, but to the public in general. It has ever stood by those who obeyed the laws and has seen that they have not been unjustly treated by the authorities of certain sections, and it has been severe in its stand against reckless drivers. In carrying out this phase of its work, the club has cheerfully co-operated with the authorities in prosecuting speedists.

In recent years the club has taken a more active part in the business and sporting sides of the automobile. It has been active in advocating laws that are fair; it has promoted two of the most successful shows ever held in the South and it has backed a number of contests, such as endurance runs, sealed bonnet contests, hill climbs and the like. At present it is preparing for a hill climb to be held on the Belvedere Hill in June.

In regard to the Swann Motor Vehicle Law, recently passed by the Maryland Legislature, "the club," to use of the words of its counsel, Osborne I. Yellott, "is strictly on the fence." There are certain sections of the law, however, which, it is known, are not at all to the liking of the club members and the organization is having 5,000 copies of the act printed for distribution among the members. The features of the law which the club does not consider to be for the best interests of the motorists will either be underlined or displayed in the margin. The club has a membership of something like 250 which is increasing.

The Automobile Club of Maryland was organized in the days of the infancy of the motor car, at a time when there were hardly more than a dozen autos in the State. The first meeting was held at the residence of the late James E. Hooper, Jan. 28, 1901. Ten were present and became charter members. James E. Hooper was elected president; C. Warner Sttork, secretary; John W. Garrett, vice-president, and Ernest J. Knabe, Jr., treasurer.

On March 14, 1906, the club held its first meeting in the present quarters, 12 West Mount Royal avenue. On Feb. 26, 1906, it was formally incorporated under the laws of Maryland.

By its by-laws, the objects of the club are declared to be "the promotion of a social organization, composed in whole or in part of persons owning automobiles for personal, business or private use: to afford a means of recording the experiences of members and others using motor vehicles; to arrange for pleasure runs and to encourage the development of the auto as a means of pleasure driving and commercial transportation; to co-operate in securing rational legislation and the formation of proper rules and regulations governing the use of motor cars in city and country, and to protect the interests of owners and users against unjust or unreasonable legislation, and maintain the lawful rights and privileges of owners of all forms of automobiles, whenever and wherever such rights and privileges are menaced; and, on the other hand, to bring about, on the part of club members and auto users generally a proper sense of regard for and obedience to all laws and ordinances on the statute books, so long as they are law; to discourage fast and reckless driving and disregard by motorists of the right of others properly using the highways of the State; to promote and encourage in all ways the construction and maintenance of good roads and the improvement of existing highways, and generally to maintain a social club devoted to automobiling and the interests of motorists."

The club's home is one of the handsomest and best equipped buildings of the kind in the country. The stair landing opens into the two main rooms and into a ladies' room. On the Mount Royal avenue front there is a large reception room tastefully furnished, the color scheme being a light green. Glass doors, which form the front of this room, open upon a balcony, from which one has an extensive view. Immediately to the rear of this room, and communicating with it by a large archway, is the meeting room of the club. The color scheme of this room is red and black. In this room all the latest magazines devoted to motoring are to be found. To the rear of this room are the locker room and bathroom.

One regular meeting for the transaction of business is held on the second Tuesday of the month and a regular social meeting on the fourth Tuesday. On other Tuesday evenings there are informal social meetings.

On the fourth Tuesday evening of each month the entertainment takes the form of talks on the construction or operation of automobiles, illustrated reminiscences of tours by members, or, occasionally, musical or literary programs. Now and then a smoker or card party is held, and almost always the house committee provides refreshments more or less Bohemian in character. These social evenings have proved a great feature in the life of the club.

The club stands for good roads, and is ever ready to do anything that, in its opinion, will advance the cause.

The Automobile Club of Maryland has always stood for the abolishing of toll roads throughout the State.

The club during the past year took up actively the matter of erecting road signs leading to Washington and Belair.

Membership in the club is divided into five classes, honorary members, life members, active members, associate members and associate lady members. The honorary membership is limited to 25 and includes, ex officio, the President of the United States, the Governor of Maryland and the Mayor of the City of Baltimore. The members may elect as honorary members any persons distinguished for their political, scientific, industrial or administrative capacities. Life membership is secured by an active member commuting all his subsequent annual dues by the payment at one time of $250. Active membership is limited to 500 members. The entrance fee is $20 and the annual dues $20. By a recent action of the club the entrance fee has been waived for all persons becoming members prior to July 1, 1910. Persons residing more than ten miles from the City Hall, Baltimore, are eligible as associate members. They are entitled to all the privileges of membership except the right to hold office or vote.

Something over a year ago the club found it would be necessary to have a paid official in charge of the clubrooms. Thomas B. Hutchison was named as assistant secretary to perform such duties. He always has on hand in the clubrooms a full set of maps and route books covering Maryland and other sections. He also has printed copies of the laws of other States and blank applications for licenses or registration. In this and divers other ways the club is keeping up the interest all the time.

Officers: C. Howard Millikin, president; Osborne I. Yellott, vice-president and counsel; H. M. Luzius, secretary; Thomas G. Young, treasurer; Thomas B. Hutchison, assistant secretary.

Board of governors: James Stone Reese, Dr. H. M. Rowe, Joseph M. Zamoiski, Joel G. Nassauer, Edward S. Dickey, H. M. Luzius.

Chairmen of committees: James Stone Reese, house committee; Edward S. Dickey, membership; Thomas G. Young, exhibitions and contests; Joseph M. Zamoiski, runs and tours; Osborne I. Yellott, laws and ordinances; Dr. H. M. Rowe, printing and publication.

Coming Events in the Automobiling World

June 20-July 6....Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.

Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Feb. 13-25, 1911..Chicago Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

June 2...........New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.

June 4...........Philadelphia, Pa., Track Meet of Quaker City Motor Club.

June 4...........Worcester, Mass., Fourth Annual Hill-Climb, Dead Horse Hill.

June 6-14........Atlanta, Ga., Reliability Run to New York City, New York Herald and Atlanta Journal.

June 7...........New Haven, Conn., Hill-Climb up Shingle Hill, Yale University Automobile Club.

June 10-11........Fort Erie, Ont., Track, Race Meet under management of Buffalo interests.

June 11..........Portland, Ore., Road Races of Portland A. C.

June 11..........Wilkes-Barre, Pa., Annual Hill-Climb up Giants' Despair, Wilkes-Barre Automobile Club.

June 14-15.......New York, Reliability Run of Motor Contest Association.

June 14-30........Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, Through the Southwest.

June 16-22.......Albany Automobile Club, Albany, N. Y., Sixth Annual Tour to Atlantic City and Return.

June 18..........Ossining, N. Y., Hill Climb of Upper Westchester Automobile Club.

June 18..........Baltimore Hill-Climb of Automobile Club of Maryland.

June 25..........Port Jefferson, Long Island, N. Y., Hill-Climbing Contest, Automobile Club of Port Jefferson.

July 1-10........ Los Angeles, Cal., Road Carnival of Licensed Dealers.

July 2-4..........Los Angeles, Cal., Speedway Meet.

July 4............Auburn, N. Y., Hill Climb of Automobile Club of Auburn.

July 4............Cheyenne, Wyo., Track Meet of Cheyenne Motor Club.

July 4............Dallas, Tex., Track Meet of Dallas A. C.

July 4............Indianapolis, Ind., Cobe Trophy Race. Held on Speedway Track, Chicago Automobile Club.

July 4............St. Paul, Track Meet of Minnesota State Automobile Association.

July 4............Wildwood, N. J., Track Meet of Motor Club of Wildwood.

July 4............Wildwood, N. J., North Wildwood Automobile Club, Race Meet and Club Run to Track.

July 11..........Plainfield, N. J., Hill Climb of Plainfield Automobile Club.

July, Middle of...Richfield Springs, N. Y., Hill Climb.

July, Middle of...Grand Rapids, Mich., Road Race of Grand Rapids Automobile Club.

July 18-22.......Milwaukee, Reliability Run, Wisconsin State Automobile Association.

July 18-23.......Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.

July 30..........Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.

Aug. 1...........Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.

Aug. 3-5.........Galveston, Tex., Beach Races, Galveston Automobile Club.

Aug. 15..........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.

Aug. 15..........Start of Munsey Tour.

Aug. 17..........Cheyenne, Wyo., Track Meet.

Sept. 2-5........Indianapolis, Ind., Speedway Meet.

Sept. 3...........Wildwood, N. J., Reliability Run of North Wildwood Automobile Club.

Sept. 5...........Wildwood, N. J., Track Meet.

Sept. 5...........Cheyenne, Wyo., Track Meet.

Sept. 5...........Wildwood, N. J., Speedway, Labor Day Race Meet of North Wildwood Automobile Club.

Sept. 17..........Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.

Sept.............Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.

Oct. 1...........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.

Oct. 8............Philadelphia, Fairmount Park Race, Quaker City Motor Club.

Oct. 15...........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.

May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.

June 2-8........Prince Henry (German) Touring Competition.

June 13-18........Scotland, Scottish Reliability Trials.

June 20..........French Voiturette Race.

June 21..........French Stock-Car Race.

June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.

June 27..........Speed Trials at Kiev, Russia.

THE AUTOMOBILE

Vol. XXII | Thursday, June 2, 1910 | No. 22

THE CLASS JOURNAL COMPANY

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231-241 West 39th Street, New York City

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GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

REPETITION of a statement, presenting it as the outline of fact, even though it may not be, gives to it the tone of truth without the substance. How it is possible to be hypnotized into believing that a thing is so, despite the fallacy it conceals, is no more fittingly illustrated than when the question of starting on the spark is given the investigation it deserves, in view of a wide belief in the efficacy of the plan. Scores of correspondents, generously differing with a statement which was made in "Letters Interesting, Answered and Discussed," were all in complete accord, each offering apparently conclusive evidence of the alleged fact that starting on the spark should be regarded as a normal expectation, even though the combustion chamber in each cylinder of a motor is relieved of compression before the effort is made.

There are times when certain types of motors, notably those with four or more cylinders, working four-cycle, will permit of starting on the spark, as it is called, but the best way to ascertain the proper range of this idea lies in giving it a trial under practical conditions, involving enough of the various makes of automobiles to permit of striking an average. In view of the wide interest which seems to be taken in this phase of the autoing situation, the Editor decided to put the idea to test, and a garage was selected which permitted of handling upwards of 100 automobiles, most of which represented the higher-priced products, but, taking it on the whole, they represented a sufficient range of thoroughly good automobiles to make the demonstration thoroughgoing. The result of the test may be stated briefly: Sixty-five automobiles were tried by the chauffeurs who run them, and strange to relate, in view of a persistent tradition, not one of them offered to support the contention that "starting on the spark" is a normal expectation.

It will be fair to state that the attempt was made in the morning as each chauffeur came into the garage for the purpose of taking his car out. Each was accosted and requested to start his car on the spark, rather than to use the starting crank. It may be interesting to observe that not one of them seemed to be oversanguine, but they nevertheless agreed to make the attempt, which proved to be futile in each case. The conditions were normal, nor was the weather cold. A variety of cars were represented.

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IGNITION methods are being refined up to the level of the most fitting requirement, and in step with the progress which is being made in the other departments of the industry, just now the double spark idea is being tried out in racing automobiles abroad, for the most part, but in America to some extent. The method of procedure involves the use of a magneto unit which is provided with a double armature, and a distributor which is so contrived that the two sparks are delivered simultaneously. Two spark plugs are used in each cylinder, they being placed at diametrically opposite points, so that the mixture is ignited from two points of vantage, thus hastening the flaming of the mixture so that there will be less, if any, combustion going on during the period of the power stroke. This plan seems to be good, in that it increases the weight and thermal efficiency of the motor; it also affords a good measure of safety, and it reduces the number of accessory units. Since the double magneto will still furnish one spark, if the part of it which furnishes the other is out of order, it offers a means of dispensing with the customary auxiliary ignition system.

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MOST conspicuous among the motors which have won renown in aviation work are those in which the cylinders revolve in a vertical plane, the motion dispensing with the flywheel and its weight, with water-cooling and with the fan. Air-cooling generally has, of course, received the benefit of renewed investigation in France, where it had been once somewhat lightly discarded. The same is true of the two-cycle principle, and of the double-opposed horizontal motor, and, having let themselves loose, the French designers have taken the step in full and have lately produced a two-cycle, double-opposed horizontal, air-cooled motor which appears to do excellent work. At the same time, the five, seven and nine-cylinder motor with the cylinders placed radially, but not revolving, is becoming popular, and others have turned their attention to the further refinement of the copper-jacketed racing motor and, by thinning its walls and lengthening its stroke, have produced an engine which seems to be less thirsty for an excess of lubricating oil than its progenitor in the automobile racing field. It is hardly conceivable that out of so much activity, most of it directed by the most skilful motor designers in the old world, there should not accrue distinct gains for all motor-employing industries and all motor users, particularly automobilists.

Curtiss Flies From Albany to New York

GLENN HAMMOND CURTISS flew from Albany, N. Y., to New York City Sunday morning, making the trip of 137 miles in 2 hours and 32 minutes' flying time, or at a rate of 1 mile in 1 1-8 minutes, on an average for the flight. Mr. Curtiss in his biplane then continued the trip from the city limits to Governor's Island, completing the exhibition exactly at noon.

En route from Albany he made two stops, the first at Poughkeepsie, where he stayed for an hour, and the other at Inwood Park, which is within the limits of the metropolis, where he remained for 1 hour and 7 minutes.

The start was made at 7:03 Sunday morning under most favorable conditions, and the biplane almost at once rose to an elevation of 1,000 feet over the Hudson River and shot southward at a high rate of speed. At Poughkeepsie a perfect landing was made, 75 miles from the start. Here the supply of gasoline and oil was replenished and 1 hour later the southward course was resumed. The prize trial was concluded at Inwood Park, where further supplies of gasoline and oil were taken on board and then Curtiss gave a complimentary flight for the benefit of New York's millions by traversing the North River clear to the Battery and Governor's Island. The exact elapsed time from Albany to New York was 5 hours, lacking 3 minutes.

On the entire trip, Curtiss used seven gallons of gasoline and about two of lubricating oil.

The trip was undertaken in a successful effort to win a prize of $10,000 offered by the New York *World*. This was paid to the aviator within 3 hours after he landed. Incidentally he wins the Scientific American cup, an emblem offered to the American aviator who made the longest flights. Curtiss had already achieved two flights that exceeded those of his rivals, and the Albany-New York event clinched his ownership of the trophy.

The aviator carried a letter from the mayor of Albany to Mayor William J. Gaynor, bearing good wishes and felicitations. A special train left Albany at the same time as the aeroplane and had much difficulty in remaining in sight of the airship, so swift was the pace set.

Curtiss was elaborately received, and ever since his flight has been the center of attention. He was the guest of honor Tuesday night at a banquet given by the *World* and has been visited by many of the business, social and political leaders of this section.

In forecasting the future of the airship Curtiss told Mayor Gaynor that he believed it would be developed into fishlike form and would attain a speed of 100 miles an hour without noise, supplanting all military and naval force.

The announcement of a $30,000 prize for a flight from New York to St. Louis has been made on behalf of the New York *World* and the St. Louis *Post-Dispatch*. During the banquet tendered the aviator, Mayor Gaynor arose and said that he had been commissioned by the two newspapers to make the offer. The terms under which the award will be given have not yet been framed, but will be in the immediate future.

Oswald Motor Company Expands

SOUTH BEND, IND., May 30—The Oswald Motor Company of Goshen, Ind., has taken steps to increase the capacity of its plant. Two additions will be erected at once, one being 165 by 65 feet, two stories high; the other will be two stories high, 132 by 45 feet. Both additions will be constructed from cement blocks and from $10,000 to $15,000 will be spent for equipment and the present number of employees will be doubled. The company announces that its entire output for 1910 and 1911 has been sold.

The Greater Laporte Good Roads Association has been launched at Laporte, Ind., for the purpose of building good roads out from that city. Officers were elected and committees were appointed to look after the different phases of the work.

No 24-Hour Race for Atlanta

ATLANTA, GA., May 30.—The Atlanta Speedway Association has announced with great positiveness that it will not attempt a 24-hour race this year. Assistant Secretary "Bill" Nye went to the Brighton Beach track to see if there appeared a good chance of making a go of all-day racing at the Georgia capital. His verdict was "no." So work is going on for a local meet to be held about Midsummer. This event will be made up chiefly of amateur races, with a few contests for the local professionals. If properly worked up this event should be one of much local importance.

The local Speedway Association is working hard to get its Fall dates changed to October 27, 28 and 29 and has petitioned the A. A. A. for those dates.

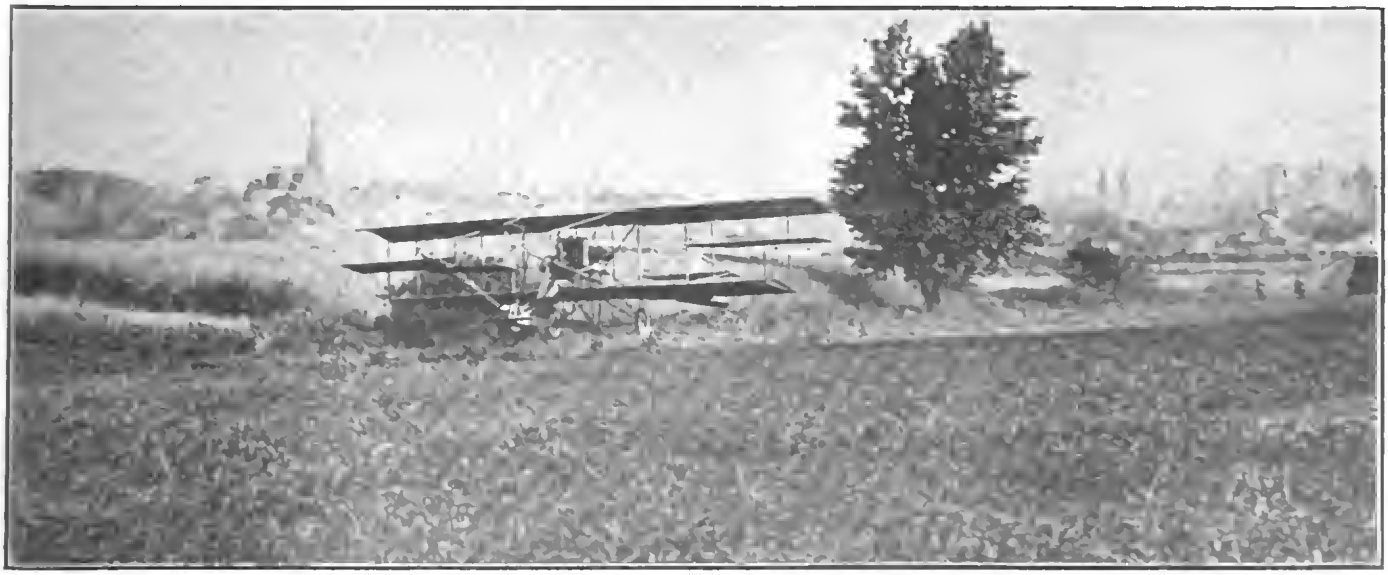


Fig. 1—As the biplane arose from its temporary halting place en route from Albany to New York.

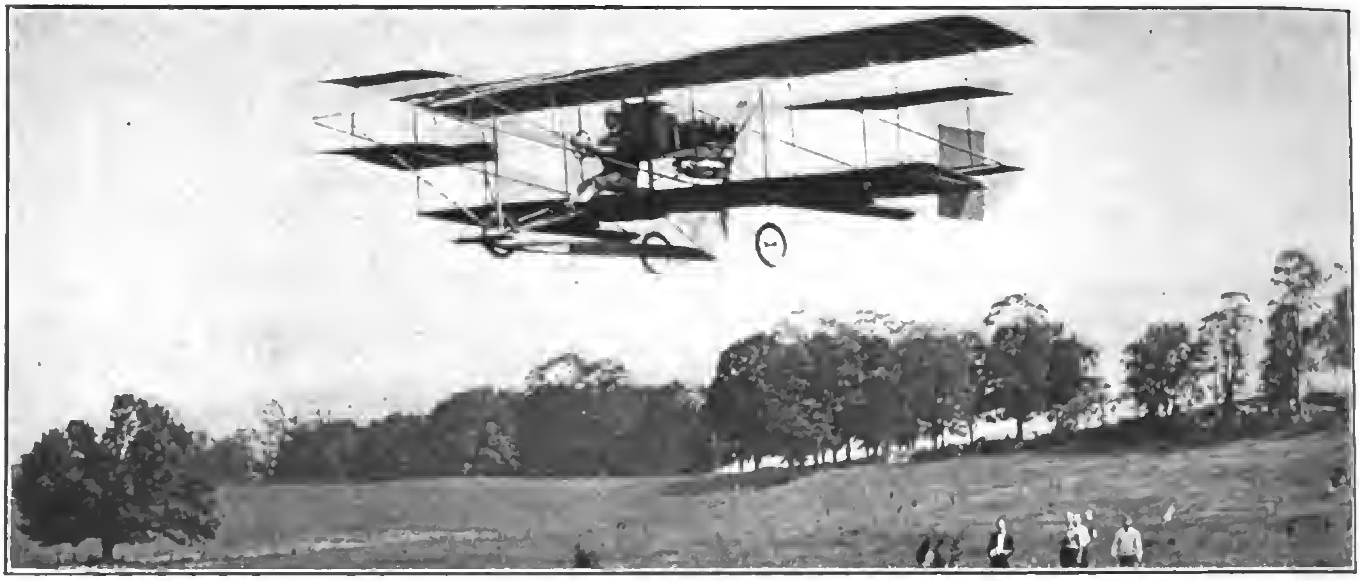


Fig. 2—Aviator Curtiss preparing to make a landing on the outskirts of the city before taking his final flight to Governor's Island

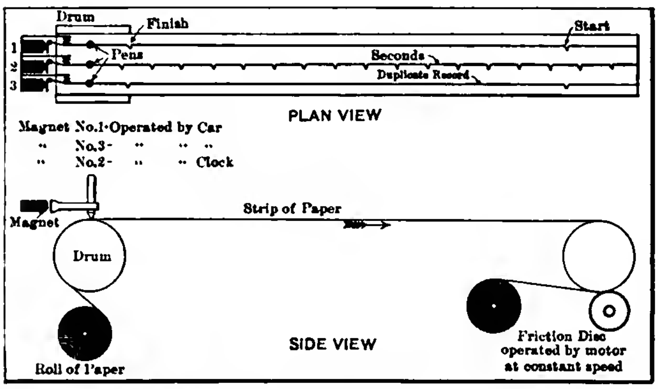
Dead Horse Hill Will Have New Timing Equipment

WORCESTER, MASS., May 30—For the first time in the history of the Dead Horse Hill climb and possibly for the first time in any similar contest, electrical timing of the cars will be made, and the new apparatus will be remarkable for its reliability and accuracy. The apparatus to be adapted for the June 4 contest is from instruments belonging to the department of mechanical engineering of the Worcester Polytechnic Institute, and will be in full charge of Prof. David I. Gallup, who will be assisted by John C. Harvey and C. D. Knights, students of "Tech."

Prof. Gallup's apparatus consists of a roll of paper on a drum driven at constant speed by a small motor and on which are indicated seconds intervals through an electrically connected clock and pendulum, and the speed of the paper is such that a second interval may be made equal in length to 4 in., which will be sufficient to determine time to one-hundredth of a second.

The instant a car passes over the line (either at the start or finish) an electric circuit will be opened by a specially devised snap switch, and this will be indicated on the moving tapes, each of which will be marked with the make of the car and its number, event number and driver, in order that the record may be kept on file.

In order to reduce to a minimum any chances of error, the system will be installed in duplicate, and connections will also be made so that the instant a car crosses the starting line and that of the finish, a series of single-blow gongs, placed at intervals up the steep course, will be rung, so that all the spectators along the course will be enabled to note the time of the car's starting and also of its crossing the finish line, at the top of the hill. The system, so far as it has been tested, indicates a mastery of a difficult situation.



Recording mechanism used in timing cars at Worcester hill climb.

Montreal to Have Aviation Week

MONTREAL, May 30—Official announcement has been made that a world's flying meet will be held at Montreal June 28 to July 4. This will be known as "Aviation Week". The meet is to be held under the auspices of the Automobile and Aero Club of Canada, and will bring together aviators from all parts of the globe, including England, France, Germany and United States.

In addition to aeroplanes, there will be balloon races of the spherical and dirigible type, parachute drops and bomb acts. Many American pilots will take part in the lighter-than-air types of aerial craft exhibitions.

120 Taxis for Orphans' Day Run

Taxicabs to the number of 105 for Orphans' Automobile Day were donated by the New York Motor Cab Owners' Association. If twenty-five more private cars are offered, no child will be left behind this year.

The constituent firms of the association who will donate the taxicabs are the New York Cab and Auto Company, New York Taxicab Company, Universal Taximeter Cab Company, Mason Seamon Transportation Company, Taxi Service Company, Renault Taxicab Company, Kayton Taxicab Company, New York Transportation Company, Haverty Taxicab Company and the Toggart Taxicab Company.

The Connecticut Cab Company already donated fifteen yellow taxicabs and these added to the 105 will make 120 taxicabs in line. This worthy effort on the part of the good citizens is gaining ground from year to year.

Walter J. Gould Meets Death on the Road

The many friends of Walter J. Gould, late assistant superintendent of the Grout Auto Manufacturing Company, of Orange, Mass., will learn with regret that he met his death May 24. The machine was being driven on the State Highway in the town of Merrimack, which is about two miles north of the village of Reed's Ferry. The chauffeur failed to observe a sharp curve ahead and the automobile was going too fast to make it; the car turned over, landing the five occupants on the hard ground with fatal results to Mr. Gould.

The other passengers were more or less severely injured, notably Charles M. Hecker and William Castner. Medical Examiner George M. Davis, of Manchester, was summoned to the scene, and worked over the injured men, but could do nothing for Mr. Gould. Mr. Gould was married and leaves a widow and son.

Busy Week in the Michigan Automobile Center

DETROIT, May 30—Following the epochal news of last week, when the United States Motor Company announced the establishing here of a division headquarters, there has been something going on all of the time.

Five new factories were announced during the week, two for Detroit, one for Wyandotte near by, one for Pontiac and the last for Mt. Clemens, about 30 miles northwest. Of the two Detroit plants, one, the Dayton Airless Tire Company, is moving here with 300 to 500 employees from Dayton, O. Col. J. C. Hooven, of Hamilton, O., is largely interested, while the following Detroiters are officers or directors: Frank C. Van Dyke, president of the Van Dyke Motor Car Company; George C. Clark, its treasurer; S. Olin Johnson, of the Penberthy Injector Company; Wilbur Brotherton, manager of the Jerome B. Rice Seed Company.

The purchase of a fifteen-acre tract of land at River Rouge, within the city limits, is said to mean that that part of the city will soon have a large plant. The automobile concern in question has a car in the city demonstrating its worth, and promises to employ some 100 men at the start, bringing most of them from their present location in Ohio.

The purchase of a seven-acre tract of land at the corner of South Saginaw street and the town line road, Pontiac, by R. F. Monroe, of the Monroe Body Company, is said to mean one more big factory for that town, although Mr. Monroe, when seen, refused to either deny or affirm the report.

At the same pushing town, the General Motors band has been organized, and Mayor Monroe was elected president. Twenty-four men came out to the first rehearsal. The object of the band is to boost Pontiac and incidentally have a good time.

Detroit is vitally interested in the question of exports to Canada, for many of the automobile plants here have Canadian branches, and if the trade would warrant it, many more would establish factories there. That this would be a wise move is shown by the Government's report for the first ten months of the fiscal year, in which the increase over the corresponding period of the previous year was shown to be from $1,123,723 to $3,055,456, a neat little raise of $1,931,733, or 172 per cent.

Many factories are already taking an active part in the plans for the Industrial Exposition, which begins June 20 and lasts until July 6. The Regal Company has invited every Regal agent in the United States to attend the exposition as its guest. The following dealers visited the Chalmers factory recently and made arrangements for their 1911 allotments: Charles S. Snyder, Snyder Automobile Company, York, Pa.; J. W. Gillis, Rochester, N. Y.; L. W. Hodgins, Columbia Garage, Spokane, Wash., and S. S. Primm, Park Automobile Company, St. Louis. On the same day, William T. Taylor, of the Taylor Motor Distributing Company, Philadelphia, visited the Warren plant, and signed up for 1,000 Warren-Detroit "30's" for 1911 delivery.

President John Anhut, of the Anhut Motor Car Company, returned from Toledo last Friday with contracts for 410 Anhut sixes, and options for 440 more. This contract was made with the Ohio Motor Sales Company, of Toledo, distributors for this make of car in Southern Ohio.

The supply of good help is much below the demand, as evidenced in the advertising columns. Just at present there seems to be an unusual demand for draftsmen to work on 1911 models. The Hupp concern is seeking assemblers and engine men; the Packard company body builders and painters; the Metzger Motor Car Company lathe hands, tool designers, other machinists and carpenters; the J. C. Wilson Body Company watchmen, body builders, sheet metal workers and painters; at the Brush Runabout plant, carpenters are in demand; as are machinists and assemblers at the E-M-F plant No. 3; also body builders at the Yeomans Body Company. More than this, several Cleveland firms are endeavoring to reduce the available supply of men by seeking help here to go to Cleveland.

All work and no play make Jack a dull boy, so the workmen are stimulated in their desires to have a good time. In the baseball line, much has been done to further a healthy rivalry between the various automobile factories, this resulting in the formation of two leagues, one being known as the Automobile League, and comprising as members the following: E-M-F, Chalmers, Anhut and Grabowsky Power Wagon Companies. In this league, L. Robert Lilly is president, Frank J. Donahue, secretary, and Thomas F. Manning treasurer. A. G. Spaulding & Bros. have denoted a handsome trophy to the winners of the pennant. The other is a six club league, the members being: Brush Runabout, K-R-I-T, Detroit Lubricator, Dodge Bros., Detroit Radiator and Jos. N. Smith Companies. The league is called the Auto Parts League, and has as its initial officers: S. E. Allo, Brush Company, president; W. R. Webb, K-R-I-T Company, vice-president. Two parks have been secured and another will be before the opening of the season on June 4. On this and each succeeding Saturday, three games are scheduled right through to the first of October, when the League will, in all probability, transfer its energies to football.

Baltimore Club Plans Big Climb

BALTIMORE, MD., May 31—Secretary H. M. Luzius of the Automobile Club of Maryland stated that there would be at least 50 cars in the Baltimore hill-climb on the Belvidere Hill, June 18. A new ruling of the committee will compel each car to carry a full load of passengers, cemmensurate with its capacity.

The timing will be by means of an electric device which will split seconds. Joel G. Nassauer is chairman of the climb committee, the other members being H. M. Luzius and Frank H. Hack, Jr.

June 15 has been selected as the date for Orphans' Day in this city. This event will not be under the auspices of the Automobile Club of Maryland as heretofore, but will be given for the benefit of the little ones by the Baltimore *News*. This paper has taken up the cause of the orphans and already its appeal to motor car owners of the city has met success. Many of them have expressed their willingness and pleasure of loaning their cars for such a purpose. The boys and girls will be taken for a jaunt through the city and suburbs and back to their homes after having a big dinner.

Automobile Notes from Louisville

LOUISVILLE, May 30—More than 200 Kentucky motorists attended the races at the Indianapolis Motor Speedway. Half of this number left Louisville Sunday morning and arrived in Indianapolis the same afternoon. The trip was made in fifty cars under the auspices of the Louisville Automobile Dealers' Association. Carl Reimers was the pacemaker on the 126-mile trip.

Roy C. Packard, an enthusiastic motorist of Pensacola, Fla., arrived in Louisville May 27 after a 1,000-mile trip.

If the plans of members of the Louisville Automobile Club are carried out, Louisville will have a magnificent floral parade on July 4. In order to stimulate interest in the event the following prizes have been offered: First prize, $100; second prize, $60; third prize, $40. No car can enter the parade unless properly decorated.

The route committee of the Louisville Automobile Club have mapped out the second annual reliability and economy contest. The run this year will be through the western section of the State and there will be three days of travel. The exact date of the contest has not been fixed.

Giant's Despair Climb Attractive

Wilkes-Barre, Pa., May 30—Entry blanks for the fifth annual hill-climbing contest up the Giant's Despair course under the auspices of the Wilkes-Barre Automobile Club, which takes place on Saturday, June 11, were sent out to-day. There are to be eleven events and the prizes offered aggregate in value $2,520. The first five events are for gasoline cars varying in size and power and having a piston displacement of from 161 to 230 cubic inches to cars with a piston displacement of from 601 to 750 cubic inches.

The sixth event will be for the $1,000 Hollenback trophy, which has been won once by the Knox Automobile Company and once by the Corbin Motor Company. It has to be won three times by one entrant to become his permanent property. This event is for cars costing between $2,000 and $3,000.

The seventh event is a free-for-all gasoline cars, with a first prize of $250, a second of $100 and a third of $25.

The winner of this event will not be allowed to take part in the invitation or consolation race for all cars, with a first prize of $150 and a second of $50.

List closes at midnight, June 6. The course is now being prepared and is already in fine condition. It is to be patrolled on the day of the race by troopers of the State constabulary and special officers, and will be open for practice for the contestants on the Wednesday, Thursday and Friday before the race. The course is 6,000 feet long, and has a rise of 700 feet with one sharp elbow and the "S" turn and the grades are from 10 to 22 per cent.

The general contest committee includes J. H. Perkins, Guy W. Moore, P. S. Ridsdale, George W. Lewis and T. A. Wright.

Roads for Central New York Relay Run

Albany, N. Y., June 1—Chairman S. Percy Hooker, of the State Highway Commission, writes to the automobile clubs of Central New York, in substance:

"It is the purpose of the State Highway Commission not alone to construct State and county highways, but to see that the town highways are improved in accordance with the amount of traffic they are called upon to carry. Much was accomplished during the year 1909, and still better results are looked for during the present year. The improvement of all the roads in the State cannot fail to increase the values of farm lands to a marked degree.

"I have noticed in certain newspaper articles that special efforts were being made to improve the highways over which the projected relay run will be made, resulting in the neglect of other roads. This is an incorrect impression, and may have arisen from the fact that on the roads which are the cause of these comments, the improvement has been very marked as compared to any other era, and it might naturally be thought that efforts were being concentrated along certain main thoroughfares. Investigation will disclose that such is not the case. In the agreements for the expenditure of highway moneys in every town of the State, the rule was rigidly insisted upon by this department that each mile of road in each town of the State should receive the attention which its importance demands. The purpose of the Bureau of Town Highways is to see that all the town roads of the State receive due attention, and I believe that the roads in general have greatly improved.

"I should regret very much to have the impression go abroad that these roads were especially prepared for this relay run."

(Signed) S. Percy Hooker, Chairman.

Nashville to Have Auto Club

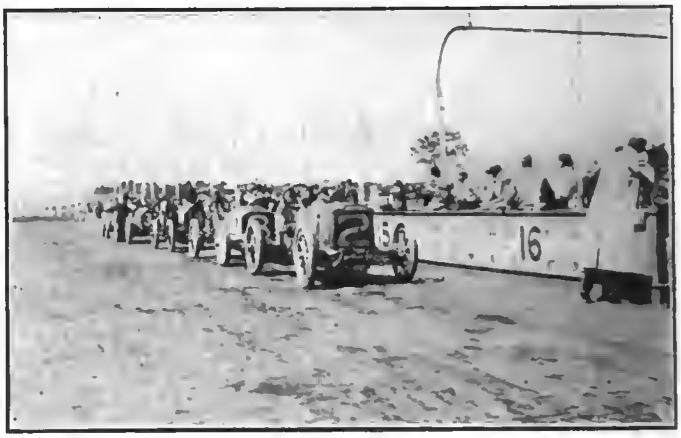
Nashville, Tenn., May 30—Nashville at last has a full-fledged automobile club after several ineffectual attempts. The fact that the Glidden Tour is to pass through here has awakened the auto spirit and brought about the formation of the club.

Records Fall at Indianapolis

(Continued from

Indianapolis, Ind., May 27—The Hoosiers showed they were eager for another taste of speedway racing after a winter spent in discussing the pros and cons of track surfacing, wondering whether or not the brick pavement would come up to expectations in a speed way and whether or not Indianapolis would regain the stock-car marks captured by Atlanta last fall. The results of the afternoon effectually answered these questions in the affirmative. No free-for-all marks were shattered, but in nearly every one of the class events run Indianapolis had the better of the argument with Atlanta.

The new brick surfacing proved fast, and demonstrated that it is not as rough on tires as expected, especially with the smaller cars. The shaving given the bricks by the Overland



Ready for Speed Trials at Indianapolis Speedway

testers proved most beneficial and not a single complaint was heard as to the track.

Wilcox, National, Winning 10-Mile Handicap

The 6,000 people who were in the stands came early and stayed late, and they enjoyed every bit of the racing. While the action of Referee Pardington in ruling out several cars on the ground that they did not come up to the stock car definition shot holes in the program, so to speak, the people did not complain even though these enforced scratches left but three Nationals as starters in one of the races.

Of course, the main event of the afternoon was the 100-mile race for the Prest-O-Lite trophy, won last year by the Buick, but which did not have a chance to defend its title because of Referee Pardington's ruling, which made Chevrolet and Burman sit on the side lines. The Westcott and two of the three Jacksons also came under the referee's ban. This left in the

—W. & S. Cup to Marmon

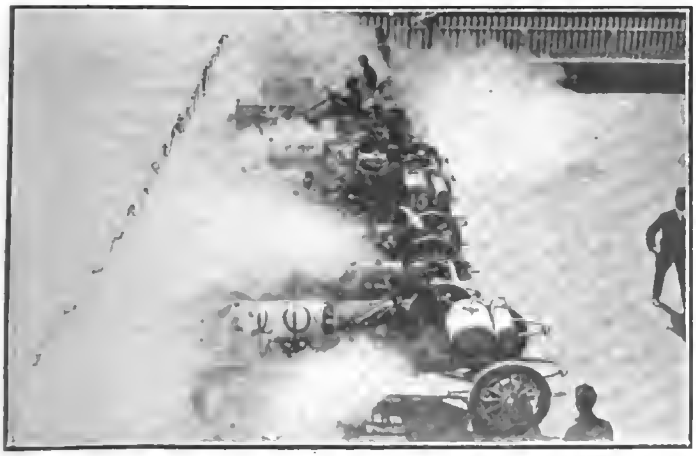
Page 991.)

field Fox in the Pope-Hartford, Aitken, Kincaid and Merz in Nationals, Lynch in a Jackson and Harroun and Dawson in Marmons. Aitken set the pace at the start, but he had plenty of competition, for the two Marmons dogged his heels continually while he was trying to shake the field. This trio formed the first group, while in grim pursuit and some little bit back were Kincaid and Merz.

The first trouble came in the sixth lap when Fox, in the Pope-Hartford, was put out of the running by a broken steering knuckle, which caused him to run off the track on the inside and break a wheel. Neither driver nor mechanic was hurt and the race proceeded. Shortly after this the Nationals began to have tire troubles, so that at the end of 20 miles Dawson's Marmon

Start of 200-Mile Event; Line Up in Front of the Judges

had assumed the lead. At this stage Kincaid, the ultimate winner, was next to last, the Jackson being the trailer. At 30 miles



Start of 10-Mile Stock Chassis Race

Harroun was the pacemaker, closely pursued by Dawson and Merz, while Kincaid was absolutely last. Harroun later lost three laps with valve-tappet trouble, and at 40 miles his team mate, Dawson, was making the running, the Nationals still fighting tire troubles. Dawson continued to pick up the odd seconds and at 60 miles he was 2 minutes 18 seconds to the good, with Merz the runner-up.

When Dawson was two laps ahead he had to stop at the pits for the first time. This was in the thirty-sixth round and an examination disclosed the same trouble experienced by Harroun—valve tappets. It sounded the death knell to the Marmons'

(Continued on page 1024.)

Motor News from Ohio Capital

Columbus, O., May 30—Development in the rubber and tire factories of the Rubber City are coming thick and fast, and during the past week a number of additions and extensions were planned in the tire factories. Hardly a day passes but what a building of some description is planned.

The Firestone Tire and Rubber Company is planning extensive additions to its plant. Last week a contract was let to George W. Carmichael & Company for a new $500,000 plant. The building is to be completed by the beginning of 1911.

The Star Rubber Company is completing a large addition which will double the capacity of the plant. Two buildings were recently added to the plant, each of which is 100 by 50 feet, and other additions have been authorized.

The O'Neil Tire & Protector Company expects to move from its present location in a few weeks to the upper floors of the Adamson Machine Company's plant on West Exchange street.

The B. F. Goodrich Company is making extensive alterations in its plant since completing a number of large additions, and the Diamond Tire and Rubber Company is also making extensive changes. The Goodyear Tire & Rubber Company is not only erecting additions in Akron, but has also built a factory in Canada, the first American firm to build on the other side of the border.

Arrangements are being made for the annual Orphans' Day under the auspices of the Columbus Automobile Club, early in June.

Miss Blanche Stewart Scott, Vassar graduate, of Rochester, N. Y., and Miss May Lyman Phillips, of Boston, who are making the trip from New York to San Francisco in an Overland car, passed through Columbus recently on their way to Indianapolis, where they witnessed the automobile races.

The Anderson Automobile Company, of London, Ohio, was incorporated with a capital of $1,500 to operate a garage by H. Anderson, C. L. Hutchinson, J. L. Graham, George M. Hickle, I. J. Collins and John H. Keller.

The Canton Motor Car Company, of Canton, Ohio, was incorporated with a capital of $50,000 to do a general garage and sales agency business, including dealing in motor trucks, by J. E. Milner, P. E. Mooch, A. E. Mitzel, H. V. Briggle and M. W. Richards, Jr.

Howard & Wilkinson, Central Ohio agents for the Buick and Welch, have taken the agency for the Rapid Commercial car, manufactured at Pontiac, Mich.

Many Enter Dead Horse Hill Climb

Worcester, Mass., May 30—Preparations are being made to accommodate from 25,000 to 50,000 spectators at the annual hill climb of the Worcester Automobile Club, Saturday, June 4, on Dead Horse Hill. The contest is the biggest event of its kind in New England and always attracts an unusual amount of interest throughout that section.

Twenty-one events are carded and the entries to date include the following: Houpt-Rockwell, events 1-A, 9, 16-B, 18 and 19; Buick, event 6-A, driver, Duncan Hooker, Jr.; Buick, 10-model, event 12-B; Alco, events 15-B, 18-B, 19-B, Harry F. Grant, driver; Maxwell in 12-B, Thomas Costello, driver; Maxwell in event 6-A, Martin Doeley, driver; Babcock Electric, event 21, F. A. Babcock, driver; Warren-Detroit, events 6-A and 12-B; Model 100 Marquette, events 9 and 15-B; Fiat-150, in several events with Caleb Bragg at the wheel; Cole 30, in several events and an entry from the Oakland Motor Car Company.

C. Howard Gillette, president of the Automobile Club of Hartford, has been selected as referee.

Toledo, O., May 30—Frederick E. Barker, sales manager of the Willys-Overland Company, will retire from this interest on June 1. His future plans are not announced.

Interesting Items from Buffalo

BUFFALO, May 31—The Dixon Motor Car Company has made extensive alterations and improvements in its store on Main street, Buffalo. The basement of the large store has been cemented and will be used as a showroom and repair department, and an elevator, which will carry the largest makes of motor cars, has been installed. The company is planning to erect a one-story garage in the rear of the store.

The United States Auto Station Company has filed incorporation papers with the County Clerk of Erie, the capital stock being $5,000, to engage in general garage business. The principal stockholder is Frank J. Rohr, of Rochester, N. Y. The other directors are John A. VanArsdale and Warren Willett, of Buffalo.

The Pierce-Arrow Motor Car Company, the E. R. Thomas Motor Company, and F. A. Babcock, are among the contributors to the $100,000 fund being raised by the Chamber of Commerce and Manufacturers' Club for the purpose of boosting Buffalo and attracting large plants and conventions to the city.

A big motor car meet will be held at the Fort Erie, Ont., race-track, just across the river from Buffalo, on Friday and Saturday, June 10th and 11th, under the joint auspices of the race-track management and Buffalo interests.

The work of preparing the track for the races has already been begun.

Chairman Orson E. Yaeger, of the Contest Committee of the Automobile Club of Buffalo, has announced that the club is preparing plans for a 4- or 5-day reliability contest.

Indianapolis' First Day's Events

AMATEUR FREE-FOR-ALL, FIVE MILES

No. Car	Driver	Time
1—National	Greiner	4:09.3
2—National	Tousey	

PREST-O-LITE TROPHY RACE, 100 MILES

1—National	Kincaid	1:23:43.12
2—National	Merz	
3—Jackson	Lynch	
4—Marmon	Dawson	
5—Marmon	Harroun	

TEN MILES, 231 TO 300 CUBIC INCHES

1—Marmon	Harroun	8:16.8
2—Marmon	Dawson	
3—Pope-Hartford	Fox	

FIVE MILES, 161 TO 230 CUBIC INCHES

1—Buick	Chevrolet	4:41.7
2—Cole	Endicott	
3—Firestone	Frayer	

TEN MILES, 451 TO 600 CUBIC INCHES

1—National	Aitken	8:25.9
2—National	Kincaid	
3—National	Wilcox	

FIVE MILES, 301 TO 450 CUBIC INCHES

1—National	Kincaid	4:05.7.
2—Marmon	Dawson	
3—Marmon	Harroun	

FREE-FOR-ALL HANDICAP, FIVE MILES

No. Car	Driver	Hdcp.	Time
1—National	Greiner	scr.	5:44.9
2—National	Tousey	35 sec.	
3—Stoddard-Dayton	Green	scr.	

Records Fall at Indianapolis

(Continued from

hopes, for neither Dawson nor Harroun figured in the fight from this point on. Harroun never got past 80 miles, and at 90 miles Kincaid had the lead with Merz almost 2 minutes behind, while Lynch had worked up past Dawson. This order prevailed at the end, Kincaid winning in 83:43.12; Merz second, 85:44.15; Lynch third, 88:41.07, and Dawson fourth, 93:53.27.

The 5-mile free-for-all for the Indianapolis motor speedway helmet, a new trophy which carries with it a cash prize of $100 and a salary of $50 a week to the holder, brought out a rare field, among which were the two big Buicks with the 6 by 5 1-4-inch cylinders, which had been ruled out of the stock-chassis class; Bragg in the Fiat, Kerscher in the Darracq, Harroun in the Marmon six, Aitken in the new National 70, Kincaid in the six-60, and Lytle in the American. Young Bragg jumped the field from the pistol and had a nice lead of 50 yards going into the backstretch, with Burman in one of the Buicks following. From this point on the race was between these two and it looked as if Bragg held the whip hand. Burman did not gain much on the amateur, who came into the stretch for the last time with three lengths advantage. Then he suddenly slowed and Burman passed him like a flash, landing the helmet comfortably, the Fiat finishing second. It was said spark plug trouble put an effective brake on the Fiat. Burman's time, 3:37.24.

INDIANAPOLIS, IND., May 28—Twice raced for, it was not until to-day that a winner was evolved for the magnificent Wheeler & Schebler cup, said to be worth $10,000 and undoubtedly the most costly cup ever put up for any kind of a sporting competition. Now the first leg on the towering trophy is held by the Marmon people through the plucky efforts of Ray Harroun, of Chicago, who guided the Marmon six-cylinder Wasp 200 miles in 2 hours 46 minutes 32 seconds at an average speed of 73.05 miles an hour, defeating a rare field, which included the best cars now racing on American tracks. Nineteen cars started.

The Jackson, driven by Lynch, went the entire 200 miles without a stop of any kind, while Harroun's Marmon drew up at the pit only once and that was to take on oil and gasoline.

At the gun Arthur Chevrolet jumped out, and for the first few rounds he had a comfortable lead over the field, but Harroun, running on a schedule and as calm as if he were taking a spin on the boulevards, commenced to creep up yard by yard until at the 10-mile post he only was 4 seconds behind the leader At 15 miles he decided it was time to play his hand and at the tape he shot by the 16 B Buick and took the lead. From that point on he never was headed and at no time was he in danger of letting go his hold on the pacemaking position.

At the half century the order was Harroun, A. Chevrolet and Fox in the Pope. From this time on there wasn't much to vary the monotony of the long grind, and when the finish came it showed Harroun two laps to the good, with the other finishers, Lynch, Aitken and Chevrolet, in the order named.

Summary of the 200-mile race for the Wheeler & Schebler Cup.

No.	CAR	Driver	10 Miles	20 Miles	30 Miles	40 Miles	50 Miles	60 Miles	70 Miles	80 Miles	90 Miles	100 Miles	110 Miles	120 Miles	130 Miles	140 Miles	150 Miles	160 Miles	170 Miles	180 Miles	190 Miles	200 Miles
32	MARMON	Harroun	8:18	16:03	23:51	31:38	39:27	47:25	55:30	*63:26	71:33	79:33	89:25	97:18	115:30	113:57	122:16	130:54	139:31	148:18	157:09	166:32
16	JACKSON	Lynch	9:23	18:07	26:52	35:32	44:09	52:45	61:15	69:47	75:18	86:44	95:13	113:43	112:08	120:30	128.54	137:27	145:53	154:31	163:13	171:48
7	NATIONAL 40	Aitken	8:40	16:58	30:01	38:35	47:05	55:32	63:59	72:31	82:55	91:20	99:40	107:56	116:12	124:25	132:38	140:49	148:45	156:36	164:27	173:28
44	BUICK 16B	A. Chevrolet	9:02	17:07	26:47	35:08	43:31	51:43	60:10	69:55	78:26	86:58	95:21	103:50	112:04	120:22	128:49	137:17	148:52	157:09	165:25	173:49
3	POPE-HARTF'D.	Fox	9:05	17:42	26:24	35:06	43:57	52:43	61:26	72:41	81:34	90:33	99:24	107:58	116:19	124:41	133:07	141:34	153:05	161:29	170:00	78 laps
46	KNOX SIX	Oldfield	9:01	17:45	26:25	40:19	48:58	57:05	66:35	75:30	84:20	93:20	102:13	110:49	119:14	127:35	135:59	148:18	156:30	164:34	77 laps	
47	NATIONAL 40	Kerscher	8:49	17:21	25:54	38:38	54:01	62:31	70:49	79:12	90:21	98:42	107:02	115:23	123:44	132:07	140:28	148:50	155:05	153:02	171:38	77 laps
11	NATIONAL 40	Merz	9:04	19:09	29:14	37:53	49:18	58:06	66:54	75:36	84:24	93:11	104:16	113:10	122:05	130:53	139:45	148:34	157:19	166:07	174:51	76 laps
22	CUTTINO	Clarke	9:26	19:06	28:13	37:32	46:44	55:48	64:49	73:50	82:49	91:49	100:48	109:46	118:39	127:34	136:31	145:24	154:16	163:04	76 laps	
18	JACKSON	Ellis	9:02	18:16	27:17	36:25	45:25	54:27	63:34	72:43	81:46	90:57	99:55	109:03	118:13	127:14	136:25	145:24	154:16	173:05	75 laps	
20	CUTTINO	Bisbee	9:39	21:28	30:53	40:15	52:54	65:17	74:48	84:07	93:21	102:44	112:28	122:31	132:47	143:06	153:36	164:21	175:08	68 laps		
41	BUICK 100	Burman	8:14	16:12	24:21	38:08	48:10	60:03	68:47	77:09	85:38	95:10	103:52	113:06	133:10	142:01	154:37					
31	MARMON 32	Keene	9:46	19:18	28:45	68:19	97:46	107:20	116:13	124:30	133:46	145:47	154:30	153:12	171:51	Runni	ng at	finish				
17	JACKSON	Schwitzer	22:59	48:60	58:05	67:03	76:03	85:05	94:02	102:52	111:47	123:06	131:59	140:53	156:27	Out at	52 laps					
21	CUTTINO	Gelnaw	9:48	19:04	28:13	37:35	47:05	58:26	67:42	77:09	86:38	96:13	107:48	117:52	Out at	50	laps					
42	BUICK 100	L. Chevrolet	8:27	20:10	28:51	37:33	48:10	58:26	66:46	75:08												
12	WESTCOTT	Endicott	9:48	19:23	28:54	38:33	48:17	63:26														
30	MARMON 32	Dawson	8:58	17:28	25:53	34:03																
10	NATIONAL 40	Kincaid	8:22	19:15	27:40	36:08	46:15															

*All readings are in minutes and seconds.

—W. & S. Cup to Marmon

page 1023.)

INDIANAPOLIS, May 30.—To-day's events, which were witnessed by 60,000 spectators, were characterized by the breaking of one Speedway record in the mile and kilometer trials, Barney Oldfield, in his 200-horsepower Benz, covering the kilometer in 21.45 seconds, the previous mark being 25.13 made by Caleb Bragg in the 90 Fiat at Los Angeles. In the mile trials Oldfield established a new American speedway record of 35.63 which was under his mark of 36.22 made on the Los Angeles motordome.

In the 160-230 class at 10 miles, Chevrolet with his model 10 Buick set a new mark of 9:03.60, the old figures being 9:49.46. In the 301-450 class, 10 miles, John Aitken in a National 40 went the distance in 7:57.08; former best, 8:08.98. Oldfield broke another record with his Knox Six in the 5-mile event, 451-600 class, going the distance in 4:01.36; former mark of 4:03.24.

Summary of Events of Second Day

TIME TRIALS, 1 MILE FLYING START

No. Car	Driver	Time
1—Empire	Motsinger	107.03 seconds
2—American	Lytle	44.44 "
8—National	Aitken	46.87 "
14—Fiat	Bragg	41.08 "
32—Marmon	Harroun	42.37 "
54—Darracq	Kerscher	41.83 "

10 MILES STOCK CHASSIS, 301-450 CUBIC INCHES

No. Car	Driver	5 miles	10 miles
10—National	Kincaid	4:12.15	8:12.02
9—National	Aitken	4:12.40	8:08.98
30—Marmon	Harroun	4:12.62	8:09.06
11—National	Merz	4:13.05	8:10.14
16—Jackson	Lynch	4:29.37	8:48.81

5 MILES STOCK CHASSIS, 451-600 CUBIC INCHES

No. Car	Driver	2½ Miles	5 Miles
46—Knox	Oldfield	2:09.92	4:03.24
11—National	Herr	2:10.42	4:04.54
9—National	Aitken	2:10.84	4:04.80

CLASS D FREE-FOR-ALL HANDICAP, 10 MILES

No. Car	Driver	Handicap Time	Handicap	Actu'l Run'g Time
11—National	Wilcox	7:15.33	:50	7:16.33
16—Jackson	Lynch	7:18.03	1:25	8:48.03
22—Cutting	Clarke	7:19.00	1:25	8:44
25—Marion	Anderson	7:30.10	1:25	8:55.10
43—National	Greiner	7:34.40	:30	8:04.40
3—Pope-Hartford	Fox	7:35.70	1:00	8:35.70
8—National	Aitken	7:40.72	:25	8:05.72
47—National	Tousey	7:41.14	:50	7:41.64
28—Hereschoff	Geinaw	7:46.95	2:40	10:26.95
4—Firestone	Frayer	7:52.17	2:20	10:12.17
24—Marion	Tinkler	7:57.53	1:45	7:58.98
27—Hupmobile	....	8:06.96	3:40	11:46.96
46—Knox	Oldfield	8:14.65	scratch	8:14.65
5—Cole	Edmunds	8:18.93	2:20	10:36.98
18—Jackson	Ellis	8:19.12	1:25	9:44.12
26—Warren-Detroit	Miller	8:19.85	2:20	10:39.85
21—Cutting	Bisbee	8:26.91	1:40	10:06.91
12—Westcott	Endicott	8:32.86	1:25	9:57.86
1—Empire	Motsinger	8:36.32	2:40	11:16.32
2—American	Lytle	accident	:25	....

Summary of Third Day Events

50-MILE STOCK CHASSIS, CLASS B, 231-300 CUBIC INCHES

No. Car	Driver	10 mi.	20 mi.	30 mi.	40 mi.	50 mi.
33—Marmon	Harroun	8:55.76	17:30.92	26:06.11	34:25.47	42:41.83
34—Marmon	Dawson	9:08.12	17:38.80	26:09.77	34:32.26	42:43.09
3—Pope-Hartford	Fox	8:55.96	17:32.13	26:08.65	34:36.94	43:11.05
29—Great Western	Kincaid	9:40.98	18:40.52	27:42.87	36:43.35	45:47.36
25—Marion	Anderson	9:29.26	18:43.11	27:49.33	36:52.18	45:57.27
26—Warren-Detroit	Miller	10:37.88	20:53.75	33:04.03	43:13.57	17 laps
15—Jackson	Scheifler	13:20.22	22:16.52	31:20.99	made 13 laps	
20—Cutting	Clarke	27:49.91	36:56.86	46:15.02	made 12 laps	

FIVE-MILE CHAMPIONSHIP, 231 TO 300 CUBIC INCHES

No. Car	Driver	Time
1—Marmon	Dawson	4:41.33
2—Marmon	Harroun	4:41.36
3—Marion	Anderson	4:50.59

TEN-MILE CHAMPIONSHIP, 161 TO 230 CUBIC INCHES

1—Buick	L. Chevrolet	9:03.60
2—Buick	Burman	9:14.86
3—Firestone	Frayer	10:32.46

TEN-MILE CHAMPIONSHIP, 231 TO 300 CUBIC INCHES

1—Marmon	Harroun	9:25.31
2—Marmon	Dawson	9:25.34
3—Cutting	Clark	9:25.57

FIVE-MILE CHAMPIONSHIP, 451 TO 600 CUBIC INCHES

1—Knox	Oldfield	4:01.36
2—National	Aitkin	4:01.92
3—National	Kincaid	4:02.28

Automobile Activity Around Boston

BOSTON, May 30—Judging by the manner in which the owners of private cars are responding to the call sent out by Chester I. Campbell, of the Boston Automobile Dealers' Association, for machines to take the blind and crippled children on an outing June 8, the affair will be a big success. In addition to cars some people have sent checks to Mr. Campbell so that he may hire additional machines. The Boston Automobile Dealers' Association has given $150 and members of the Association will supply about 50 machines. It is expected that more than 200 cars will be used on the outing and sports have been arranged for the drivers of machines under the direction of Thomas J. Burke, a famous athlete, who represented America at the Olympic games.

Four garages in Cambridge, just across the river from Boston, were sold last week to motor dealers in Boston and a fifth is now under consideration. They were erected some time ago by a real estate dealer, and were speedily occupied. E. D. Dodge Motor Company, Boston representatives of the Pope-Hartford and Waverley electrics, bought two buildings with 20,000 square feet of land, all assessed for $43,000. A. P. Underhill Company, Knox agents, bought one with 10,000 feet of land for $18,000, and a fourth was sold to A. C. Plummer, who represented a motor company at present not ready to move there. The price was $16,500. The Whitten-Gilmore company are negotiating for another of the buildings which they occupy at present. They are all one-story buildings built purposely for garage and repair work and minus posts.

J. W. Maguire, Boston agent for the Pierce-Arrow, is looking about for a place on which to build a new garage and repair shop, having outgrown his old quarters on Harcourt street.

Plans are under way to have a number of the Bay State A. A. members resume their annual outings to Rye Beach, N. H., where they formerly went early in the summer each year. The date planned is June 17, a holiday in Massachusetts, which comes this year on Friday, allowing a run of at least three days.

The Haynes car is again represented in Boston after a lapse of nearly a year. George H. Hudson, of the Hudson-Colby Company, agents for the Herreshoff, has taken the agency, having Eastern Massachusetts for his territory. C. S. Henshaw, now manager of the Boston branch of the Thomas, formerly handled the Haynes in the Hub.

FIVE-MILE CHAMPIONSHIP, 301 TO 450 CUBIC INCHES

1—National	Aitken	4:06.69
2—National	Kincaid	4:06.73
3—National	Merz	4:07.06

TEN-MILE CHAMPIONSHIP, 451 TO 600 CUBIC INCHES

1—Knox	Oldfield	7:50.75
2—National	Wilcox	7:59.83
3—National	Kincaid	8:00.05

TEN-MILE CHAMPIONSHIP, 301 TO 450 CUBIC INCHES

1—National	Aitken	7:57.08
2—National	Kincaid	7:57.56
3—National	Merz	7:57.61

FREE-FOR-ALL, TEN MILES

1—Fiat	Bragg	7:21.95
2—National	Kincaid	8:01.81
3—National	Greiner	8:26.87

FREE-FOR-ALL, FIVE MILES

1—Fiat	Bragg	3:34.03
2—Darracq	Kirschner	3:48.67
3—National	Aitken	4:05.13

FREE-FOR-ALL, HANDICAP, FIVE MILES

		Hdcp.	
1—Stoddard-Dayton	Reed	54 sec.	3:38.65
2—National	Tousey	54 sec.	3:54.54
3—National	Aitken	27 sec.	3:56.86

FREE-FOR-ALL, TEN MILES

1—Fiat	Bragg	7:02.68
2—Darracq	Kirschner	7:04.80
3—National	Aitken	7:39.18

TIME TRIALS

		Kilo.	Mile
Benz	Oldfield	....	35:68
Benz	Oldfield	21:45	27:1

Suits Settled: Reorganization Coming

TOLEDO, OHIO, May 30—Suits filed against J. N. Willys and the Willys-Overland Company at Indianapolis last Monday have been amicably adjusted and will be withdrawn without further trouble. Two suits were filed, one by P. C. Forbes of Indianapolis, in the County Court, alleging that Willys is a resident of that city, and the other, by Henry F. Campbell, in the Federal Court, claiming that the defendant is a resident of Toledo. Injunctions and an accounting were demanded.

President Willys stated that the difficulty arose because of disgruntled stockholders who have not been in sympathy with the business policy of the concern, and who had offered to dispose of their stock to him for $2,000,000. "This proposition I flatly refused," he said.

"Their actual investment with me was $40,000 and I told them I would not stand to be held up. I offered them $450,000 for their stock in the sales company, but they declined to accept this. I finally compromised rather than engage in prolonged litigation. I now own all but 243 shares of the 20,200 shares of the different companies. These 243 shares are in the possession of the men who are working with me in the company in Toledo.

"I am going to reorganize all the companies into the Willys-Overland of Toledo. The capital of this company is now $2,000,000, of which $1,200,000 has been issued. The other $800,000 is to be issued to the Overland Automobile Co., of Indianapolis, and when that is done, the latter concern will be turned over to the Toledo company, making but one corporation with a capital of $2,000,000, with $100 as the par value of each share."

The Ohio Motor Sales Co., of Toledo, was this week incorporated with a capital of $10,000. The new concern will have the local sales agency for the complete line of Hupmobile cars. Rooms have been secured just off Madison avenue on Erie street, and the place is now being remodeled and put in shape for occupancy within ten days. C. J. Osborn will have charge of the business. William Pratt will be assistant manager.

Amateur Hill Climb in Westchester

(Continued from page 994.)

Summaries of the Races

EVENT NO. 1—CLASS C, SUBDIVISION 1-2-3. OPEN TO CARS WITH PISTON DISPLACEMENT TO AND INCLUDING 300 CUBIC INCHES

No. Car	Driver	1st Try	2nd Try
21—S. P. O.	Thomas N. Cook	1.19 1-5	1.16 1-5
22—E-M-F	H. C. Sierck	1.23 1-5	1.23 4-5
23—Chalmers	A. W. Page, M.D.	1.33 3-5	1.32
24—Chalmers	W. M. Quimby	1.29 4-5	1.29
25—Lancia	C. M. Chauncey	1.25 1-5	1.24 2-5
26—Lancia	J. G. Wilson	1.32 2-5	1.32
27—Lancia	A. E. Gallatin	1.28 1-5	1.25 2-5
30—Premier	J. Thompson	1.34 2-5	1.31 1-5

EVENT NO. 2—CLASS C, SUBDIVISION 4. OPEN TO CARS WITH PISTON DISPLACEMENT OF 301 TO 450 CU. IN.

No. Car	Driver	1st Try	2nd Try
41—Speedwell	H. A. Weatherbee	1.13 2-5	1.12
42—Rainier	P. G. Grant	1.16	1.20 2-5
43—National	J. M. Rutherford	1.05 2-5	1.05 2-5
46—Cleveland	R. M. Jesup	1.23	1.20 3-5
47—Buick	C. H. Jackson	1.13	1.10
48—National	C. D. Goddard	1.21 2-5	1.18

EVENT NO. 3—CLASS C, SUBDIVISION 5. OPEN TO CARS WITH PISTON DISPLACEMENT OF 451 TO 600 CU. IN.

No. Car	Driver	1st Try	2nd Try
52—Locomobile	J. R. Johnson	1.32 4-5	1.21 2-5
55—Mercedes	S. E. Wishart	1.07 4-5	1.05
56—Simplex	G. W. Quintard, 3rd	1.06 1-5	1.05 1-5
57—Stearns	J. D. Tooker	1.15 1-5	1.13 2-5
58—Simplex	C. A. Fowler, Jr.	1.35 4-5	1.14 1-5
59—Palmer-Singer	N. Fowler	1.22	1.17 2-5

EVENT NO. 4—FREE-FOR-ALL, CLASS D. ONE TRIAL ONLY

No. Car	Driver	1st Try
26—Lancia	J. G. Wilson	1.44 1-5
42—Rainier	P. G. Grant	1.24 3-5
43—National	J. M. Rutherford	1.06
46—Cleveland	R. M. Jesup	1.22 2-5
55—Mercedes	S. E. Wishart	1.04 1-5
56—Simplex 50	G. W. Quintard, 3rd	1.04 3-5
57—Stearns	J. D. Tooker	1.11 1-5
59—Palmer-Singer	N. Fowler	1.16 4-5
61—Simplex 90	G. B. Lambert	1.03
52—Locomobile	J. R. Johnson	1.37

EVENT NO. 5—OPEN TO MOTORCYCLE POLICE

No. Officer	Cycle	Force	Time
P2—Munro	Indian	Harrison	1.21 4-5
P3—Ball	Indian	Rye	1.16 2-5
P5—Shay	Curtis	White Plains	1.26
P7—Ruggiero	Indian	Scarsdale	1.07 1-5

Sheridan Hill Climb—Ingenious Handicapping Rules

(Continued from page 993.)

The conditions under which the hill climb was conducted were ideal. The weather was perfect and the hill itself could not have been further improved for the occasion. A large crowd of enthusiasts and interested persons from Fredonia, Brockton, Dunkirk, Forestville and other towns was on hand to witness the contest, while a large party of Buffalonians formed part of the line of spectators on either side of the road.

The system of scoring was so different from the method used ordinarily that it was the subject of general comment. The opinion among the officials who had charge of the event seemed to be that the alteration of some detail in the matter of crediting the contestants on the various sections of the hill might bring about still more equitable conditions as far as the larger cars were concerned. But on the whole, the working of the plan in an event where classification was not resorted to, is considered most auspicious for a beginning of such a revolutionary move.

The extreme steepness of the hill resulted in numerous spectacular features during the climb, and the whole affair may be put down as satisfactory from the viewpoint of the spectator; fairness to the entrants and as a thorough test of the climbing ability of the cars and their general utility in traversing heavy grades under normal and extraordinary conditions.

Points Made Against Cars Under New Plan

NAME OF CAR	H.P.	Cylinder Bore	Piston Stroke	Car Model	Entrant	Driver	Cylinder Volume	Time First Contest Seconds	Points First Contest	Points Second Contest	Final
Ford	20	3¾	4	20	A. Getlen	O. F. Fay	176.7	75 1/5	13,641.24	5,750.0	7,891.24
Marion	35	4¼	4½	Roadster	Mulholland Co.	F. C. Carter	255.3	70	17,871.00	5,750.0	12,121.00
Buick	18	3¾	3¾	10	David Goldsmith	David Goldsmith	165.7	86 1/5	14,283.34	1,880.0	12,403.34
Pullman	30	4⅛	5	O Touring	A. P. Sloan	A. E. Mesler	255.8	75	19,185.00	5,750.0	13,435.00
Overland	40	4½	4½	42	Mulholland Co.	F. J. McDonald	255.3	73	18,848.90	3,660.0	14,188.90
Oakland	30	4	4	30	N. B. Healy	P. K. Johnson	318.1	65 1/2	20,835.55	5,750.0	15,085.55
Buick	30	4½	5	17	Skinner & Nichols	W. T. Nichols	318.1	69	21,948.90	5,750.0	16,198.90
Pullman	35	4½	4¾	K Touring	A. P. Sloan	Robert Weikum	302.2	74	22,362.80	5,750.0	16,612.80
Overland	42	4¼	4½	48	Mulholland Co.	M. Dodds	198.8	72	18,381.60	940.5	17,441.10
Cadillac	30	4¼	4½	Touring	O. F. Fay	O. F. Fay	255.3	97	24,764.10	932.5	23,831.60
Thomas*	40	4¼	4½	Flyer	R. MacDonald	R. MacDonald	468.3	68 3/5	32,125.38	5,750.0	26,375.38
E. M. F.	30	4½	4½	30	Edmunds & Son	E. Edmunds	226.2	83 2/5	18,865.08	524	18,341.08
Thomas*	40	4¼	4½	Flyer	R. MacDonald	R. MacDonald*	468.3	68 3/5	32,125.38	5,750.0	26,375.38

*R. MacDonald drove two Thomas cars of same style, making same score with each.

U. S. Motor Company Absorbs Stoddard-Dayton

DETROIT, May 30—With the news given out here on Saturday last of the absorption of the Dayton Motor Car Company of Dayton, O., by the United States Motor Company, it was also stated that the plans of the latter were complete, and that from now on attention would be paid entirely to the work of getting out cars for next year, for which the plans are unusually ambitious.

The latest company to be absorbed, the Dayton Motor Car Company, is a very large and flourishing one as the estimate of its worth, $2,500,000, will go to show; as well, also, the output for the current year, namely 8,000 cars, ranging in price from $1,500 to $3,500; while this firm also controls the Courier Company (which is included in the sale to U. S. Motor Company), the latter turning out 1.500 Courier cars.

Now, that the organization is complete, the roster shows that it comprises a total of sixteen plants, now built or building. These are: Maxwell-Briscoe Company, five; two at Providence, two at Tarrytown, one at Newcastle; Dayton Motor Car Company, three; two Stoddard-Dayton, and one Courier at Dayton; Brush Runabout Company, two, both in Detroit; Briscoe Mfg. Co., two; one in Detroit, and one in Newark, N. J.; Alden-Sampson Mfg. Co., two; one in Pittsfield, Mass., and one just started in Detroit; Columbia Motor Car Company, one in Hartford, Conn.; Gray Motor Company, one in Detroit.

These sixteen plants now employ 12,500 men, which will be increased to nearly 17,000 for 1911. This large number of employees will be needed to care for the enormous production, relative to which Benjamin Briscoe, the head of the enterprise, is quoted as follows:

"We expect to produce between 50,000 and 60,000 cars for 1911, or a total business of approximately $55,000,000, the employees at the Columbia plant being doubled, those at the Dayton works being increased to such a number as will enable us to double the number of Courier cars now turned out, while all the other factories will be correspondingly increased."

The new Detroit plant for the Alden-Sampson Mfg. Co., which will be the real headquarters of the power wagon end of the United States Motor Company, will consist of one long narrow single story building of reinforced concrete construction, with a smaller separate office building. The main shop building will be 1,000 ft. long by 175 ft. wide. Commenting on the Detroit situation, Frank Briscoe said:

"In the various Detroit plants we will employ over 6,000 men by the first of the year, we are going to build a great big addition to the Brush plant on Oakland avenue that will be shaped like a letter U. Each leg of this will be 1,050 ft. long and the connecting link 450 ft. long, the whole structure being 152 ft. wide, one story in height and of the saw-tooth roof construction, which gives the maximum amount of interior light and convenience for all phases of manufacturing."

Sentinel Trophy Route Selected

MILWAUKEE, May 30—Contestants in the first annual Wisconsin tour for the Milwaukee *Sentinel* trophy, under auspices of the Wisconsin State Automobile Association, will travel one of the most difficult routes ever laid out for a motor tour, according to M. C. Moore, president of the W. S. A. A., who has just returned from the pathfinding tour in a Rambler.

It took Mr. Moore seven days to blaze the trail for the five-day tour. Difficulties encountered at this time, however, will not be faced by the contestants, because the pathfinding was done in May and the tour will be run July 18 to 23, inclusive. The roads which were in poor condition when the pathfinder passed will be entirely different for the tour.

The longest run will be on the fourth day, when 210 miles will be covered from Chippewa Falls to Appleton. The first night control will be Madison; the second, LaCrosse; the third, Eau Claire-Chippewa Falls; the fourth, Appleton, returning to Milwaukee on the fifth day. A schedule of twenty miles an hour will be maintained. Mr. Moore will act as pilot.

The Wisconsin Motor Manufacturing Co., of North Milwaukee, Wis., has increased its capital stock from $100,000 to $200,000.

The Franklin Automobile Co., of Milwaukee, Wis., has filed an amendment to its articles of incorporation changing the name to Franklin Auto & Supply Co. Henry Danischefsky is president of the company. The headquarters are at 321 Fourth Street, Milwaukee. This concern has just taken the agency for the Chase motor truck and has handled the Franklin, Regal, and Babcock electric.

Phillip Kellar, of Kaukauna, Wis., has been granted letters patent on a new type of safety brake for use on motor cars in place of the emergency brake. The appliance consists of two steel shoes which drop to the ground instantly when released, lifting the rear wheels from the ground and compelling the car to slide on the shoes.

The Abresch-Cramer Auto Truck Co., of Milwaukee, Wis., has moved into new and larger quarters in a five-story reinforced concrete structure.

Clubmen Finance Road Repair

RICHMOND, VA., May 30—The Richmond Automobile Club, through a committee composed of Dr. Angus Nichols, R. B. Alport and E. C. Pelouse, donated $600 to the road supervisors of Chesterfield County, Va., for use in completing the road improvements between Petersburg and this city.

The macadamizing of the thoroughfare has been completed all but about three miles, and the donation is to be used for this stretch.

Members of the club state that they would have given a larger amount, but they recently became discouraged by the frequency of arrests for alleged violations of the speed laws, made by county authorities. It is understood that the rulings of the authorities are to be modified.

Quite a number of motorists here met the advance cars in the Washington *Post* Test Run when they arrived to-day, and the Richmond Automobile Club turned out with a car bearing the club officials. The contestants were welcomed to the city. and entertained for some time before the return trip to Washington.

Clubmen Work Hard on Roads

SIOUX FALLS, S. D., May 30—Automobile owners of Pierpont, Day County, S. D., have demonstrated what can be accomplished by a practical good roads campaign. Every morning for the past two weeks a big delegation of autoists left Pierpont in autos for the country roads which lead to the town, equipped with picks, crowbars and shovels. As a result the little town of Pierpont is approached by one of the finest road systems in the country and one that is bringing this section much notice throughout motordom of the adjoining States.

The Beloit (Wis.) Automobile Club plans to hold its first annual sociability tour of two days in June. It is planned to run to Janesville, Jefferson, Watertown, Waupun, Waukesha and Milwaukee on the first day, returning via Racine, Kenosha, Geneva, Delavan and Janesville on the second day.

Good Roads Tour Offers Great Promise

WITH a Columbia, Gordon M. Wagner will be pacemaker for National Good Roads tour, starting from Atlanta June 6 and finishing at New York June 14. With the mails of Tuesday and Wednesday still to be accounted, the entry list now contains sixty-two contesting and eight official cars. The entry box closed June 1. The list is as follows:

OFFICIAL CARS (NON-CONTESTING)

Entrant's Name and Address	Make of Car
James R. Gray, Atlanta	Pierce Arrow
Major John S. Cohen, Atlanta	White Gasoline Car
R. H. Johnston, the White Company, New York	White Steamer
Matheson Automobile Company, New York	Matheson "Silent Six"
Ray M. Owen, for R. M. Owen & Co., New York	Reo Roadster
Columbia Motor Car Company, New York	Columbia
A. D. Corwin, Buick Motor Company, New York	Welch-Detroit
Ajax-Grieb Rubber Company, New York	Lozier (Briarcliff model)

CONTESTING ENTRANTS

Entrant's Name and Address	Make of Car
Beaumont Davidson, Atlanta	Packard
W. J. Stoddard, Atlanta	National
Colonel J. J. Woodside, Atlanta	Thomas
R. E. O'Donnelley, Atlanta	Packard
Joseph F. Gatins, Jr., Atlanta	Knox
Edward M. Durant, Atlanta	Pope-Toledo
W. S. McNeil, Jr., Atlanta	Lambert
Regal Motor Car Company, Detroit, Mich	Regal
W. T. McNinch, Atlanta	Lambert
Atlanta Motor Car Company, Atlanta	White Star
Jackson P. Dick, Atlanta	American Traveller
Maxwell-Briscoe Motor Company, New York	Maxwell Touring Car
Edward H. Inman, Atlanta	Simplex
C. W. Dupre, Marietta, Ga	Maxwell
Charles I. Ryan, Atlanta	Columbia
W. E. Wimpy, Atlanta	Buick
J. H. Marsteller, Roanoke, Va	Chalmers-Detroit
Forest Adair, Atlanta	Stevens-Duryea
E. M. Willingham, Atlanta	Ford
N. W. Wallace, Charlotte, N. C	Hupmobile
P. S. Arkwright, Atlanta	Pope-Hartford
A. Burwell, Jr., Charlotte, N. C	Firestone-Columbus
Brush Automobile Company, Atlanta	Brush
Kelly-Knight Motor Car Company, Atlanta	Kissel-Kar
Arthur T. Smart, Atlanta	Speedwell
Georgia Motor Car Company, Atlanta	E-M-F
Mrs. Elizabeth A. de Giers, New York	Thomas
E. D. Crane & Co., Atlanta	Firestone-Columbus
W. D. Alexander, Atlanta	Stoddard-Dayton
Asa G. Candler, Jr., Atlanta	Lozier
Maxwell-Briscoe Company, Tarrytown, N. Y	"Baby" Maxwell
John W. Grant, Atlanta	Locomobile
E. D. Crane & Co., Atlanta	Hupmobile
T. H. Cooper, Salem, Va	Corbin
C. H. Johnson, Atlanta	Stevens-Duryea
Georgia Commission Company, Albany, Ga	Halladay
John Moore & Co., New York	Brush
Herman J. Haas, Atlanta	Winton Six
J. E. Brown, Atlanta	Selden
S. M. Smith, Bluefield, W. Va	Speedwell
Dr. E. C. Seawright, Fayetteville, Ga	Ford
C. D. Smith, Albany, Ga	Jackson
Julian H. Reynolds, Augusta, Ga	Maxwell
L. S. Brown, Athens, Ga	Mitchell
Roy Collier, Atlanta	Thomas
Mercer Automobile Co., Trenton, N. J	Mercer
W. G. Humphrey, Atlanta	Pullman
Ohio Motor Car Company, Cincinnati, Ohio	Ohio
Pullman Motor Car Company, York, Pa	Pullman
Carter & Logan Brothers, Savannah, Ga	Cole
A. P. Herrington, Atlanta	Reo
Robert Campbell, Cedartown, Ga	Oakland
D. K. McColl, Bennettsville, S. C	Cadillac
J. L. Henderson, Hampton, Ga	Stevens-Duryea
M. L. Thrower, Atlanta	Ohio
Marcellus Rambo, Birmingham, Ala	Columbia
Good Roads Committee, Winston-Salem, N. C	Buick
R. D. Apperson, Lynchburg, Va	Palmer-Singer
R. G. Scruggs, Waycross, Ga	E-M-F
W. P. Walthall, Atlanta	Moon
Mayor Gaston Gunter, Montgomery, Ala	White Gasoline Car
W. H. Peacock, Cochran, Ga	Cadillac

Asks Court to Withdraw Reward

WILMINGTON, DEL., May 30—If the Delaware Automobile Association can induce the Levy Court of New Castle County to withdraw a standing reward offered by the court some time ago, of $15 for the arrest and conviction of automobile drivers who exceed the speed limit, it is the belief of the officers of the association that its new plan for enforcing the law can be made successful.

The association took the matter up with the Levy Court at its last meeting, requesting a withdrawal of the reward, temporarily at least, on the ground that it is an incentive to activity on the part of unscrupulous officers and others who might be guilty of persecution, in order that the association may carry out its policy of dealing with offenders in an orderly and systematic manner.

Some time ago the Levy Court agreed to share with the association, to the extent of $150, the expense of tripping up and punishing speeders, and under this agreement the association has mapped out measured stretches in several different parts of the county, the locations known only to the association officers, and there are watchers, who are also unknown, except to the officers. These watchers have reported a number of violations and the violators are receiving warning notices, and if they do not heed these they will be prosecuted. The plan is working well, but there is an indication of its being interfered with by the standing reward.

The Levy Court has taken the matter under advisement and will probably give an answer next week.

Callan Bill Signed by Hughes

ALBANY, N. Y., June 1—Governor Hughes signed the Callan bill yesterday. The bill provides registration of automobiles and licensing of chauffeurs, and it is estimated that the revenue to be derived from its operation will be in the neighborhood of $1,500,000 annually. The new law goes into effect August 1.

Hoosier Automobile Items

INDIANAPOLIS, IND., May 30—A receiver has been appointed for the Indiana Motor and Manufacturing Company, which has its principal offices in this city and its factory in Franklin. The Security Trust Company has been named as receiver. William H. Freeman, a stockholder, claims indebtedness of $750.

Inability to get parts to complete several hundred cars that are ordered is said to be responsible for the company's difficulty. It is said that the company has orders for about 700 cars, which it cannot fill and deliver from lack of parts. John E. Billheimer, Auditor of State, is president of the company.

The Cole Motor Car Company has leased the building at 820-822 East Washington street that has been occupied by the Reliable Auto Exchange. The building is 50 by 200 feet, three stories high and fireproof, and will be used by the Cole Company for painting and finishing.

The Reliance Motor Truck Company, of Owosso, Mich., has opened a sales branch here, taking temporary quarters with the Buick Motor Company in East New York.

The Wilcox-Clemens Auto Company has moved into new quarters at 19 W. Ohio street, in a building just completed. The company has the agencies for the Speedwell and Clark cars.

This city was a control last Tuesday for a "Roadability" run given from Terre Haute to Indianapolis and return, under the auspices of the Terre Haute Motor Club, the prize being a trophy offered by the Terre Haute *Tribune*. There were nineteen contestants, no attempt being made at speed, the plan being to finish closest to a secret schedule. One of the contestants was Paul Cox, a fourteen-year-old boy, who drove an Overland car. The distance was 144 miles for the round trip.

Club Will Improve Highways

NEBRASKA CITY, NEB., May 30—An automobile club was formed here last week, the object of which is to promote good roads. An effort will be made to secure every autoist.

Kingston Welcomes New Automobile Maker

KINGSTON, N Y., May 30—W. A. Wood Automobile Manufacturing Company, a new corporation of the State of New York, is about to enter the automobile manufacturing field for the manufacture of high-grade pleasure cars and trucks. They have purchased the Peckham Car & Truck Company's plant at Kingston, N. Y., comprising seven acres of ground, with five buildings fully equipped with machinery and power plant, the main building being 325 x 75. The plant is situated on the junction of the West Shore and Ulster railroads, and has three separate branch tracks entering the plant. Some changes of equipment will be made to adapt the plant to the special work in hand, and these are under way, and the plant will add its contribution to the production of cars for 1910. The production will be high-grade pleasure cars, 30 to 60 horsepower, in every style, with chain or shaft drive, and a 30 horsepower chassis for runabout or touring car or town car service. An important part of the production of the new plant will be the manufacture of high-grade commercial trucks, and for this purpose an arrangement has been made with the Commercial Cars, Limited, of England, manufacturers of the Commer truck, for the reproduction of this truck under the existing designs, with slight modifications, adapting it to American use. The sample new truck was received from the Custom House last Friday at 4.30, made its initial trip to Poughkeepsie that evening, arriving at 10.30, and in the morning proceeded to Kingston. The new model for the production of touring cars is also ready for duplication.

The city of Kingston gave the new industry a rousing reception at the Armory on Friday evening under the auspices of the Kingston Chamber of Commerce. The hall was filled with enthusiastic business men. An address of welcome was made by the Mayor of Kingston, followed by congratulatory responses from representatives of the city and of the new industry.

The project is regarded as something more than a mere civic gain to the community by the progressive citizens of the city.

Fig. 1—The new automobile which brought about the demonstration and is the basis of manufacture

Fig. 2—The commercial truck which will have a place in the large new industry

Auto and Aero Club Elects Officers

MONTREAL, May 30—The annual meeting of the Automobile and Aero Club of Canada was held on Saturday and the following officers elected for the ensuing season: President, F. H. Anson; vice-president, L. C. Rivard; secretary-treasurer, G. A. McNamee; directors, J. A. Mackay, H. W. Pillow, C. F. Smith, Duncan McDonald, A. L. Caron, A. J. Dawes, Wm. Carruthers, and Eugene Tarte.

The question of establishing a country clubhouse was brought forward and a committee appointed to look into the matter.

Much has been accomplished in the matter of road improvement. The chief work of the club, the improvement of the International Highway between here and Rouse's Point will be continued this year. The distance is 50 miles. It is estimated that thousands of dollars are lost to the country each year through the bad road between St. John's and Rouse's Point, which prevents many automobilists from coming to Canada. The club hopes in time to persuade the government to establish a State road through this district.

Ground Broken for Velie Plant

MOLINE, ILL., May 30—Ground has been broken for the new plant of the Velie Engineering Company. The building will be located between Third and Fourth avenues and east of Twenty-fifth street. The present plans contemplate a building 600 feet long, 4 stories high and 80 feet in width. It will be of reinforced concrete similar to that occupied by the Velie Motor Vehicle Company. The new corporation has secured sufficient ground for four buildings of the size mentioned.

Publicity for New Association

Letters asking for financial support to the recently formed Association of Motor Car Manufacturers have been sent out pretty generally by the legal representatives of that body. The following is a copy of a circular letter signed by Henry C. Walter, Detroit, under date of May 19.

"In view of the fact that you were invited to attend meetings held in Detroit, for the purpose of taking steps looking to united action on the part of the independent manufacturers of automobiles, in combating the unfair methods of the A. L. A. M., you are informed that all plans were perfected on Monday last. Numerous counsel have been engaged, and action started along the general lines suggested in my previous communications.

"The companies that have been sued, most of which were represented, have decided to pay all the expenses of the present litigation.

"If those that have not yet been proceeded against care to contribute to a fund to be devoted solely to educational advertising, they may remit such amount as they desire to J. B. Chaddock, Treasurer Finance Committee, Association of Motor Car Manufacturers, Moffat Building, Detroit, Mich. Remittances may be made by companies that are not members of the association. From $250 to $500 from each company will be acceptable.

"I send you under separate cover a copy of a full-page newspaper advertisement now being run by the A. L. A. M., which should prove of interest to you.

"(Signed) HENRY C. WALTERS.
"Special Attorney, Association of Motor Car Manufacturers."

In the Realm of the Makers

R. H. Johnston has been appointed manager of the New York branch office of The White Company and will enter upon his new duties at once. Mr. Johnston has been advertising and publicity manager of the company since the early days of the industry and his numerous activities in that position have made him well known to the motoring public. Under the pen names of "Pathfinder" and "Pioneer" he has been a frequent contributor to the magazines on touring subjects. He has devoted much time to searching out and describing touring routes, and the information thus secured has been issued in the form of the White route books, which have proven exceedingly useful and popular.

Mr. Johnston entered the services of The White Company in time to take part in the famous New York-Pittsburg endurance run of 1903 and he has been active in tours and public contests ever since that time, frequently serving as an official. He has also been an active factor in the cause of good roads and has been closely identified

R. H. Johnston, New York Manager of the White Company

with the movement of building a national highway between New York and Atlanta. He was one of the prime movers in the New York Motor Club, now defunct, and the entertainments which he organized and presided over have not yet been forgotten.

Two years ago Mr. Johnston brought a test case to determine the rights of non-resident motorists in the State of New Jersey. Although the Supreme Court of the State finally decided against him, the litigation served to emphasize the unjust provisions of the original Frelinghuysen law, and that law was thereupon amended and modified in several important particulars.

Mr. Johnston was born and bred in New York and thinks that Broadway is the garden spot of the universe. When he moved his office from New York to Cleveland last Fall there were many who predicted that he would soon return—a prediction which events have verified. There will be a host of friends to welcome him back.

Moon Automobiles Doing Missouri Roads

Among the Various Agencies

The Vale Automobile Company, of Beloit, Wis., is handling the Marion.

Rix & Company, of Calgary, B. C. are named as the Winton agents in that vicinity.

The Selden Automobile Company has opened a Pittsburgh agency at 320 Liberty avenue.

The American Garage in East Market street, Indianapolis, has taken the agency for the Royal Tourist.

Joseph Striker has just been added to the local sales force of the Buffalo agency of the Franklin Automobile Company.

The Ferromatic Tire Company, of Kansas City, Mo., has established its principal headquarters at Manitowoc, Wis.

The Southern Vehicle & Auto Company, of New Orleans, has taken the agency for the Lozier line of cars for that city and vicinity.

The Automobile Equipment Company has taken on the agency in Baltimore for the Kissel Kar. The firm is located at 2207 Madison avenue.

Barrett Bros., of Albany, Ore., have secured the agency for the Overland cars. White & Scheer have secured the agency for the Overland at Canby, Ore.

The Smith Auto Company, of Birmingham, Ala., has contracted for the Halladay line, manufactured by the Streator Motor Car Company, of Streator, Ill.

H. M. Meyer, Pittsburg, has been given the agency for the Automobile Air Shock Absorber in that city. Edgar A. Dossert, Philadelphia, has been appointed the agent for that vicinity.

The Mitchell-Lewis Motor Company, of Racine, Wis., has started construction work on a large warehouse of steel, concrete and brick. The building will be two stories high and will be used to store finished cars awaiting shipment.

D. D. Cummings, of Minneapolis, Minn., has opened a public garage in the Bailey building at Ashland, Wis.

The Sawyer Implement Company, of Sturgeon Bay, Wis., is equipping a part of its building into a garage, which will be in charge of Edward Hunt, an expert motor car mechanic.

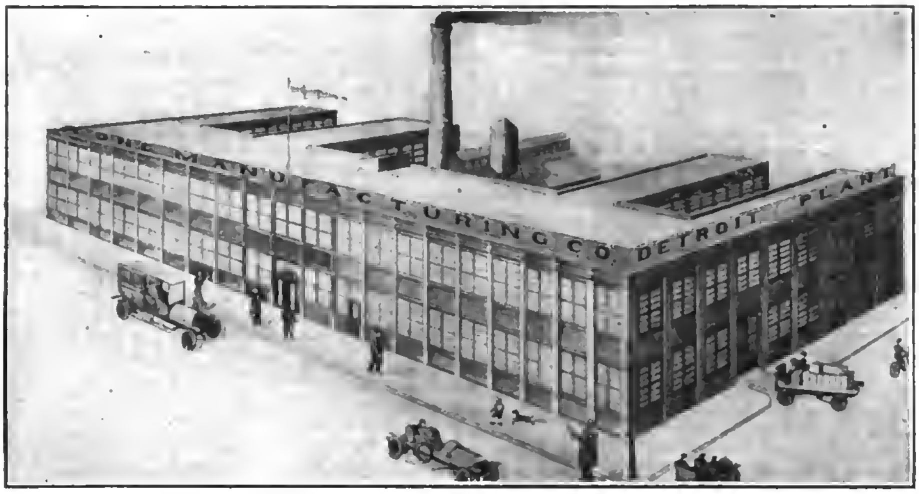
The Inter-State Automobile Company, of Muncie, Ind., is highly pleased with the showing of its Class B entry in the recent Harrisburg run. The car was awarded first prize in that class.

E. E. Short has opened an agency for the Inter-State in Indianapolis under the name of the Interstate Motor Sales Company and has located at Fort Wayne avenue and Tenth street.

The Findlay Motor Car Company, of Findlay, O., was this week incorporated by A. L. Welch, M. C. Mulball, Roy H. Hunter, J. C. Brooks and S. Gilfether. It will have a capital stock of $300,000. It is expected that the company will get under way shortly and push things to the limit.

The E-M-F Company is planning to establish a branch in Omaha for the E-M-F and Flanders cars. If this is done it is announced that a large new building will be erected here this Spring.

C. C. Hildebrand, Assistant General Manager of the Chalmers Motor Company



New Long Radiator Plant at Detroit, Mich.

Frank J. Flanigan has established a Simplex agency in Seattle. His agency contract covers the States of Washington and Oregon, and Seattle will be the distributing headquarters.

The Chittenden Motor Car Company has taken the Buffalo agency for the Lion motor cars. All business done in the handling of these cars will be under the name of the Lion Sales Company.

The Brooke Automobile Company, of Kansas City, has opened an agency in Omaha at 2318 Farnam street, under the management of Paul C. Gee. The company handles the Lexington car.

Charles W. Larson has purchased the garage at 524 West Main street, Waukesha, Wis., and will operate it under the name of Auto Supply Company. Mr. Larson has the agency for the Overland.

The Shaffer Manufacturing Company, agents for the Pullman car, will erect a new garage at 408 North Calvert street, Baltimore.

The Champion Company, a Boston concern engaged in the manufacture of spark plugs for automobiles, will remove to Toledo. The machinery for the company is expected to arrive in a week or ten days. The concern will supply spark plugs for the Willys-Overland Manufacturing Company.

Lee Counselman, Vice-President and General Manager of the Chalmers Motor Company

O. H. Hansen and Theodore Tellefson have leased the Scobie Building, at Cambridge, Wis., and will open a garage and salesroom for the Buick, Ford, Oakland, White and Oldsmobile.

Mortimer Reeves has been appointed contest manager of the United States Motor Company. Mr. Reeves is a brother of Alfred Reeves, general manager of the A. L. A. M.

H. E. Halbert, proprietor of the Garfield Park Automobile Garage, Chicago, denies the reports that have been circulated that he has sold the property or contemplates any change in its management.

The Streator Motor Car Company, of Streator, Ill., commenced the erection of two machine shops, each 75 by 400 feet. These buildings are to be of the latest mill construction, and machinery is already on the ground for equipping them throughout.

Hockaday Brothers have opened a motor supply house in temporary headquarters at Wichita, Kas., having disposed of their department of bicycles and sporting goods. L. C. Graham has been engaged as manager of the firm's auto accessories department.

The General Tire Company, of Cincinnati, was incorporated recently with an authorized capital of $10,000, to deal in automobile tires and accessories, with A. V. Boettles, J. H. Marvin, Phil Eid, A. J. Braumvart, Jr., and John L. Boake as incorporators.

The Michelin Company has discontinued the retail department of its tire agency in Buffalo, and attention will now be devoted exclusively to the wholesale trade. The retail business has been placed in the hands of the Chittenden Motor Car Company, located at 906 Main street, Buffalo.

General Trade News.

Owners of automobiles in Buffalo have been informed that the Board of Aldermen of Nunda, N. Y., has adopted a speed limit law. Vehicles are limited to 10 miles an hour through the village. Any violation will be punished by a fine of not less than $5 nor more than $50.

The Taxicab Co. of America has purchased the building formerly used by the Henkel livery, Detroit, and is equipping it as a garage. The Henkel barn recently was the scene of a dispersal sale of horses and cabs, the business being given up as no longer profitable, since the advent of the taxicabs.

E. B. Finch has resigned as manager of the technical department of the Chalmers Motor Company, to become Cleveland distributor of Chalmers cars. Last Monday his fellow employees and the company joined in giving him a farewell dinner, at which time he was presented with a fine shotgun as a testimonial.

J. B. Long, President of the Long Manufacturing Company

The Cole Motor Car Company, of Indianapolis, has reorganized the Chicago sales and distributing agency. G. W. Stephens and F. S. Cropley have formed a company to be territory distributors of the Cole 30, and will be temporarily located in the Standard Automobile Company. In the near future they will remove to much more commodious quarters.

Michelin Tires on Winners—In the equipment of the first, second, third and fourth cars to finish in the Wheeler and Schebler and Prest-o-Lite contests on the Indianapolis Speedway, were included Michelin tires. On the Marmon winner and the Jackson car which finished well up, no tire changes were required in the former event. On almost all the cars that won national championships in the Decoration Day events the Michelin tires were in evidence.

Prominent Automobile Accessories

ELECTRA SPARK PLUG

It may not be generally understood that the electromotive force, which is available from a magneto or a coil, is limited by the breakdown potential of the spark plug. If the spark plug will not stand up against the electromotive force of the magneto, it will be necessary to decrease the distance of the gap in the spark plug to protect the same, but it must not be forgotten that this very process is the one which limits the electromotive force of the magneto. It has not been difficult to design magnetos for high potentials; it is even possible to realize 30,000 volts, but it is quite another question to so design a spark plug as to be able to use these higher potential ways. The illustration here offered shows two types of the "Electra" spark plug, the one to the right being a modification of the standard form, somewhat lower in price, and is offered here for what it is worth. The section to the left is the standard form, in which A is the main insulator of porcelain, surrounding the electrode Q. B is the enlarged portion, which offers two abutting faces for the soft packing C1 and C2.

This packing is asbestos in character, enveloped in copper sheathing. D is a protecting insulator, also of porcelain, and the threaded portions E and F serve as the housing, F being reduced to the proper size for screwing into the cylinder. The terminal H offers a neat and substantial way out of the customary difficulty, and affords a substantial means of connecting the high potential leads to the spark plugs. This spark plug is used in France, and is about to be introduced to American autoists by M. Volpé, 136 Liberty street, New York. This type of spark plug is used in conjunction with magneto and other ignition work on divers of the better grades of foreign automobiles, and it is expected that it will prove of more than a little value on exacting American work of this character.

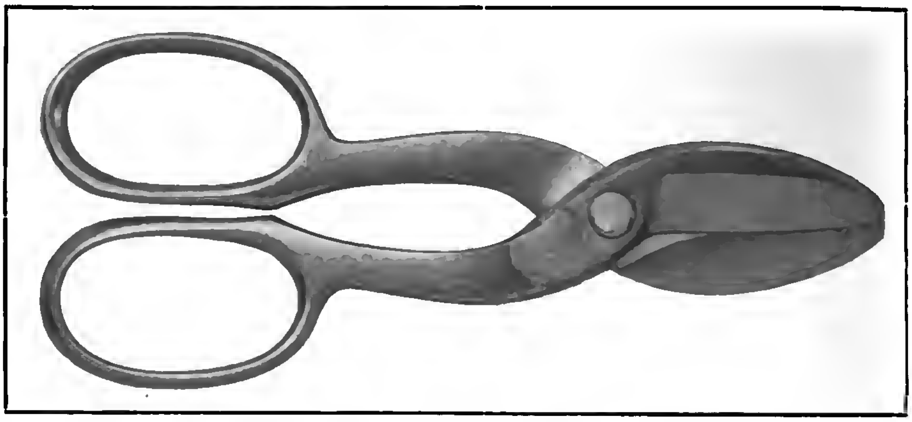


Fig. 2—Snips as used by autoists for various purposes; they are made in several sizes

SHEAR AND SNIP COMBINED

In an emergency while motoring, or, in fact, almost any time, the possession of a good strong, sharp pair of shears or snips is necessary. In case of repair work on the road the cutting of washers or gaskets on the spot may mean the saving of exasperating delay. In order to provide a thoroughly adequate tool of this description, the National Cutlery Company, of Philadelphia, has made a new type of snip which combines the principles of shears and is marketing the tool at $1.50.

The company says that the quality and finish are first rate and recommends the tool to automobile operators without hesitation. It is made with oval blades to facilitate cutting small circular washers and for performing many other kinds of emergency work.

Automobile Touring Tent—To enjoy an automobile tour through the wilder sections of the land, a good, waterproof tent of light weight and close woven texture, is about as important to the success of the trip as an adequate supply of food or gasoline. The New York Sporting Goods Company, realizing that self-evident fact, has

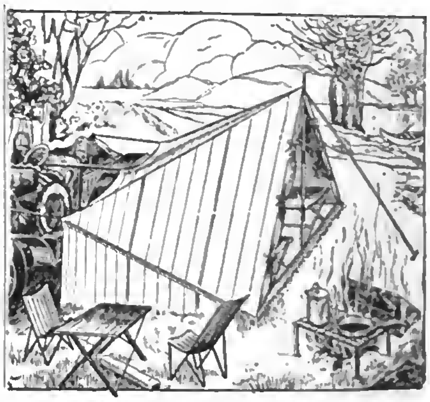


Fig. 3—"Compact" Khaki Tent

put on the market an automobile touring tent which is pronounced satisfactory in every way by the manufacturers.

It is made of khaki and is waterproofed after completion in other respects. It is reinforced with tape at the seams and is built to stand hard usage. The pole that is used with this tent is in three joints and the guy ropes are so arranged that they may be stayed either to the car or by tent pegs. The whole tent weighs only 31 pounds and can be folded into a package 36 by 7 inches, thus occupying only a small space in the car.

When the tent is raised it makes a room with nine feet frontage, seven feet high and deep, sufficient to accommodate three cots, or two cots and folding tables and chairs. Larger tents are not practicable for automobile tours, but if the party to be served is larger than four, two tents may be set facing one another.

The price of the outfit is $25, or the tent may be had separately for $16.

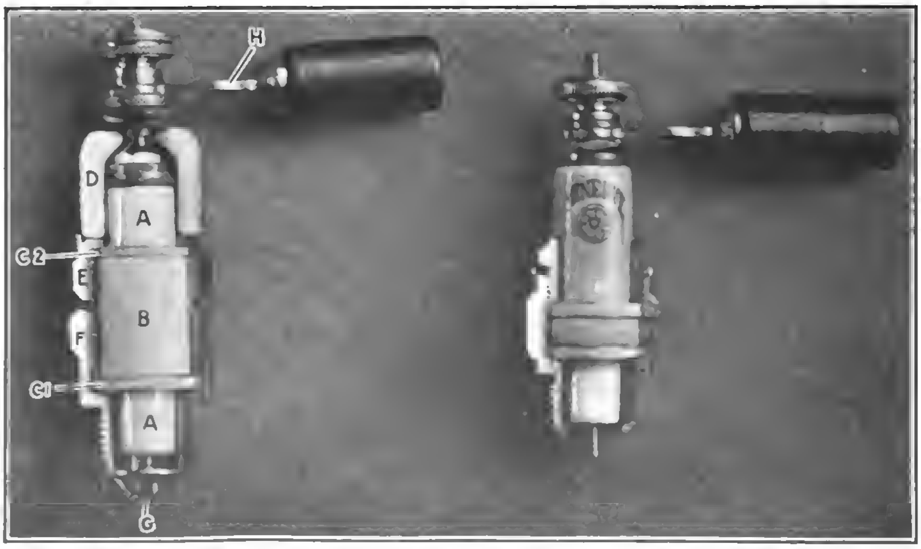


Fig. 1—Two Types of Electra Spark Plug—Section to Show Insulation

Vol. XXII. New York—Thursday, June 9, 1910—Chicago No. 23

The Automobile

"Good Roads"





ATLANTA, GA., June 6—Most important of the events of the year is the "Good Roads Tour," which made an early start from Atlanta this morning. The advance guard was represented by a patrol of mounted police supported by a fire wagon, and the tooting of its siren proclaimed to the world that 71 entrants, with their splendid automobiles decorated with flying banners, and bound by the tradition which is at the foundation of Anglo-Saxon success, had started to blaze the way of the Great National Highway, which is being advocated by the sponsors of this tour in the guise of the New York *Herald* and the Atlanta *Journal*, and which is to dissolve the Mason and Dixon Line, mingle the thoughts of the North and South, and cement the world efforts of the two great sections of the country for the common good.

As the roll of honor was gradually unfurled before the keen and riveted gaze of Georgia's best citizens who were assembled there to do honor to the occasion, the cars checked off, each in its proper place, all in the pink of condition, and with a certain synchronized inter-relation of the sound emanations due to the cycle rhythm of the sturdy power plants which were there as the direct representatives of the automobile engineers who work in American plants and evolve the mechanisms which are as the keystone which ties the arch fashioned from the automobile on the one hand and good roads on the other.

The music rendered up by a mass-band bade a parting farewell, the strains of which greeted the ears of the occupants of the automobiles which made up the rearguard, and the assemblage rent the air with prolonged cheers as the grand parade straightened its line for its onward march, heading for Anderson, S. C., over the route which the Columbia Pathfinder had pioneered.

Pleasant Atmosphere

After getting under way on Monday, the participants soon brought away a full realization of the seriousness of the undertaking. When the cars rolled off of Atlanta's splendid pavement, and the oil-like consistency of Georgia's clay began to coquette with the tire-bound wheels of the automobiles, skill on the part of the pilots of the cars was brought into greater prominence, and the little pleasantries which flitted over the assemblage at departure were supplanted by the more serious views which portrayed a stern reality fraught with possibilities, intermingling even dangers. As the day wore on, and the June sun began to paint the western horizon, a recount of the day's work included no accidents of a serious nature, unless, perchance, tire trouble, of which there was enough.

The Locomobile, entered by John W. Grant, was not so fortunate as the other automobiles; it skidded into a ditch, and an inventory of the damage done included a broken spring. This incident transpired at a point some 40 miles from Atlanta, but Mr. Grant had company in his misery, which included Charles T. Smith, of Concord, who

From Martinsville to Staunton, in Virginia

drove a Maxwell; also Emmett Callan, of Washington, Ga., in a Maxwell; they, too, had spring breakages to record.

From Atlanta, all along the line, the farmers gathered to witness the passing of the automobile procession. At Norcross, which is a small suburban town, there was a solid line of people, which, including farmers' teams, gathered at the crossroads, not forgetting a vast display of automobiles, which were lined up along the curb, made a brave showing.

If the Norcross citizens did themselves proud, they were staunchly supported in a thousand ways; steam whistles shrieked a welcome everywhere; negro laborers and their families paid tribute to the automobile, and the citizens of Norcross, who were represented by an enlightened committee, put up a big sign at the edge of the town, which intercepted the thousand-eyed cavalcade, and it read, "speed limit 110 miles." From Norcross on to Duluth, the ovation was never-ending, being in the main a repetition of that which went before, varying in some measure, and limited only by the ingenuity of the citizens, whose enthusiasm knew no bounds.

As an unpleasant accompaniment to an otherwise agreeable situation, such of the contestants as were less fortunate than their sportsman-like competitors, fell by the wayside, as tires became unruly. Just outside of Duluth the Jackson, No. 42, with C. D. Smith, of Albany, Ga., accompanied by Mrs. Smith, W. N. Tickner, and a pleasant party, succumbed to a puncture, and the broad smiles which illumined the countenances of the party was barely equal to the character of the illumination which was generated by four additional punctures before Auburn was reached. There were the customary number of little incidents which peppered the situation from time to time, rendering it rather the more savory, perhaps, than otherwise. The Velie car, on nearing Winder, cast up a variety of motor trouble, which lost to it a noticeable measure of time.

State Lines To Be Crossed Through Floral Arches

The friendly frontiers of the respective States will vary such monotony as there may be in divers ways. At Knox's

Working on New Road Which Leads to Winston-Salem

Bridge, in South Carolina, a floral arch was placed at Fairplay; every tourist received a postal card from the debutantes, who were voted pretty, and the noted hospitality of the South was notched up for the occasion. The 266 occupants of the 70 automobiles which are participating in the tour were so stunned by the overwhelming attention which they received at Atlanta, that when they departed at 8:30 on Monday morning, with the "God Speed" of Mayor Maddox, the latter with his staff, including Fire Chief Cummings and his "red devil," were reduced to comparative silence, but they have since awakened to the splendor of it all and they expend between times on the tour, vying with each other in praise of the great Southern metropolis and its hospitable inhabitants.

ANDERSON, S. C., June 7—The first day's run was not without its strenuous possibilities, while the path, considering it in general, was all that could be anticipated. There were wet roads to encounter, due to rain which fell in that section of Georgia on Sunday afternoon, continuing over until Monday morning.

Cars as They Are Entered for the

No.	Cars.	Contesting Entrants.
1	PACKARD:	Beaumont Davison, Atlanta.
2	NATIONAL:	W. J. Stoddard, Atlanta.
3	THOMAS:	Colonel J. J. Woodside, Atlanta.
4	PACKARD:	R. E. O'Donnelley, Atlanta.
5	KNOX:	Joseph F. Gatina, Jr., Atlanta.
6	POPE-TOLEDO:	Edward M. Durant, Atlanta.
7	LAMBERT:	W. S. McNeil, Jr., Atlanta.
8	REGAL:	Regal Motor Car Company, Detroit, Mich.
9	LAMBERT:	W. T. McNinch, Atlanta.
10	WHITE STAR:	Atlanta Motor Car Company, Atlanta.
11	AMERICAN TRAVELLER:	Jackson P. Dick, Atlanta.
12	MAXWELL:	Maxwell-Brisco Motor Company, New York.
13	SIMPLEX:	Edward H. Inman, Atlanta.
14	MAXWELL:	C. W. Dupre, Marietta, Ga.
15	COLUMBIA:	Charles I. Ryan, Atlanta.
16	BUICK:	W. E. Wimpy, Atlanta.
17	CHALMERS-DETROIT:	J. H. Marsteller, Roanoke, Va.
18	STEVENS-DURYEA:	Forest Adair, Atlanta.
19	FORD:	E. M. Willingham, Atlanta.
20	HUPMOBILE:	N. W. Wallace, Charlotte, N. C.
21	POPE-HARTFORD:	P. S. Arkwright, Atlanta.
22	FIRESTONE-COLUMBUS:	A. Burwell, Jr., Charlotte, N. C.
23	BRUSH:	Brush Automobile Company, Atlanta.
24	KISSEL KAR:	Kelly-Knight Motor Car Co., Atlanta.
25	SPEEDWELL:	Arthur T. Smart, Atlanta.
26	E-M-F:	Georgia Motor Car Company, Atlanta.
27	THOMAS:	Mrs. Elizabeth A. de Giers, New York.
28	FIRESTONE-COLUMBUS:	E. D. Crane & Co., Atlanta.
29	STODDARD-DAYTON:	W. D. Alexander, Atlanta.
30	LOZIER:	Asa G. Candler, Jr., Atlanta.
31	MAXWELL:	Maxwell-Briscoe Co., Tarrytown, N. Y.
32	LOCOMOBILE:	John W. Grant, Atlanta.
33	HUPMOBILE:	E. D. Crane & Co., Atlanta.
34	CORBIN:	T. H. Cooper, Salem, Va.
35	STEVENS-DURYEA—	C. H. Johnson, Atlanta.

The clay roads, of which a considerable portion of the pathway is composed, were, in the vernacular of the natives, "as slippery as oil." The running time of the cars for the first day was as follows:

HOW THE CARS WERE STRUNG OUT ON THE PATH

Class 1—Allowed Time, 10 Hours 48 Minutes

No. 20, Hupmobile, 10 hours 23 minutes; No. 23, Brush, 8 hours 46 minutes; No. 31, Maxwell, 9 hours 15 minutes; No. 33, Hupmobile, 8 hours 53 minutes; No. 37, Brush, 10 hours 13 minutes.

Classes 2 and 3—Allowed Time, 9 Hours 53 Minutes

No. 7, Lambert, 9 hours 31 minutes; No. 8, Regal, 8 hours 40 minutes; No. 10, White, (steamer) 8 hours 55 minutes; No. 12, Maxwell, 7 hours 51 minutes; No. 14, Maxwell, 8 hours 19 minutes; No. 19, Ford, 9 hours 37 minutes; No. 22, Hudson, 9 hours; No. 24, Kissel Kar, 8 hours 14 minutes; No. 41, Ford, 8 hours 35 minutes; No. 43, Maxwell, 8 hours, 57 minutes; No. 50, Cole, 9 hours 34 minutes; No. 51, Reo, 8 hours 25 minutes; No. 53, Cadillac, 9 hours 16 minutes; No. 57, Buick, 8 hours 49 minutes; No. 59, E-M-F, 10 hours 1 minute; No. 60, Buick, 9 hours 3 minutes.

Classes 4, 5, 6 and 7—Allowed Time, 9 Hours

No. 1, Packard, 8 hours 27 minutes; No. 2, National, 8 hours 24 minutes; No. 3, Thomas, 8 hours 49 minutes; No. 4, Packard, 8 hours 51 minutes; No. 5, Knox, 8 hours 43 minutes; No. 6, Pope-Toledo, 8 hours 50 minutes; No. 11, American Traveler, 8 hours 29 minutes; No. 15, Columbia, 9 hours; No. 13, Pope-Hartfprd, 8 hours 24 minutes; No. 16, Buick, 8 hours 30 minutes; No. 17, Chalmers, 8 hours 45 minutes; No. 21, Pope-Hartford, 9 hours 52 minutes; No. 25, Speedwell, 9 hours 46 minutes; No. 26, E-M-F, 8 hours 43 minutes; No. 28, Firestone-Columbus, 8 hours 30 minutes; No. 30, Lozier, 8 hours 14 minutes; No. 34, Corbin, 8 hours 8 minutes; No. 35, Stevens-Duryea, 8 hours 37 minutes; No. 36, Halladay, 8 hours 33 minutes; No. 38, Winton, 8 hours 32 minutes; No. 39, Selden, 9 hours 30 minutes; No. 40, Speedwell, 7 hours 54 minutes; No. 42, Jackson, 10 hours 30 minutes; No. 45, Thomas, 8 hours 34 minutes; No. 46, Mercer, 8 hours 4 minutes; No. 48, Ohio, 8 hours 22 minutes; No. 49, Pullman, 7 hours 57 minutes; No. 52, Oakland, 8 hours 29 minutes; No. 56, Columbia, 8 hours 57 minutes; No. 58, Palmer-Singer, 7 hours 54 minutes; No. 61, White (Gasoline), 8 hours 42 minutes; No. 62, Cadillac "30," 8 hours 18 minutes; No. 63, Stevens-Duryea, 7 hours 40 minutes; No. 65, Maxwell, 10 hours 20 minutes; No. 69, Columbia, 8 hours 26 minutes.

Long Trek from Atlanta to New York

No.	Cars.	Contesting Entrants.
36	HALLADAY:	Georgia Commission Company, Albany, Ga.
37	BRUSH:	John Moore & Co., New York.
38	WINTON SIX:	Herman J. Haas, Atlanta.
39	SELDEN:	J. E. Brown, Atlanta.
40	SPEEDWELL:	S. M. Smith, Bluefield, W. Va.
41	FORD:	Dr. E. C. Seawright, Fayetteville, Ga.
42	JACKSON:	C. D. Smith, Albany, Ga.
43	MAXWELL:	Julian H. Reynolds, Augusta, Ga.
44	MITCHELL:	L. S. Brown, Athens, Ga.
45	THOMAS:	Roy Collier, Atlanta.
46	MERCER:	Mercer Automobile Co., Trenton, N. J.
47	PULLMAN:	W. G. Humphrey, Atlanta.
48	OHIO:	Ohio Motor Car Company, Cincinnati, O.
49	PULLMAN:	Pullman Motor Car Company, York, Pa.
50	COLE:	Carter & Logan Brothers, Savannah, Ga.
51	REO:	A. P. Herrington, Atlanta.
52	OAKLAND	Robert Campbell, Cedartown, Ga.
53	CADILLAC:	D. K. McColl, Bennettsville, S. C.
54	STEVENS-DURYEA:	J. L. Henderson, Hampton, Ga.
55	OHIO:	M. L. Thrower, Atlanta.
56	COLUMBIA:	Marcellus Rambo, Birmingham, Ala.
57	MITCHELL:	Good Roads Committee, Winston-Salem, N. C.
58	PALMER-SINGER:	R. D. Apperson, Lynchburg, Va.
59	E-M-F:	R. G. Scruggs, Waycross, Ga.
60	MOON:	W. P. Walthall, Atlanta.
61	WHITE GASOLINE:	Gaston Gunter, Montgomery, Ala.
62	CADILLAC:	W. H. Peacock, Cochran, Ga.
63	STEVENS-DURYEA:	Mrs. Myrtle M. Barnes, Montgomery, Ala.
64	BUICK:	L. S. Collier, Atlanta.
65	MAXWELL:	Charles T. Smith, Concord, Ga.
66	WHITE STEAMER:	Edwin P. Ansley, Atlanta.
67	MAXWELL:	Emmett Callan, Washington, Ga.
68	NATIONAL:	F. J. Cooledge, Atlanta.
69	COLUMBIA:	John W. Mangham, Griffin, Ga.

The Schedule Beat Some of the Automobiles a Little

The first report over the wire, which has, of course, to be verified in the final sum-up, gives the cars by names as follows, as having fallen behind the schedule:

From Atlanta to Anderson, Near the Mountain House

No. 21, Pope-Hartford, entered by Preston S. Arkwright, of Atlanta, fined 50 points; No. 25, Speedwell, entered by Arthur T. Smart, of Atlanta, fined 43 points; No. 42, Jackson, entered by C. B. Smith, of Albany, Ga., fined 77 points; No. 55, Ohio, entered by M. L. Thrower, of Atlanta, fined 12 points; No. 65, Maxwell, entered by Charles T. Smith, of Concord, Ga., fined 77 points; No. 32, Locomobile, entered by John W. Grant, of Atlanta, had the misfortune to break a wheel, and just how much of a penalty will be attached to this incident, is yet to be made known. Up to midnight of the first day's run, this car had not put in an appearance, but word was received at Anderson that the car is on the move, and it should catch up before the end of the second day. No. 47, Pullman, entered by W. G. Humphrey, of Atlanta; No. 9, Lambert, entered by J. T. McNinch, of Atlanta; No. 44, Mitchell, entered by L. C. Brown, of Athens, Ga.; No. 67, Maxwell, entered by Emmett Callan, of Washington, Ga., checked in at 11:40 P. M. to-night.

The distance from Anderson to Charlotte is 158.8 miles, as the pathfinder surveyed the route. The time of running is to be a duplicate of that which obtained between Atlanta and Anderson.

Charlotte, N. C., Marks End of Second Day

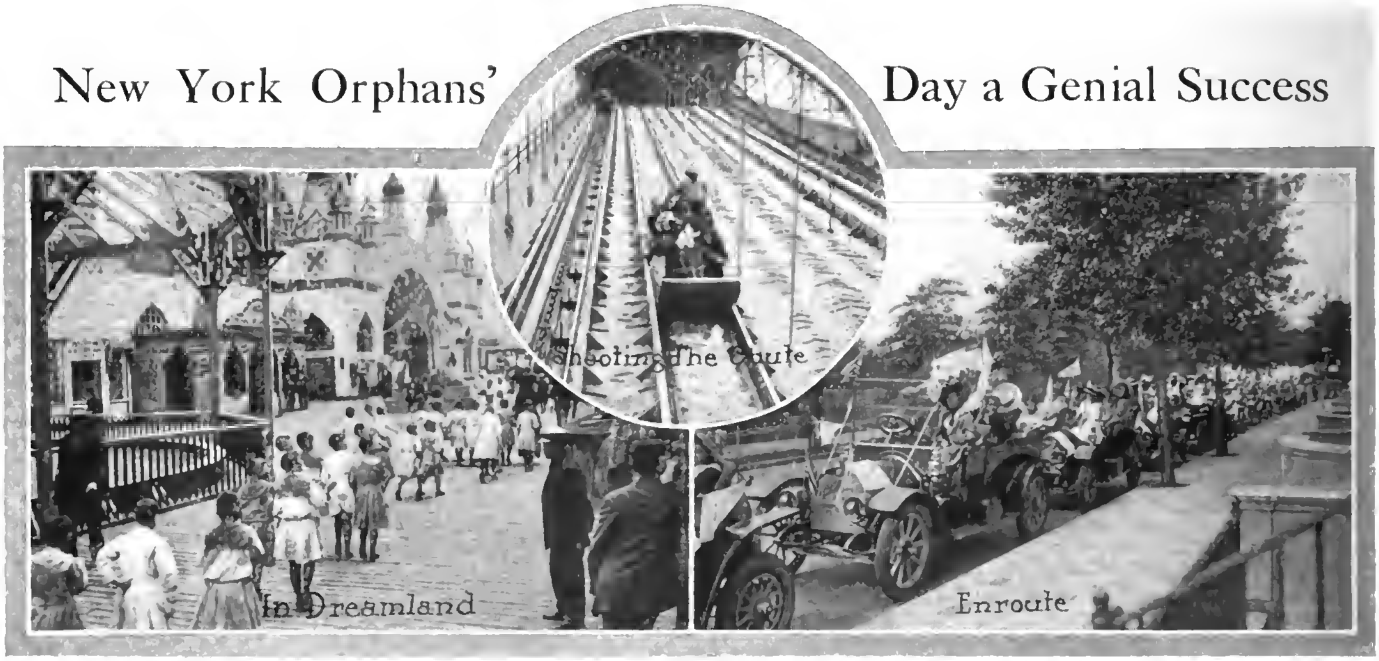
Charlotte, N. C., June 8—Common accord of the tourists voices a single sentiment; it has for its plaint the fact that Charlotte did itself so proud and offered such a wide diversity of entertainment that it was a mistake to so fix the itinerary that the tour could not linger there for at least another day. The run from Anderson to Charlotte was one of consuming interest. There was but one accident of moment; it fell to the lot of the Stevens-Duryea car, which belonged to Mrs. M. L. Barnes, of Myrtle, Ala. Approaching Greensville, at an ugly point in the road, the car broke out of control and a summary of the happenings of the time included a broken front wheel. Mrs. Barnes is making a strenuous effort to have the wheel replaced by a new one, which will have to come from Greensville.

Along the route at every point of vantage grandstands are

(*Continued on page* 1066.)

The Road to Rocky Mount Was Not of the Best

New York Orphans' Day a Genial Success



LEFT—Orphans Never Knew of a Place Like Dreamland Before. RIGHT—On the Ocean Boulevard. TOP—Shooting the Chutes

FOUR miles of automobiles, laden with 3500 happy little children, inmates of 22 of New York's orphanages, made a trip to Coney Island, Thursday. The children were the guests of the Orphans' Automobile Day Association of New York and they had a royal time.

There were 400 cars in the procession and an effort was made to maintain 50-foot intervals during the run. Aside from the fact that the truck divisions contained 32 big machines, the feature of the parade this year was the presence of 120 taxicabs in line. There were over 200 touring cars, most of them privately owned and donated for the occasion. Fifteen sight-seeing cars, three opera 'buses and several automobile stages were in line.

Some of the youngsters were picked up as far away as Yonkers, thus the ride they had was nearly 75 miles long, but the average was in the neighborhood of 30 miles.

At 10 o'clock in the morning, under unpromising weather conditions, the head of the procession began to move amid the delighted shouts of the little ones. Every car was bedecked with streamers announcing that its destination was "Dreamland" and nearly every child had been furnished with a small American flag. So when the cars straightened out over any stretch of street that was without curves, the line of automobiles had a gay appearance. Sections of the cars had been delegated to get the youngsters at the various institutions and the parade formed on the cross streets between Seventy-ninth and Seventy-second streets with the head of the column resting at Seventy-eighth street and Broadway.

The route followed was down Broadway to Forty-eighth, to Fifth avenue to Fifty-seventh, thence to Second avenue and across the Queensboro bridge and by a devious route through Brooklyn to the scene of the annual merry-making.

There were six bands in the procession and after the cars had reached their destination, the musicians furnished a variety of tunefulness for the benefit of the big crowd. Every show in Dreamland was open to the kids and they Shot the Chutes and did various other things until they were tired.

But first of all, immediately after reaching Coney, the little ones were filled up to the last notch with a tasty dinner provided by Hugh Chalmers and served in one of the immense dining-rooms of the resort. Three times the great hall was filled with the clamoring children, who were ready to do justice to a far less toothsome spread.

Col. K. C. Pardee, president of the Orphans' Day Association and secretary and general manager of the Maxwell-Briscoe Company in business life, presided. Col. Pardee was decorated with a sample of all the badges used in the parade and presented a smiling face to the little ones from above the riot of color lent by the bright badges.

Alex. Schwalbach, secretary of the association, was in direct charge of the details of the affair and spent probably the busiest day of his life in handling all the questions that arose.

It is estimated that the cars in line represented a total valuation of over $2,000,000.

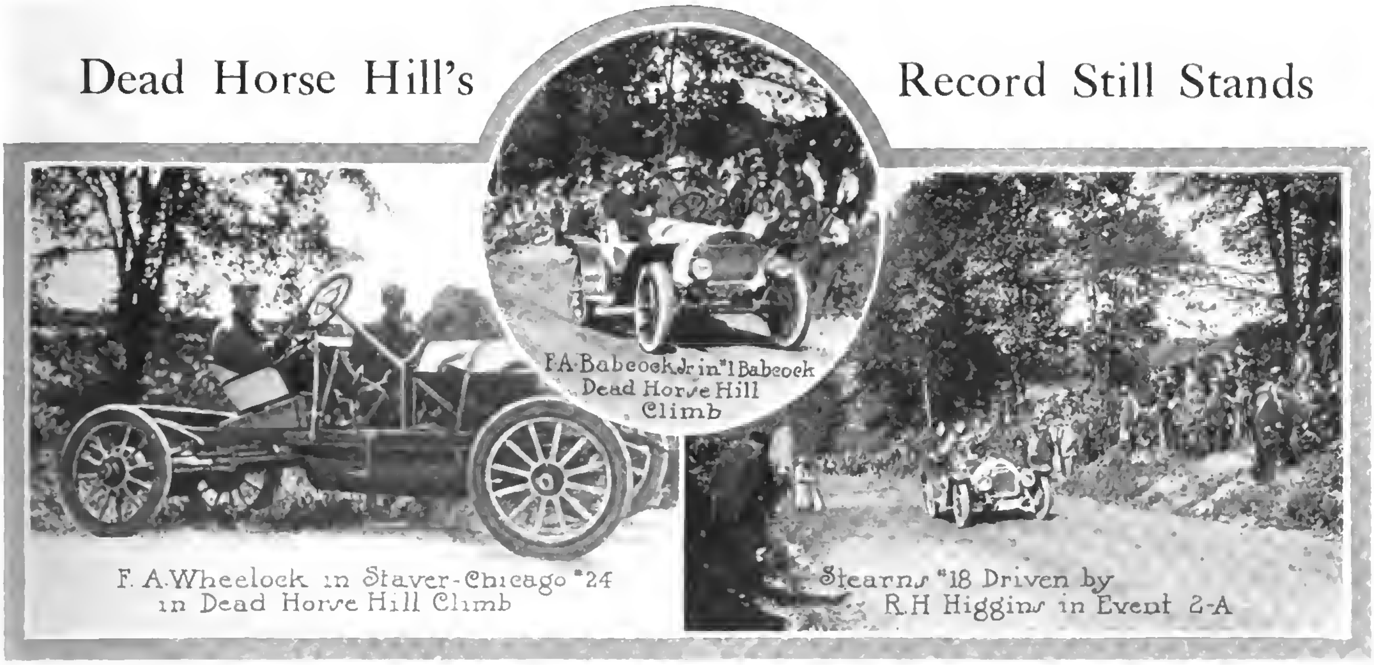
One of the effective things about the affair was the interest displayed in it on the part of the public. Everywhere along the route of the procession, crowds gathered and watched the progress of the cars and cheered the little ones heartily. The parade was for their benefit and it was given by motordom of New York and when these two phases of the idea became connected in the minds of the interested public, the result was a long series of smiles. It was freely estimated that the automobile was brought into close touch with thousands of persons during the parade whose idea of the motor car was something hostile to safety and well-being. After seeing the thousands of happy children, whose day of pleasure had been given them through the instrumentality of automobile owners, even the most prejudiced among the observers, at least had good grounds upon which to found a more charitable attitude of mind.

Splendid Line of Automobiles Waiting for the Many "Fares"

It is doubtful if any similar affair was ever carried out with the same amount of careful adherence to pre-arranged rules. Everything worked out with mechanical precision from the start, clear through the long program, to the safe return of the children to the institutions.

The affair was a notable success from every viewpoint, and plans for next years are already being discussed.

Dead Horse Hill's Record Still Stands



LEFT—Winner of event 12B. CENTER—The only electric that contested. RIGHT—Stearns had a walkover in second event

WORCESTER, MASS., June 6—Records were made in the fifth annual hill climb held on Dead Horse Hill Saturday afternoon, under the auspices of the Worcester Automobile Club, among which were three in events under the price classification, three in the piston displacement classes and the Worcester County amateur championship event. In the free-for-all contest, however, the performance of the Stanley steamer last fall stands as the record of the hill.

While the fields were small in all the events, the racing was spirited and spectacular and Worcester took an afternoon off and attended the affair in force to enjoy the sport. The hill, which has always been known as a killer of horses, is a mile long, rising 325 feet in a series of short, sharp jumps. It had been put in excellent shape for the racing with the idea of setting a new mark for the hill, but Caleb S. Bragg's Fiat Special was unequal to the task of bettering the former record.

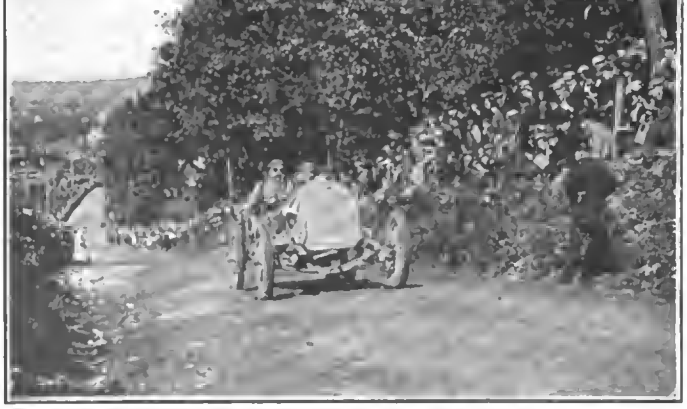
The Staver-Chicago car, entered in Event 12B, for cars with piston displacement of from 161 to 230 cubic inches, a newcomer in this section, won the first honors in competition with three others. The car demonstrated excellent speed and hill-climbing qualities and was well handled by F. A. Wheelock. In this event the Cole "30" was second, close to the winner; the Maxwell entry and the Lancia were unplaced. The winner set a new mark for its class.

The showing of the Jackson entries was prominent, winning Events 4A and 14B and finishing third in the free-for-all and lowering the record for cars of 301 to 450 cubic inches displacement and also for those listed at from $1,600 to $3,000.

The little Cameron beat the former mark for cars of its class selling between $801 and $1,200, and the Thomas made a new record for those listed at from $1,600 to $2,000.

The Stearns entry negotiated the hill with a full complement of passengers, but was not forced to high speed, as it had no opposition in the only event in which it competed.

The Stanley steamer in the Worcester County amateur championship event, and driven by its owner, Jay Clark, Jr., won the race in 1:09 9-10, giving Mr. Clark ownership of a handsome trophy, he having won two legs in the two preceding years.



Jackson Won Two Events on This Occasion

One of the most interesting performances of the afternoon was that of the Babcock Electric, which covered the route at a twenty-mile-an-hour gait, taking the hills without making any fuss. This event was carded as Number 21, and the electric was the only starter. Its time was 3.00 9-10.

The Alco won Event 15B without opposition; Event 18, one of the free-for-all affairs, and was second in the Record of the Hill event. It was also second in the main free-for-all. The car set a new mark for the 451 to 600 cubic inches displacement class.

In no less than six of the events there was but one entrant—the Thomas Flyer, in Event 1A, the Stearns in 2A, the Atlas in 3A, the Cameron in 7A, the Alco in 15B, and the Babcock Electric in Event 21 all having walkovers.

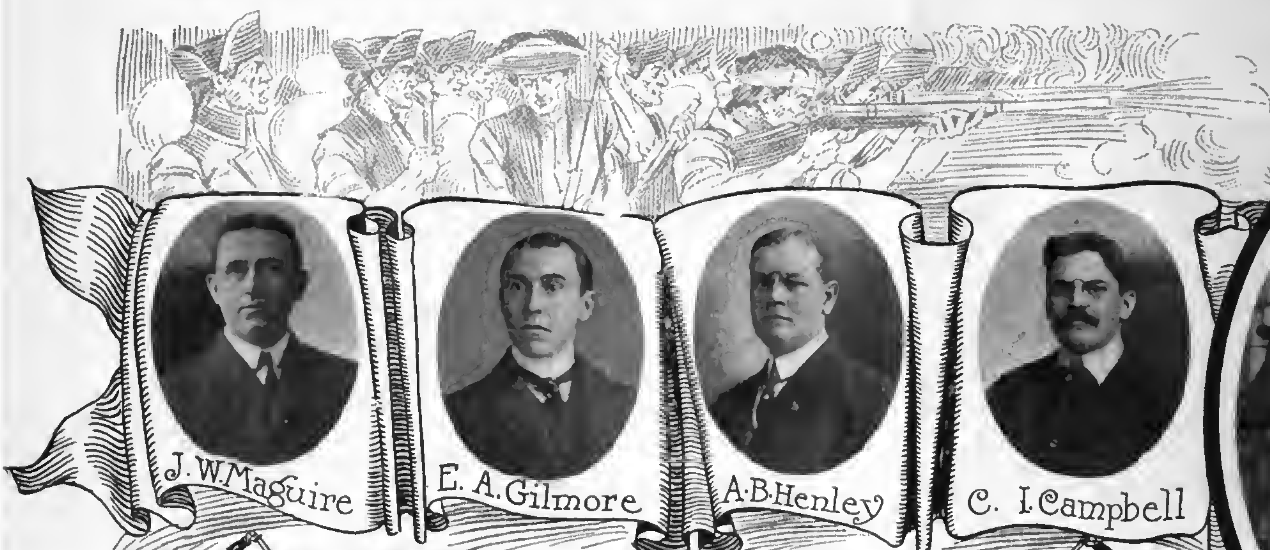
There were several motorcycle events carded, the best showing in which was made by B. A. Swenson (Indian), who made 1.03, and Edward Jerome, on a similar machine, who made 1.10 7-10.

The contest was under the direction of John P. Coghlin, former president of the club, who acted as chairman of the committee on arrangements, assisted by George D. Webb, Albert H. Inman, Daniel F. Gay and Milton C. Snyder. C. Howard Gillette, president of the Automobile Club of Hartford, was referee, and L. R. Speare was honorary referee.

The judges included the following, several of whom are presidents of outside automobile clubs: A. D. Converse, H. R. Burbeck, A. E. Bliss, A. E. Lerche, F. S. Matthewson, W. A. Thibodeau, J. Fortescue, W. H. Chase, Ira C. Coombs, John O. Heinze, A. G. Pattison, F. M. Barber and Chester I. Campbell.

The timing was under the direction of David L. Gallup. Fred J. Wagner started the cars and Charles F. Webb was clerk of the course. The scoring was done by Frank L. Coes.

The officers of the Wor- (*Continued on page* 1066.)



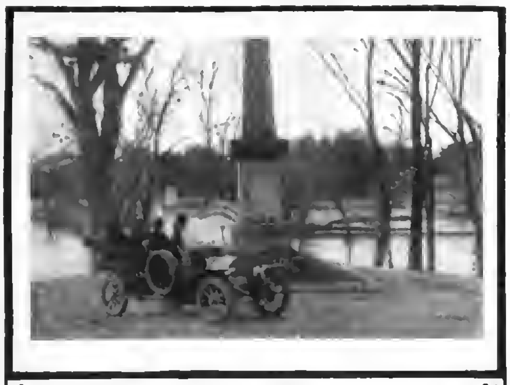

Harvard

Bay State

DURING the few years that represent the period of the automobile, Boston has progressed and developed along all lines of human advancement at a much higher rate than it achieved in any period of similar length in its history. Despite all her historic mile-posts in the record of the nation, the modern progress of Boston is her chiefest civic jewel. There has been a metamorphosis worked into the life of The Hub during the past ten years and to an appreciable extent it has been due to the automobile.

Boston is not pre eminent in the manufacture of motor cars, but it possesses all the potential factors that go to make up a rich field for their use. It is a wealthy, industrious city which boasts of its advanced thought, culture and education; so when the vogue of the motor came about, Boston at first accepted it and then made it its own.

Foremost among the expressions of motordom in Boston is the Bay State Automobile Association. This organization throughout its history of over five years has been one of the potent forces of the sport, industry and social influence of the motor car. It has been high in the councils of the city, state and nation, and no body of motorists in the land has had more to do with shaping the popularization of the American motor car than the Bay State Automobile Association.


Concord Bridge

The association has been effectively active in doing things that tended to increase the interest in motoring in New England. To no small extent it has worked to make the Boston Automobile Show one of the largest and most important functions of motordom. The Boston show ranks with those of New York and Chicago, as a result of this industrious interest.

The Bay State was one of the first organizations to take up the matter of endurance runs on such a basis as to make them valuable as tests and examples of automobile efficiency and reliability. It inaugurated the famous "Climb to the Clouds" up the rocky sides of Mt. Washington, as a club event, and the existing record for the climb is held by a Boston man, William Hilliard. Charles J. Glidden, founder of the Glidden Tour, is a member of the association and the first few events held under that title included Boston in their itineraries. Summer and winter at the earliest period of the endurance run, the Bay State conducted such competitions. As examples of its enterprise in this direction, the fact may be noted that one of the early runs of the association was to Keene, N. H., and return, and another was to Providence, Worcester and back to Boston in the dead of winter. The last contest of this sort that was held by the association was the famous run to Bretton Woods in the White Mountains, some 400 miles long. Six cars finished the run with perfect scores and in order to gain a definite result, the officials ordered the contestants to continue night and day in an effort to break the tie. Physical limitations of men and cars finally brought the run to a close.

The international mile championship trophy, offered by Sir Thomas Dewar was won first by Louis S. Ross and later was captured by Fred Marriott, in one of the steam cars manufactured by the Stanley concern. Mr. Stanley is a member of the club. Numerous speedy drivers have been developed by the Bay State, including: Herbert L. Bowden, Harry Grant, who won a Vanderbilt Cup, Joe Matson and Joe Downey.

Old North Bridge Battle Ground

The association was formed Jan. 7, 1905. L. R. Speare was chosen president. Headquarters were secured at the Hotel Lenox and later the club home was removed to Auburndale. It was found that this location was too far away from the center of the city and the club moved back to town, where a house was leased in Dartmouth Street. After two years in this convenient but expensive location, the club gave it up and took rooms at the Hotel Carleton, where it now is.

Like every other organization that has a real mission, the life of the Bay State Automobile Association has been varied. During its first three years it gained in membership and importance. Then came a split that for a time threatened the life of the body and resulted in a reorganization. This period of trouble happily has been passed and with renewed vitality, the club is reaching out into extended fields. It was the precursor of the


Where Paul R

Automobile Association

iversity

Massachusetts State Automobile Association, which is one of the main factors in the state in the way of legislation touching the motor car.

The Boston Chronograph Club is another child of the Bay State. This organization of expert timers and scorers furnished the timers for the first of the Vanderbilt Cup races and also for the early race meets on the Florida beaches. All the members of the Chronograph Club belong to the Bay State.

In the way of legislation of a reasonable character affecting motoring, the club has always been active and efficient.

Excessive liabilities caused radical action to be taken at the commencement of the current year. Instead of electing officers as heretofore, the club voted to place its affairs in the hands of a commission composed of L. R. Speare. J. H. MacAlman, E. A. Gilmore, J. S. Hathaway, A. B. Henley, J. W. Maguire, C. I. Campbell and Harry Knights. Each member of the commission is identified with some branch of motoring in an intimate way and under the present administration, the affairs of the club have been straightened out until its future has assumed the rosy hue of hope

The commission first got rid of an expensive lease that hung over the situation like a cloud and since than, by tactful and energetic effort, the membership roster has been swelled until, at present, the condition of the organization is sound and live interest in it has been stimulated.

Washington Oak

In the near future, a meeting undoubtedly will be called to elect officers and once more the Bay State will assume the usual form of an automobile club. This may not take place until the first of next year, but the solvency of the organization has been amply demonstrated.

The fundamental purpose of the Bay State Automobile Association is the welfare of motoring. Chief among the necessary elements to make motoring possible are good roads, and consequently, the best effort of the club has always been exerted toward improving the highways. In doing what it has done, it has been aided in large measure by the liberal understanding of the foundation principle of good roads by the agricultural element of the state.

James J. Hill, one of the constructive financial giants of the age in a recent statement touching on the high cost of living said that there had been a revolt against working on the farm because of its inaccessibility. He pointed out that high prices of farm products resulted through the action of the law of supply and demand and cautioned the world that the best way to reduce prices was through an increase in supply. In order to increase the supply of farm products it is necessary to make the farms accessible and thus make them attractive to the workers. Prices had advanced 100 per cent in a dozen years and the motive for radical action was very definitely present.

The answer to the problem is simply—good roads and adequate transportation. If the farmer and his wife and family and servants were placed within easy distance of the life, gayety and activity of the city; if it were possible for him to send in his produce quickly, economically and certainly to a broad, living market and to maintain close touch with the world while operating his farm, the result would be unquestionably to make farming more attractive and more profitable. The actual cost of hauling heavy loads over bad roads had eaten up the profits of many a skilful farmer and he was constantly face to face with the question of margin on the wrong side of the book. Then came the motor car; first as the plaything of the rich; then the more generally used pleasure conveyance of the moderately wealthy, and now as a most vital element of commerce

Ride was Stopped

The Minute Man at Concord, Mass.

Massachusetts was among the first of the states to realize the possibilities of good roads. The market gardeners of the Bay State had appreciated their worth early in the epoch of the automobile, and as a result the road situation of the state makes an extraordinary good example of the progress that has been achieved along that line.

How entirely justified their attitude is may be realized from the consideration of the figures that have been given.

Some Requirements of Automobile Gasoline

SENSATIONAL statements, which had for their purport the possible scarcity of gasoline, were made and reiterated with such vehemence a year or two ago, that autoists were constrained to believe that the fuel problem would become the most serious phase of the whole autoing situation within a short time. It was then believed that hexane was the only suitable distillate of the hydrocarbon series which would properly serve in automobile work, which belief was based upon the fact that the volatility of hexane was at the right rate and with sufficient uniformity to serve for the purpose without leaving a residuum.

At that time, there were many geniuses who labored under the false impression that kerosene oil would become the ultimate fuel, and that some different kind of a motor would have to be designed to burn it. Skill always comes to the rescue of the man who nurses a bugbear, and this case proved to be no exception to the rule. Instead of designing a freak motor to burn kerosene oil, it was found to be feasible to design the fuel so that it would burn in an automobile motor, and at the same time avoid having to use the distillate hexane as the sole product, at the cost of an enormous quantity of by-product, which could not be used as rapidly as produced in other arts and industries.

The distillers of oil realizing fully that hydrocarbon by-products, unless they can be utilized in the arts and industries, introduce a formidable problem, due to the fact that these by-products cannot be disposed of in any way, excepting industrially. Were they to be run into a sewer they would reach the waterways, float on the top, and become a menace; likewise to spill them into a depression in the earth, would be to make an artificial liquid hydrocarbon lake which would be a menace also. Enough has been said to indicate that the by-products of the distilling process in the making of automobile gasoline must be regulated to the quantities which will find a use in various ways. When the seriousness of the problem was fully realized, the experts who deal with such matters began experimenting with composite fuel, with the idea of utilizing the entire range of the distilling process, including hexane, heptane, octane, and decane, with perhaps other fractions, should the plan prove efficacious.

It was not necessary to involve the pentane fractions, they being more volatile than hexane, for the reason that these lighter distillates are vastly in the minority and have many uses, so that they may be readily disposed of in the ordinary way. It is fortunate for the automobile situation that the lighter distillates are not so good as automobile fuel; the heat units per unit of weight are less, and the inflammability is in excess of that desired, not only from the point of view of safety, but for the further reason that the rate of flame travel in the compressed mixture in the combustion chambers of cylinders, is in excess of the actual demand, and motors so provided would be prone to knock.

As carbureters were improved, and as automobile engineers arrived on a better basis in their understanding of the requirements, it became apparent to them that there should be a sufficient quantity of the lighter distillates present in the total fuel to permit of starting a cold motor without having to crank, beyond the mere spinning of the motor, as an outside limit. Automobile fuel, to satisfy this phase of the situation, must hold enough hexane to serve as the volatile member of the family, after which it may be diluted with the heavier distillates, even beyond the point marked decane.

Bosch Dual Ignition System Explained

STABILITY of ignition for motors, considering the nature of the service and exposure to the inclemency of weather and lack of attention, or what is more to the point, the kind of attention which emanates from the curiously inclined, is of prime necessity. Realizing this, the Bosch Magneto Co., headquartering in New York City, brought out what is known as the dual system of ignition, which, in addition to a magneto, involves the use of a battery, instead of the employment of a separate times and a multi-coil, though the magneto is so contrived that a suitable interrupter is incorporated into the mechanism and a form of step-up transformer is made to do double duty, serving primarily to spark the latent charge in a cylinder in the act of starting the motor from the seat, and in case the magneto should become deranged the same coil may be brought into play to serve as a substitute sparking system.

The magneto is installed in the usual way, and although the wiring and connections are different, as will be shown, even so the problem is bereft of complexity, and a so-called clean dash is one of the advantages realized. The unit coil, which is of a shape to fit snugly in a circular housing of metal, is so encased as to be water-tight, and the condenser, trembler and switch are included within the housing.

Switch Handy to Get At

The switch is so made and connected as to enable the operator of the car to switch from the magneto to the coil and vice versa at will, and a neutral point intervenes so that the electrical system may be turned off when the occasion requires.

The dual system magneto differs from all others of the same make in that a battery interrupter is added and the connections are altered to suit the occasion.

Neglecting the parts which are required to compose a complete and perfect mechanism, it remains to be observed that there are two separate sets of contacts, each perfectly independent of the other, and either set may be used without the other; nor does it matter if one is out of order—the other will work perfectly in the meantime. The battery contact system, used to interrupt the current flowing from the battery, is just as

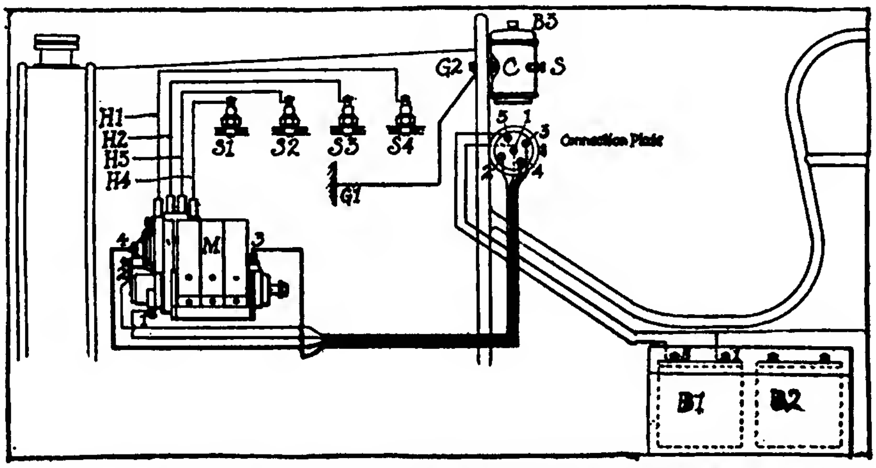


Fig. 1—Diagram of wiring of the Bosch dual ignition system, showing the magneto, spark plugs, dash coil, wiring connections and battery

capable and quite as independent as here arranged as it would be in a separate housing, but it offers the inducement of being in a place of natural advantage and reduces the wiring system to its simplest form.

Diagram of Bosch Dual Wiring System

For a four-cylinder motor the diagram as presented in Fig. 1 will serve the purpose here, although it will be understood that any motor, with any number of cylinders, as usually employed, may be adapted. This system will suffice for ignition purposes. The magneto M is placed at any convenient point, and high tension leads H1, H2, H3 and H4 may be connected to the four spark plugs S1, S2, S3 and S4. In these respects the dual system is no different from the conventional forms of high-tension magnetos.

Back of the high-tension leads, as they pass from the magneto to the spark plugs, the system takes on a dual character, and the connections between the coil C, on the dashboard, the magneto M, and the battery B1 or B2, if a reserve battery is available, should be from No. 1 on the magneto and No. 1 on the battery to No. 1 on the connection plate of the coil C, which is given diagrammatically just below. Nos. 2, 3 and 4 from the magneto should connect to corresponding numbers on the connection plate of the coil, and No. 5 of the battery should lead to No. 5 of the connection plate of the coil. The ground connection G1 to G2 completes the circuit. The connections to the control, which is a switch S, are made when the system is assembled, and in starting all that can be done is to press the button B3 on the top of the coil, when, if the conditions are right in the cylinders, as respects mixture, the motor should start.

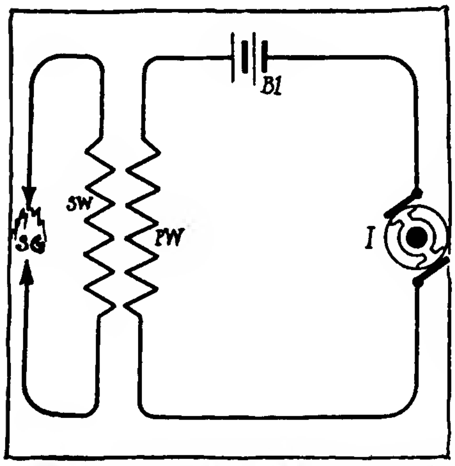


Fig. 2—Theoretical diagram of the dash spark coil, showing the windings of the coil as saw-teeth, spark gap, battery and interrupter

It is generally well understood that a static transformer will not set up an inductive secondary electromotive force when a continuous current is applied to the primary windings of the transformer, and this system mystifies many motorists because they do not understand that static transformers are usually designed for alternating current work, and they do not see wherein the difference lies or why this particular transformer will work and others will not.

There are one or two little details that stand in the way of a perfectly clear understanding of this situation, and those who understand that a coil with a trembler will deliver a spark have only to remember that the Bosch coil, as used in the dual system, is a trembler coil when the button is pressed, and a step-up transformer at all other times. As a step-up transformer it receives its intermittent current in the primary winding, from the battery, to be sure, but the system of wiring is so contrived that the battery current is interrupted by the battery interrupter.

Utility in Sparking

An intermittent current, while it will not deliver a secondary electromotive force holding to the sine form of wave, will, nevertheless, induce a secondary electromotive force that will serve for sparking, when the primary current is so impressed. This is what happens when the battery is cut in by the switch S, Fig. 1, and the system gives one spark per interruption, which is all that is required in ignition work, provided the spark is rightly timed and of sufficient voltage and energy.

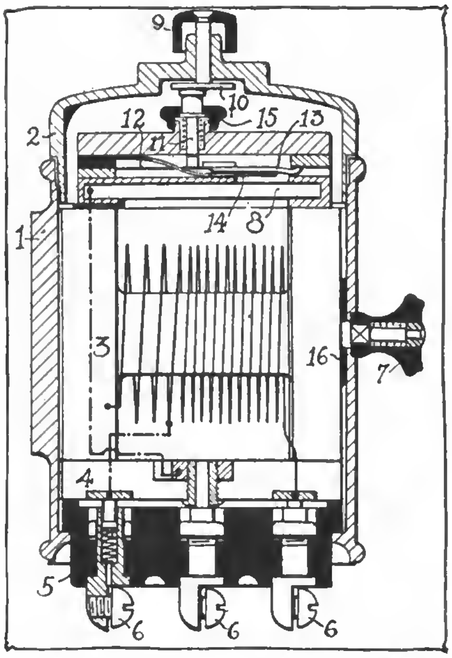


Fig. 3—Section of the dash coil, presenting connections at bottom, magnetic core within with windings thereon, and trembler at top, all within a waterproof case

Fig. 2 is a diagram of the system, in a characteristic way, in which B1 is the battery, I is the interrupter, PW is the primary winding of the transformer, SW is the secondary winding of the transformer, and SG is the spark gap. In the Bosch dual system, I is located in the magneto for convenience, PW and SW are combined in the coil C, Fig. 1, and the gap SG represents one of the spark plugs S1, S2, S3 and S4, Fig. 1.

The practical way in which the scheme is carried out is best shown in Fig. 3 of the Bosch coil in section, which, together with the explanations, affords all the information that can be of any value in view of what has been said. In this illustration, 1 is the cylindrical housing for the coil with its cover cap 2. Within the housing is the soft iron core 3, around which the winding is placed, as shown. The condenser 8 works in connection with the coil. S7 is the switch handle, which protrudes from the coil. Four is the connection plate at the base with which the connections 6 attach. The vibrator parts are shown in the top, 9 marking the press button, 12 the vibrator spring, and 11 the pin for setting the vibrator working. Fig. 4 represents the completed coil in its housing, with the control switch facing the driver. The system is widely used, it offers the advantage of a double ignition, having all the virtues of two independent methods, and the magneto is unincumbered by any part which can be construed as likely to complicate it in any way. The battery is regular, placed as in ordinary system, and starting on the spark, insofar as this plan is possible, is advisable and easily managed due to provision which is made for it. The system offers not the slightest chance for a tinker and an unlicensed screwdriver.

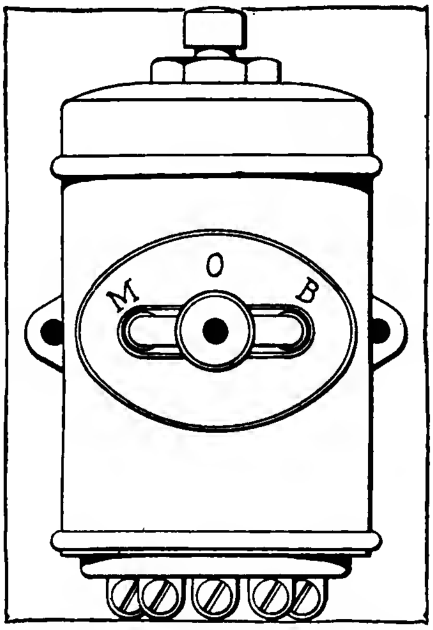


Fig. 4—General appearance of the dash coil, presenting means of opening the top for purposes of inspection and the switch on front for use in turning the magneto, or coil on, also for throwing to neutral or open.

Engineering Digest

A carefully abstracted digest of accounts of engineering activities as they are reported in society transactions and technical papers throughout the world.

Study of Concentric Valves.—Concentric valves properly constructed constitute a progress in motor design, according to F. Carlès in *La Vie Automobile* for May 14, and the more general adoption of this type would be desirable, if the elimination of all valves were not more desirable yet. One of the principal advantages of the concentric double valve is the following. The fresh gas, usually at a temperature slightly above that of the surrounding atmosphere, in passing by the exhaust valve contributes to keeping it cool, and the concentric arrangement of the parts obviates that unequal expansion and contraction of parts which sometimes leads to seizures in motors with two distinct valves. The concentric valve permits the designer to give his combustion chamber a cylindrical or even a hemispherical shape, which heats less than the ordinary. But there are also disadvantages. As the gas cools the exhaust pipe it is itself heated and expanded. Figuring it out, one finds that the mixture may readily be raised a hundred degrees in temperature, whereby its weight, and therefore the power of the motor, may be reduced 30 per cent. Also, the weight of the movable parts of the exhaust valve, especially those which are bell shaped, is increased, requiring stronger springs, which wear and strain the cams and rollers. Finally, the concentric valve is expensive. In the Pipe, Fig. 3, the bell shaped exhaust valve is machined from a block of special steel, in order to make it light, but the cost in tool wear alone is considerable. The foregoing leads to the inference that concentric valves are best adapted for a motor in which they may be cooled by water rather than by the explosive mixture. They then offer the advantages of equable expansion and contraction of parts and an opportunity for a hemispherical combustion chamber, without any accompanying drawbacks.

Fig. 1 shows the Esnault-Pelterie valve, used in an aviation motor. The two valves are in one piece, the exhaust valve forming a slide. Both are operated by the same rocker arm. Here lies trouble. At the end of the explosion stroke orifices EE are uncovered and AA covered by the slide. When now comes the time for admission of gas, the valve descends a little more, but for an instant the two orifices are uncovered simultaneously, and there is suction through the exhaust valve. When the valve is closed again the same thing happens once more. Another inconvenience. Suppose the valve is depressed five millimeters for the exhaust; it must then go down still a little further in order to begin to uncover the intake, say two millimeters, and thereafter still farther, say six or seven millimeters, to complete the uncovering of the intake and covering the exhaust orifice. That makes, then, at least 12 or 13 millimeters stroke for the valve stem, even with as scant an allowance for the diameter of the orifices as five millimeters.

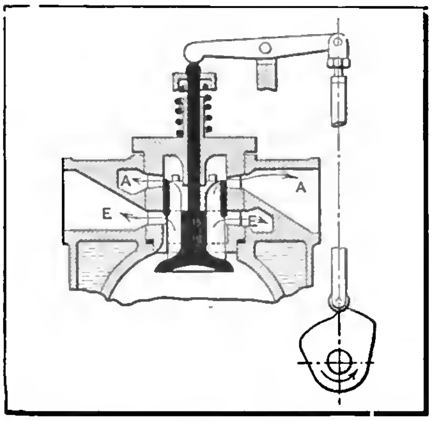


Fig. 1—Esnault-Pelterie valve in position as between exhaust and induction

In the Vorreiter valve, from Austria, Fig. 2, the slide is not integral with the central valve, but abuts against it by means of springs. The two valves are depressed together to permit the exhaust to escape. Continuing to descend the slide valve T reaches a conical seat, and both valve openings are closed. Then the central valve continues to descend, and the admission passages are opened to fresh gas. This arrangement may be suitable for large valves, but if the slide should stick, even slightly, it will no longer follow the intended movements, and in that case the motor will be stalled. The little spring cannot be very strong because it would compensate against the main valve spring (says the author). Also, the multiple conical seats do not appeal to the mechanical sense, and the guidance of the valve and of the slide seems insufficient, judging from the illustration. The total lift must be even higher than in the Esnault-Pelterie valve. Nevertheless, Mr. Vorreiter states that he has obtained a higher thermic efficiency with this valve applied to small motorcycle motors than with separate valves and a 2 per cent. higher utilization of dimensions, but the latter result may be due solely to the improved form of the compression chamber.

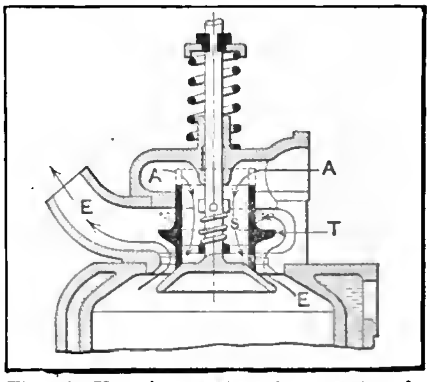


Fig. 2—Vorreiter valve in position for exhaust

The maximum valve lift is normal in the Pipe construction, Fig. 3, as each valve is operated separately, and the guidance is perfect, the induction valve sliding in the exhaust valve and the latter in its seat. In order to leave the slide free to expand and prevent the exhaust gases from entering the admission piping, the slide is provided with a segment upon its upper portion. Two rocker arms are used, A_1 and E_1, that for the exhaust valve being forked, and two tappets, two cams. This complication has perhaps no other advantage than the easier design and adjustment of the cams, but the Pipe system generally carries with it great facility in dismounting the two valves. The seat is screwed into the cylinder head and secures thereby an aluminum valve chamber which carries the induction and exhaust pipes. This valve chamber or box is in common for two cylinders, and remains in place if the valves of only one cylinder are dismounted.

The Panhard-Levassor valve, as applied to aviation motors (for example, in the Tellier aeroplane, which recently flew over Paris), is also designed on the principle of separate functioning

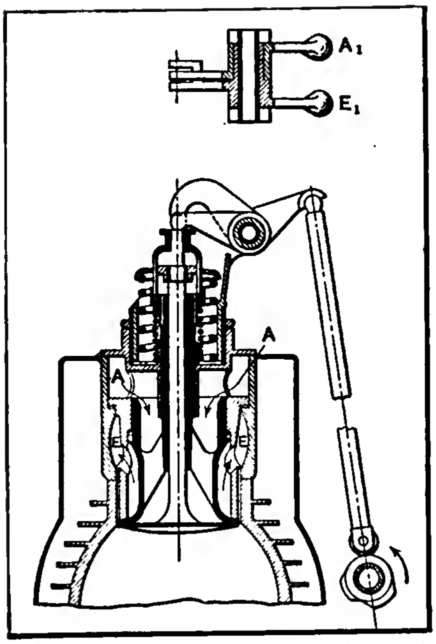


Fig. 3—Pipe valve in position as during explosion stroke

for the two valve members, and has the advantage of normal lift and large apertures for both admission and exhaust, as well as guidance of the slide direct in the seat. It is operated by a single tappet rod, which works by compression for the exhaust and by traction for the admission, see Fig. 4. The rocker arm is forked, and presses on the cover for the upper part of the valve slide, upon which is mounted the small rocker arm *C*. When the tappet descends, the rocker arm, being raised, comes in contact with the small rocker arm which depresses and opens the admission valve. In this movement the tappet and the roller are held down upon the cam by the spring *r*. The exhaust is water jacketed on all sides and the fresh gas is not required to cool the valve seat and is therefore not expanded unduly.

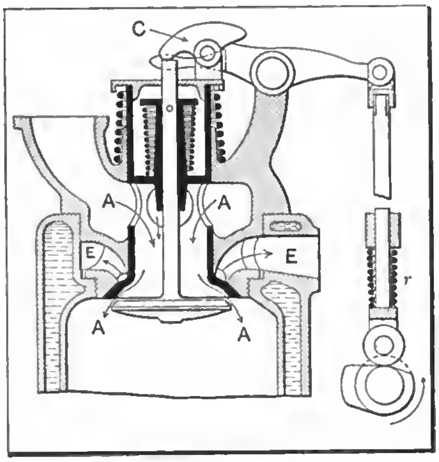


Fig. 4—Valve of P-L aviation motor, in position for admission of gas

In the Miesse valve the exhaust takes place through the center and the admission at the periphery. A single tappet and rocker-arm control the valves, and the lift is considerable. To effect the exhaust the rocker arm presses upon the central valve; this begins to descend allowing the gas to escape by the way of the interior of the bell, until the cap *c*, integral with the central valve, begins to impinge against the bell, thereby closing the aperture for the gas escape. Continuing to descend the central valve carries the bell with it and opens the passage for the fresh charge. The principal objection seems to be that the central valve is never cooled, while the fresh gas enters the cylinder heated, reducing the power of the engine.

Three samples of titanium steel, Siemens-Martin basic process, were obtained at the Osnabrück steel works by running one-half of each of three melts into a ladle, while at the same time adding metallic titanium. The other half of each melt was poured unalloyed (at the same time?). In this way three comparable pairs of ingots, each of more than one ton, were secured, the titanium running 0.038 per cent. in one sample, 0.092 in another and 0.14 in the third. There was no difficulty in getting a mixture in the ladle, and the samples all rolled perfectly sound. Large and small billets were made from the alloyed as well as from the corresponding unalloyed ingots, and from these billets test pieces were rolled and forged. Tensile tests showed greater ultimate strength for the titanium steel than for the corresponding plain steel, the difference being much more pronounced in rolled test pieces than in forged ones, however. By far the most important superiority was in toughness under drop-hammer test. The annealed titanium steel endured four times as violent impacts, in the sample with least titanium, as the plain steel. The composition of the samples was as follows:

	C.	Mn.	Si.	Ph.
I.—Without titanium	.385	1.00	.22	.44
With titanium	.37	1.00	.23	.049
II.—Without titanium	.52	1.36	.22	.078
With titanium	.54	1.33	.32	.07
III.—Without titanium	.48	1.17	.20	.075
With titanium	.48	1.17	.21	.075

The titanium left in the finished metal tested out only from 0.02 per cent. to 0.04 per cent., indicating that its function had been scavenging, taking oxides and possibly nitrogen from the metal. The toughness imparted to high-carbon steel was especially remarkable and in the bending tests the high-carbon sample, containing .52 C., could be bent further than its mate. Fractures of the titanum steel, even of sample I, with only .038 per cent. of titanium added in the ladle, showed a fibrous character similar to that of wrought iron, while fractures of the plain steel were granular. The author calls attention to good results obtained in another case at a crucible steel works by adding aluminum shavings to a strong titanum alloy, before pouring, and to the favorable reports received from the United States, where considerable quantities of titanium steel for rails have been made by adding ferro-titanium in the electric furnace, and where the material has been found superior for rails in wearing qualities and resistance to abrasion.—*Stahl und Eisen*, April 20.

Students of aeronautics may be interested in a new work, 990 pages, "Le Navire Aérien," by L. Marchis, who was recently appointed professor of aviation at the Sorbonne University in Paris. Commandant Voyer, reviewing the work in *Revue Générale des Sciences* for May 15, says it is the most complete in existence, yet the chapter on propellers is lacking, the author awaiting developments on this point.

Metallic, especially aluminum, coatings may be applied by means of steam or gases through a pneumatic nozzle to practically any object or surface. Though the metal must be molten, the metal-laden mist thrown out with great velocity from the nozzle is so thoroughly cooled, through the low temperature of the released gases, that it reaches the object to be coated at temperatures ranging from 10 to 60 deg. C. The process takes the place of galvanizing or tinning and requires no conductivity of the surfaces, or ability to resist heat or water. The coating can be made of any thickness. Steam, if used, must be superheated. The best gas for coating metals liable to oxidation is nitrogen. Hydrogen can also be used. The applications to the automobile industry are obvious, including also the use for patterns, by coating those made of cardboard or wood. (The principle is similar to that used in the improvement of old roads by driving tar into the stone surfaces by air pressure, and recently experiments have been made in New York City with rapid plastering of concrete walls by the same method.) Presented by U. Schoop to the *Académie des Sciences*.—*Comptes Rendus* for April 25.

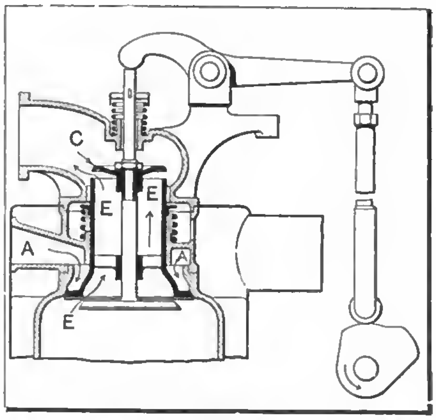


Fig. 5—Miesse valve in position for exhaust

Questions That Arise

A Series of practical questions relating to the automobile, its parts, and their functions, which arise upon various occasions, together with easily understood answers to the same.

[60]—What is the coefficient of friction?

It is the ratio of the force required to slide a body along a horizontal plane surface to the weight of the body. It is equivalent to the tangent of the angle of repose, which is the angle of inclination to the horizontal of an incline plane on which the body will just overcome its tendency to slide. The angle is usually designated as θ and the coefficient by f. The customary equation for the coefficient of friction is expressed thus:

$$f = \tan \theta.$$

[61]—Why is there a difference in voltage between charging and discharging a battery?

The chemical reactions during charging are not the same as when the discharging is being done. To obtain the same result it is necessary to maintain the same reaction.

[62]—What is the difference in voltage between charging and discharging of a battery?

According to Prof. Ayrton (Jour. Inst. Elec. Eng., England, Vol. 19, p. 699), the charging voltage during the first two-thirds of the charge is about 0.14 volt higher than the voltage on discharge over the same range. Beyond this point, in the charging period, the difference continually increases. The increase in voltage during charging, over that for discharging, is more than that due to internal resistance of the battery.

[63]—What is the greatest influence for excessive increase in voltage during charging over the voltage realized on discharging?

That it is undesirable to realize a great difference in voltage during charging of a battery over the voltage available during the discharging period is true, and, from the most authentic accounts, it is believed that a condition of persistent sulphation is at the seat of the trouble.

[64]—What is the cause of this persistent state of sulphation?

Allowing a battery to stand in the discharged state; to avoid this state of sulphation it is necessary to charge the battery immediately after it is discharged.

[65]—Will a battery continue to self-discharge after it is partially discharged?

The presence of any lead sulphate at all is enough to induce a condition of "local action," and self-discharging, so called, is but a sign of local action. Sulphate of lead is formed when a battery is in process of discharge, and if any discharging is done at all there will be some sulphate present, so that local action will be induced if a battery is allowed to stand after it is put on discharge. The one way to avoid trouble of this sort is to keep every cell of the battery in good working order and fully charged. A fully charged battery is substantially free from lead sulphate.

[66]—What is the underlying theory of the formation of sulphate of lead in a storage battery of the lead type?

During discharge, the electrodes are reduced to lead sulphate, with the delivery of sulphion from the electrolyte. A general expression of the chemical reactions (not counting divers intermediate reactions) may be taken as follows, according to the accepted idea of storage battery engineers:

$$PbO_2 + 2H_2SO_4 + Pb = PbSO_4 + 2H_2O + PbSO_4$$

This expression includes the combined reactions in the positive and negative electrodes of the cells of battery. They may be separated out in the manner as follows:

Reaction for the positive plates:

$$PbO_2 + H_2SO_4 = PbSO_4 + H_2O + O$$

Reaction for the negative plates:

$$Pb + O + H_2SO_4 = PbSO_4 + H_2O$$

[67]—What is the difference between normal and persistent sulphation in a battery?

Under normal conditions of discharge, it is claimed that the sulphate formation is on the surface of the "active material" and to a certain depth therein. If, on the other hand, the sulphate is allowed to accumulate beyond a certain point, it will ultimately penetrate to the supporting grids. After this condition is established, it is difficult, if not impossible, to realize any further good from the sulphated cell of battery; the sulphate is of high electrical resistance, and its presence between the active material and the supporting grid prevents the formation of the character of active material which obtains when the battery is in a state of proper charge. In addition to this, the sulphate, being in excess, isolates all the available active material by coating over, with the result that it is beyond the reach of the charging current.

[68]—What is the best way to overcome troubles of this sort?

If it can be overcome at all, which is a question, long-continued charging at a low rate is the best course; the electrolyte must be adjusted to proper strength before this "doctoring" charge is administered. Of course it can be overcome to a certain extent; the battery may be corrected in a measure, even in the worst example. That it will ever be as good as under normal conditions, however, is a question.

[69]—Will the life of the sulphated cells of battery be impaired?

It has been found that, after a cell of battery is over-sulphated, the life is but short at best.

[70]—What is the character of the active material which abounds on positive plates of storage batteries?

When a battery is fully charged, the active material is composed of peroxide of lead, the formula of which is PbO_2.

[71]—How much of this material is needed relative to the normal output of a cell of battery?

In the first place, but a small portion of the actual quantity of peroxide of lead on the positive plates is available for use. Of the material which is available, it is claimed that it has a value of one ampere hour for 4.48 grams of material. This is the theoretical value, according to Planté. There is some question as to the accuracy of this figure; it has also been given as 4.44; the Planté valuation is the generally accepted figure.

[72]—Why is it that all of the active material may not be utilized?

Lack of porosity of the active material is one of the great reasons; the fact that the sulphate, after it penetrates to the surfaces of the supporting grids, will induce a condition of abnormal electrical resistance, and defeat charging under effective conditions, must be taken into account. Disintegration of the active material is bound to follow.

[73]—What has porosity to do with the action of a battery?

If the electrolyte cannot "soak in" to the section of the active material, there will be no action at all, for the reason that it is the sulphion in the electrolyte that aids in the formation of lead sulphate; prevent the formation of lead sulphate and the action which is at the bottom of the useful work will be prevented also.

[74]—What is electrolyte?

In a storage battery it is the solution or composition in which the elements are submerged.

[75]—Must it be in liquid form?

No. It is sometimes in jelly formation.

[76]—What is its basis?

In the lead-type of storage battery, electrolyte is made up of a certain percentage of sulphuric acid together with a certain proportion of pure water. The strength, when the battery is fully charged, is 25 degrees Baumé. If it is desired to obtain jelly-like formation, some compound is added to bring about the desired condition. It has not been found that such formations are efficacious; they do eliminate the troubles of having a liquid to deal with, but other troubles are induced, and they have to do with the life and efficiency of the battery.

[77]—What is the nature of the material such as used to solidify the electrolyte?

Silicate of soda-water glass.

[78]—Why should the electrolyte be pure?

Every reaction excepting the normal requirement is at the expense of the life and efficiency of the battery. Some foreign substances act in the capacity of forming ingredients and reduce the life of the battery at a high rate.

[79]—What are forming substances?

Any compound which will, in the presence of an electrical charge, or discharge, reduce metal lead into a salt of lead.

[80]—What has forming to do with storage batteries?

In the process of manufacture of storage batteries, it is the custom to "form" them after they are made up of the desired ingredients. In a Planté type of plate, for illustration, the active material is formed out of the lead of the plate, in the absence of any salts of lead. This forming is done by charging the plates after they are placed in a forming electrolyte. It may be a nitrate solution, or any other solution which will hasten the formation of salts of lead out of metallic lead during the passage of an electrical current through the plates, using the solution to complete the circuit and to act in conjunction with the lead to form salts of lead.

[81]—What has all this to do with the use of storage batteries?

If a battery can be formed at a rapid rate by the addition of nitrates, or other forming ingredients, during manufacture, it stands to reason that this same forming process will be present during the life of the battery in service, if only the nitrates or other forming ingredients are present in the electrolyte.

[82]—If forming ingredients are good to use during the manufacture of a battery, why are they so undesirable after the battery is put into commercial service?

In the process of manufacture, the aim is to continue the forming process until the capacity of the battery is up to the desired standard. Were the process carried on for a longer period of time, the capacity of the battery would be increased, but the life of the same would be decreased, until finally the battery would fall apart; strength of the supporting grids would be insufficient for the mechanical requirement. This same process, if it is allowed to go on after the battery is placed in service, as it would were the electrolyte to be contaminated, would add to the capacity of the battery for a time, but the life of the same would be decreased.

[83]—Which substances must be kept out of the electrolyte?

Everything but water and sulphuric acid.

[84]—How is this possible?

Use pure distilled water and chemically pure brimstone sulphur in the process of manufacture of the electrolyte; after the battery is made, avoid the contamination of the same by keeping the cells sealed and by using distilled water in making up for loss of electrolyte.

[85]—What is the reason for having to add water to the battery in service?

Evaporation of the water is bound to take place at a slow rate, and this loss must be compensated for by adding an equal amount of the same. During charge, when the battery is nearing a condition of full charge, hydrogen and oxygen will be liberated at the nodes, and these gases, as they burst free, will pick up a certain amount of liquid and "spray," which is formed, will shoot out of the cells; this spray is made up of water for the most part.

[86]—Why not prevent the spraying by sealing up the cells?

Were the cells sealed up tight enough, the formation of gas in the manner as stated would cause a gas pressure in the cells, and they would disrupt; in order to avoid the generation of a pressure, the cells are provided with a "vent" which allows the gases to escape as they are formed, but water is prevented from escaping excepting at a very slow rate; water does escape, however, and in time it must be replenished.

[87]—Why is it that water only escapes during the gassing period?

Very little of the sulphion escapes with the spray, for the reason that, during the gassing period, some of the sulphion is mingled with the active material, and the balance, being heavier than the spray, stays behind. Still, some sulphion is lost, and the time must arrive when the same should be adjusted also.

[88]—How is the correction made when the electrolyte falls below the desired strength?

Add a sufficient amount of sulphuric acid to the electrolyte to bring up the strength to the desired level.

[89]—What is the method of procedure?

One way is to draw off a certain quantity of the weak solution, after the battery is fully charged, and add enough strong solution to bring about the desired balance. The strong solution should be made for the purpose of pure ingredients, and register about 30 degrees Baumé.

[90]—Why not add pure concentrated sulphuric acid?

It is dangerous to the one who undertakes it, due to the rapid generation of heat when concentrated solutions of acids are spilled into water or weaker solutions of water and acid. The explosive effect will cause the acid to fly about, and if it contacts with the person who makes such a mistake the result may be very disastrous. If it is not proper to use concentrated solution in a cell of battery, the same objection will be present if the strong acid is used in the process of equalizing.

[91]—Why not empty out all the old acid from the cells and put in new solution of the right strength?

The elements will then be uncovered, and if it is desired to keep them submerged in electrolyte during service, the same requirement will be present during the period of equalizing.

[92]—What is the objection to uncovering the elements?

If the electrolyte is allowed to fall below the level of the active material on the elements, heat and other manifestations of a chemical change will be rendered manifest at once; the active material will harden; porosity will be reduced, and the life of the battery will be much reduced; the capacity will also fall off as the porosity is decreased.

[93]—Will the same amount of water have to be added to each cell of battery during the process of equalization?

No. The loss of electrolyte, while it goes on in each cell of the battery, will not be the same in each. In the process of equalization, there are two points to consider.

(a) Water must be added to keep the elements submerged completely.

(b) The strength of the electrolyte must be maintained equal in each cell of the battery, and, in order to do this, it is necessary to test each cell independently (when the battery is charged and at a constant temperature) and adjust the strength.

Difference Between 2-Cycle and 4-Cycle

Editor THE AUTOMOBILE:

[2,282]—As a subscriber to your valuable paper, I notice that motors are referred to at different times as 2-cycle or 4-cycle. Please advise me what a cycle is, and what is the difference between 2-cycle and 4-cycle. SUBSCRIBER.

La Fayette, Ala.

In the 4-cycle motor there is one power stroke in each four strokes; there are two strokes per revolution of the crankshaft; valves are used to regulate the inflow and exhaust. In the 2-cycle motor there is a power stroke for each two strokes, and ports as shown in Fig. 1, are so placed as to admit the mixture and permit exhaust on each down stroke of the piston. The arrows indicate the direction of flow of mixture from the crankbox and exhaust to the atmosphere. In this illustration, a fan is shown in the act of exhausting. This fan is not used in regular practice, and the exhaust takes place under terminal pressure.

How to Estimate Horsepower of a Motor

Editor THE AUTOMOBILE:

[2,283]—To estimate horsepower of a motor, I understand the process is to square the bore of the cylinders, multiply by the number of cylinders and divide by 2.5. Will you kindly explain what is meant by squaring the bore, giving an example? Also kindly show the process for determining the displacement of a motor, in cubic inches. READER.

New York City.

To square a number is to multiply it by itself, that is to say, the square of 2 is equal to $2 \times 2 = 4$, or $4 \times 4 = 16$, or $16 \times 16 = 256$. Likewise, any number multiplied by itself will give the square of that number. In using the formula, remembering that the power of a motor is in proportion to the square of the bore of the cylinder, the formula may be written as follows:

$$\text{Horsepower} = \frac{\text{bore in inches squared} \times \text{number of cylinders}}{2.5}$$

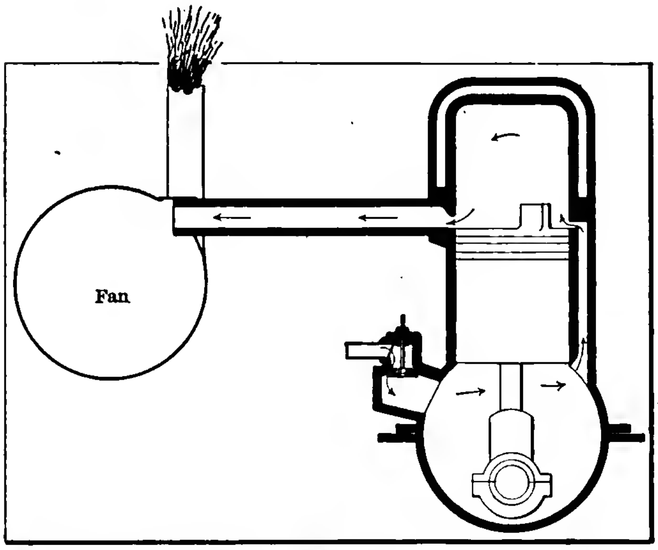


Fig. 1—Typical illustration of a 2-cycle motor with mixture in the crankbox, and an automatic admission valve thereto

For a 4-cylinder motor, if the bore is 4 inches, this formula will give:

$$\text{Horsepower} = \frac{4 \times 4 \times 4}{2.5} = 25.6$$

Using precisely the same method, the horsepower of any motor (according to this empirical formula) may be approximated.

It will be understood that this method of approximating horsepower, while it is a good one in a general way for purposes of comparison, does not give the real horsepower of the motor. The best method of determining the horsepower of a motor is to subject it to a dynamometer test.

Gasoline Is Vaporized by Heat

Editor THE AUTOMOBILE:

[2,284]—I have learned by reading THE AUTOMOBILE that gasoline will remain as a liquid until it is vaporized by the application of heat. I also understand that the reason why gasoline is suitable for use in automobile motors, aside from the fuel value it holds, is because it boils at a low temperature, thus making it unnecessary to utilize special forms of heating equipment in the process. There is one point which is a little obscure in my mind which I will bring out by asking a question. If heat must be transferred to the gasoline in order to vaporize it, is it not a fact that some of the fuel value is lost in the process? In other words, I would like to know the relation of the latent heat of evaporation, and to have you state a method by which the number of heat units involved may be ascertained. SUBSCRIBER.

Newark, N. J.

The amount of heat measured in B. T. U. necessary to raise 1 pound of gasoline 1 degree F. is 0.500 (taking an average value for the character of the gasoline used for fuel in automobile motors), and it therefore follows, as a close approximation, that a drop of 1 degree F. in the temperature of 1 pound of this gasoline corresponds to the transfer of 0.500 B. T. U. of heat. The specific heat of atmospheric air at a constant pressure is 0.2375 B. T. U. and a drop in temperature of 1 pound of air under these conditions is attended by the dissipation of 0.2375 B. T. U. of heat.

Since the best mixture of air and gasoline for automobile work is on a basis of 1:15.39 gasoline and air respectively, the transfer of heat will be as follows:

$1 \times 0.5 + 15.39 \times 0.2375 = 4.155$ B. T. U.

Considering the latent heat of evaporation of gasoline as equal to 210.5 B. T. U., it follows that 210.5 B. T. U. of heat must be supplied either by the ingredients or from some outside source before the liquid will change to gas form. In a carbureter it is necessary to consider that the heat must come from some outside source, and it is for this reason that hot-water jacketing is resorted to. In some cases the heat is supplied by heating the air before it passes to the carbureter and, while this is not the most efficacious way, even so, if the application is well made, it works very well indeed.

At all events the gasoline will not vaporize until the heat balance is established in accord with the requirement as above stated, which to bring about requires:

$$\text{Drop in temperature} = \frac{210.5}{4.155} = 50.66 \text{ degrees F. fall of}$$

temperature of the mixture to accomplish the necessary transfer of heat. Changing temperature, which is present when the fuel is being vaporized, has one other effect that interferes with good carburetion, i.e., the viscosity of the liquid changes, the difference being sufficient to cause the flow of gasoline through the nozzle to increase with temperature enough to upset the balance when the motor is running fast and in a heated condition. The effect of temperature may be stated as follows:

Temperature, °F..........	50	59	68	77	86	95
Weight of gasoline........	1	1.073	1.145	1.212	1.260	1.335

The difference, as given, is sufficient to cause the motor to perform badly, and to interfere with any automatic means of carburetion.

Motor Compression Is Bad

Editor THE AUTOMOBILE:

[2,285]—I have a single-cylinder car, with a 5-inch bore, which has been run four years. The packing rings in the cylinder are open at the ends 1-16 of an inch, and the compression is bad. Would you advise new rings put in? If so, should the open ends be at the bottom of the cylinder, or turned around so that the ends will be a quarter of a turn from each other?

Dallas, Texas. W. E. GARABRANT.

Replacing the piston rings with new and more perfect rings will be a step in the right direction, but it may not cure the difficulty. The illustration as here given shows two pistons which were photographed after the compression became bad, and the information afforded will bear upon your case. The piston at the left shows unequal wear at P1. This condition suggests that the bore of the cylinder was also worn to an elliptical formation, and it was found in practice that replacing the piston rings did not cure the difficulty, because the new rings, while they were good and true, would not conform to the elliptical curvature of the cylinders, and leakage went on as before. The top ring of the same piston, marked R4, broke off at the joint, because the ring was too large for the bore, and it buckled up, resulting in a fracture at the weakest point. The piston at the right shows substantially the same difficulty, affording, however, the additional advantage of showing the blackened zones on the rings, which were caused when the rings buckled up, due to the fact that they were not left sufficiently open at the joints. In making a repair of this character, it is necessary to regrind the cylinder, if it is not true, and replace the rings if they are not in good order.

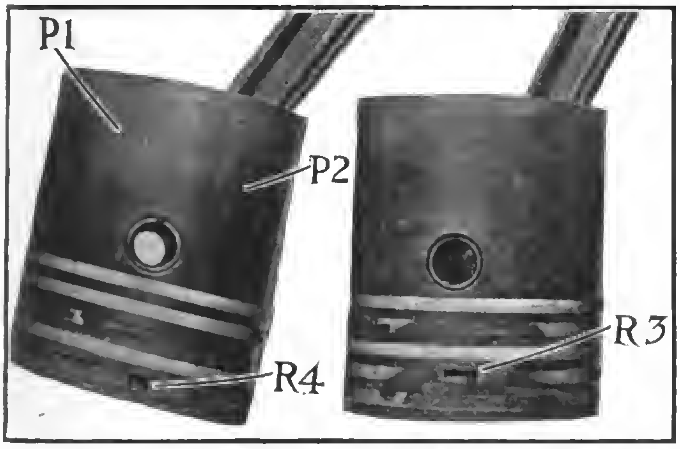


Fig. 2—Reproduction of worn out piston and rings showing how piston deformed and the rings fractured because the space at the joint was insufficient.

Magnetism in the Core of a Coil

Editor THE AUTOMOBILE:

[2,286]—I do not understand how magnetism circulates in the iron core of a spark coil. What has the iron to do with it?

Buffalo, N. Y. NOVICE.

Referring to Fig. 3, the "lines of force" are indicated by a series of loop-like lines, some of which pass through the ends of the core, and others through the diameter. When an electric current is impressed on the windings around the core, magnetism is set up in the iron core. This magnetism would be present were there no core of iron, but the magnetic flux would be less dense per unit of area in the absence of the iron core because the magnetic reluctance of air is far greater than that of iron. The iron, therefore, is utilized for the purpose of intensifying the density of the magnetic flux, so that the secondary electromotive force of the coil will be a maximum. The iron used must be of a special soft grade, of great purity, and preferably in the form of a bundle of wire. The density of the magnetic flux will be maximum at the mid-section between the boundaries A—B and A1—B1, tapering off towards the end as indicated.

Which Is Better, Long or Short Stroke?

Editor THE AUTOMOBILE:

[2,287]—One prominent manufacturer of motor cars makes a long-stroke engine, 6-cylinder, 40 horsepower, and puts up some fine arguments in its favor, yet in their larger car the engine is 5¾ x 5½. This is puzzling to laymen. Will you please enlighten?

Birmingham, Ala. ZIMMERMAN.

Not necessarily either. It is presumed that you mean when you say, "the stroke is long" that the length of the stroke exceeds the bore of the cylinder. Taking this for granted, the question of the advantage of the long stroke is one which cannot be discussed on an abstract basis. The world is so full of long stroke motors, which are wholly incapable of serving as power plants for automobiles, that it would lead one to the conclusion that the quality of a motor is not merely wrapped up in the ratio of bore to stroke. There are a hundred things to consider, and when they are all reduced to a relation involving harmony, the motor may be thoroughly good with a long or a short stroke. Lengthening the stroke, if the design is proper, adds to the power of the motor, considering a given bore. On the other hand, increasing the bore adds to the power of a motor for a given stroke.

What Has Color of Spark to Do with It?

Editor THE AUTOMOBILE:

[2,288]—Please answer in your inquiry columns, which is the best spark for a coil, a blue or a yellow spark? SUBSCRIBER.

Plainfield, N. J.

The spectroscope, which is an instrument employed in determining the composition of bodies by color comparison, has never been successfully employed in connection with the spark at the gap of a plug in an ignition system of an automobile. The best spark is the one which dissipates the largest amount of energy in the gas, and the measurement of the energy cannot be accomplished by the simple method of gazing at the spark and deciding that it is good because it is yellow, or better because it is blue. It would be something of a gain were one to be able to arrive at the conclusion that the spark is "vicious." This is not even possible by measuring the electrical energy.

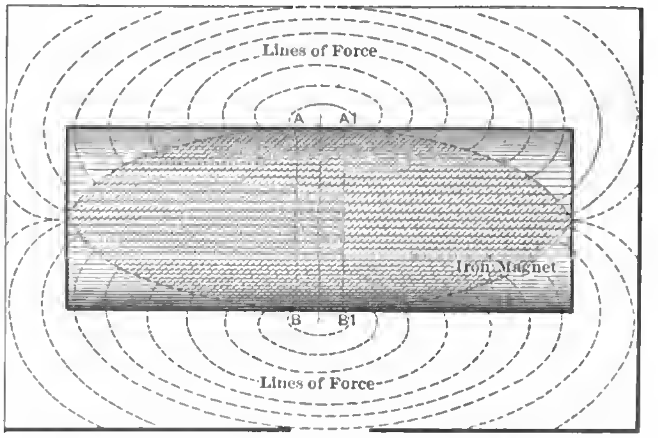


Fig. 3—Illustrating lines of magnetic force in the soft iron core of a spark coil showing how some of the lines short circuit through the diameter.

Forced Lubrication

(First Installment.)

By R. K. MORCOM, Mem. I. of A. E.

Paper read on Wednesday, May 11, 1910, at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S. W. Dr. H. S. Hele-Shaw, F.R.S. (President of the Institution), in the Chair.

THEORY and practice of lubrication are subjects of such importance that it is not surprising to find a very extensive literature on them.

The mathematical theory has been well treated, and experimental figures of a varied nature are available to confirm or correct the theoretical treatment. While taking for granted the established results of those who have investigated the matter, it may be useful to any who wish to refer to the original communications to give a slight bibliography.

Beauchamp Tower—Proc. I. M. E., 1883, 1885, 1888, 1891. Reports on Friction Experiments. These classic researches were made chiefly on pedestal and saddle bearings. The pressures were taken to high figures. but the speeds were not high. The investigations on the oil film are particularly interesting.
Osborne Reynolds—Trans. Royal Society, 1886. This gives a full mathematical treatment of Tower's results, and may be taken as the foundation of the modern theory of lubrication.
Nicholson—Trans. Manchester Association of Engineers, 1907-8. A useful paper and discussion. It co-ordinates the results of various investigators, among others—
Stribeck (Z. d. V. d. Ing. September 6, 1902).
Helmann (Z. d. V. d. Ing. Vol. 49, p. 1161).
Sommerfeldt.
Ewing and Jenkin—Phil. Trans., 1879. On starting from rest.
Lasche—Traction and Trahsmission. January, 1903. Also published separately, "On the Design of Bearings for High Speeds." An interesting account of experiments for the A. E. G. Radiation from and cooling of bearings and variation of temperature from point to point are among its most interesting sections.
Morcom—I. M. E., 1897. Deals particularly with double-acting engines using forced lubrication.
Goodman—Pamphlet on "Friction and Lubrication of Cylindrical Journals," 1890.
Archbutt and Deeley—Treatise on "Lubrication and Lubricants."
Thurston—"Friction and Lost Work."

A number of other papers might be quoted, but these give considerable information and fairly cover the ground.

The one outstanding conclusion is that the modern theory of lubrication is the theory of the oil film. The old ideal of a coefficient of friction gives place to the more suggestive theory that the resistance to motion is due to the shearing of a film of oil, which more or less completely prevents metallic contact and abrasion. The importance of the film is shown by considering that the resistance of a fully lubricated surface may be only one per cent. of a similarly loaded surface in which an oil film is not maintained. Resistance to shearing depends upon the viscosity of the lubricant, thickness of the film, and the area of film in shear. The temperature of the film may alter its viscosity; the extent of the film may not be equal to the extent of the bearing; the thickness of the film may not be such as to entirely prevent abrasion, and the clearance in the bearing may be irregularly distributed and inaccurate, and similar disturbances may be created by bad alignment of the shaft or its springiness, so it is not possible to entirely solve the problem. As usual in engineering, theory may direct or explain practice, but experience must determine it. Certain positive conclusions, however, may be taken as established:

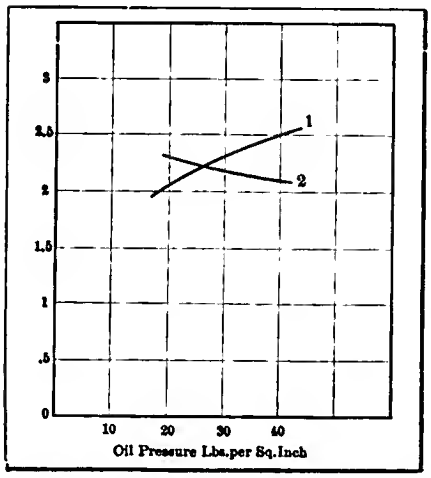


Fig. 1—Chart which is designed to give the horsepower with loads of 186 pounds and 5,130 pounds respectively

(1) The resistance decreases with the thickness of the film.
(2) The resistance increases with the viscosity of the lubricant very materially.
(3) The point of nearest approach is approximately 90 degrees from the line of load.
(4) The points of maximum and minimum oil film pressure are approximately at equal distances from the point of nearest approach.
(5) As the speed increases the points of maximum and minimum oil pressure get further and further apart, till at very great speeds they are in the line of load.
(6) As the speed increases the eccentricity of the oil film becomes less.
(7) The concentric position is the one of least resistance.
(8) Oil should be supplied at a point where the supply pressure is greater than the film pressure.
(9) The loading for a given speed must not exceed a certain limit at which the oil film is broken.
(10) This limit may be increased by lengthening the bearing, so increasing the cooling influence on the bearing.
(11) Oil grooves wrongly placed may destroy continuity of the film.
(12) A motion of pure rotation produces automatic maintenance of the film, provided the supply is adequate.
(13) The temperature varies throughout the bearing, the highest temperature being at the point where the film is thinnest.

Further, in the case of a reciprocating load we know that

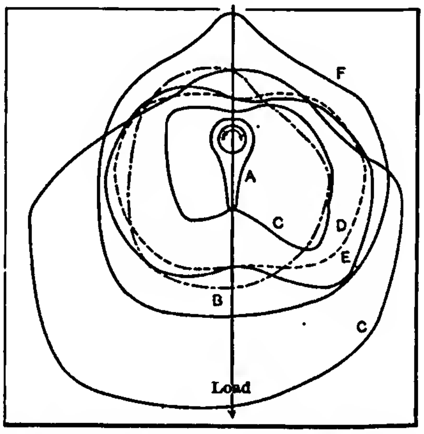


Fig. 2—Diagrams of oil pressures at various points given in section to clear the text

(1) A reciprocating load irrespective of rotation produces automatic lubrication.
(2) Heavier mean loads can be supported if the direction of load is reversed, because the lubricant is more vigorously sucked in, and the retardation of surfaces approaching one another normally increases very rapidly as the film becomes thinner.

Generally speaking, failure of lubrication is caused by rupture of the film due to:

(a) Inadequate supply of lubricant
(b) Reduction of the viscosity arising from excessive heating, either general or local.
(c) Badly placed oil grooves.
(d) Overloading.
(e) Grit.
(f) Impurities, such as water, reducing the film-forming quality of the oil.

Assuming that the bearings are not overloaded, that system of lubrication will be best which best ensures that other causes of failure shall not occur.

The more one studies the question the more does forced lubrication best appear to meet the requirements. Its acknowledged superiority over other systems for high-speed steam-engines suggests its adoption for the motor car engine. Various splash and gravity systems have been very carefully designed and worked out for car motors, and the success attained is great—so great that it is easy to argue that the success is good enough. But practice in the long run always pronounces in favor of the theoretically best, and it is this which explains the increasing favor with which pressure supply meets.

In the last installment of this article will be given particulars of the lubrication systems of a number of well-known motor cars. There are no fewer than eighteen examples using oil under pressure. The data which various manufacturers have kindly supplied will, it is hoped, serve not only to establish this point, but also to indicate accepted practice as regards the arrangement, etc.

There is considerable difficulty in obtaining full figures and particulars of up-to-date results and methods, such as oil consumptions, oil temperatures, wear over long periods, oil grooves, etc., and the table is necessarily long and incomplete. In fact, information about forced lubrication, both descriptive and experimental, is rather scanty. Nearly all the experimental work has been done on bearings lubricated by other systems.

Some experiences with forced lubrication do not at once fit in with theory, and it may be of interest to describe a few observations and experiments.

One of the most obvious things to examine was the actual saving in friction, if any, which occurred with forced lubrication. A trial was made on a 120 b. h. p. engine at 450 revs. per minute. The engine was run unloaded with oil pressures of 30 lbs. and 5 lbs., and without pressure, the supply being maintained with a syringe. A large number of no-load cards were taken and the i.h.p. averaged out. The results of the trial showed:

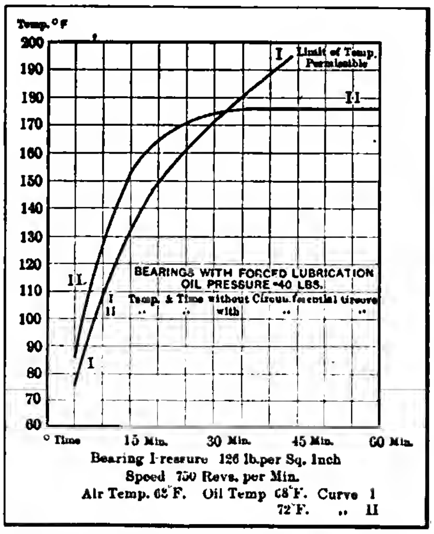


Fig. 3—Bearings with force feed lubrication with a pressure of 40 pounds per square inch, showing resultant temperatures

(1) That the engine was quieter the higher the pressure.
(2) The friction i.h.p. averaged 2.13, 2.41, 3.33, with 30, 5, 0 lbs. pressure respectively.

There is some trouble in explaining this result, for one would expect the cooler oil and more complete oil film with the higher pressure to increase rather than decrease the resistance. Some light is thrown on the case by the quieting action, which means that the film thickness in reciprocating bearings was better maintained. In addition such a result may occur in a steadily loaded bearing, owing to the more copious supply preventing excessive local heating of the film, leading to rupture. This is borne out by the experience that an engine with forced lubrication takes longer to "run in" than one with splash or gravity supply, and further that its bearings take longer to take up a high polish.

Such a result was obtained in an experimental bearing.

A 4 in. shaft was run at 1,000 r.p.m. in two bearings 10 in. long; between these was a bearing 10 1-2 in. long, loaded by means of a spring and lever. The outer bearings were supplied by a gravity supply, the inner at varying pressures. The journal was driven by an electric motor. Curves 1 and 2, Fig. 1, give the horsepower with loads of 186 lbs. and 5,130 lbs. respectively. The temperature was 168° F. in the one case and 200° F. in the other when run for some time at 25 lbs. pressure oil supply.

A series of trials were taken with a load of 24 lbs. per square inch on a bearing 10 in. long by 4 in. diameter. The bearing had a horizontal oil groove cut, and this was tried in four positions:

(1) On the loaded side.
(2) Opposite the load.
(3) On the right-hand side at right angles to the load, with rotation as in Fig. 2.
(4) Opposite to (3).

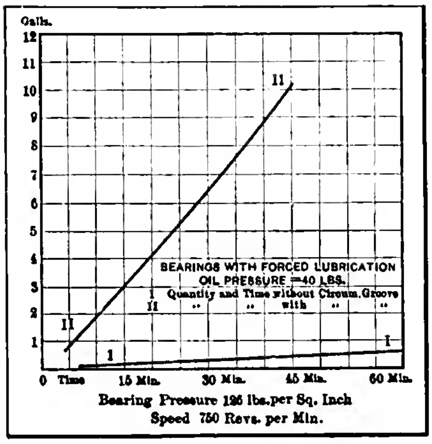


Fig. 4—Chart of the quantity of lubricant circulated, giving the time, speed and pressure

Diagrams were taken of the oil pressure at various points, a selection of such diagrams being given in Fig. 2. The curves may be compared with those composed by Dr. Nicholson from Sommerfeldt's figures.

The index to the curves of Fig. 1 is as follows:

A. 500 r.p.m. 20 lbs. per sq. in. oil pressure.
Groove position (1) 24 lbs. per sq. in.
B. 1,000 r.p.m. 20 lbs. per sq. in. oil pressure.
Groove position (2) 24 lbs. per sq. in.
C. 1,000 r.p.m. 20 lbs. per sq. in. oil pressure.
Groove position (1) 24 lbs. per sq. in.
D. 1,000 r.p.m. 40 lbs. per sq. in. oil pressure.
Groove position (1) 24 lbs. per sq. in.
E. 500 r.p.m. 40 lbs. per sq. in. oil pressure.
Groove position (1) 24 lbs. per sq. in.
F. 1,000 r.p.m. 40 lbs. per sq. in. oil pressure.
Groove position (2) 24 lbs. per sq. in.
G. 660 r.p.m. 20 lbs. per sq. in. oil pressure.
Groove position (2) 126 lbs. per sq. in.

Run at 1,000 r.p.m. and 40 lbs. per sq. in. oil pressure, the final oil temperature reached was taken and found to be:

Oil groove in position (1) 74° F. above air temperature.
" " (2) 62° F. " "
" " (3) 60° F. " "
" " (4) 62° F. " "

It would appear that position (3) is the best position.

A further series of trials were run at heavier loads with spring loading. It is unnecessary to give the trials in detail. The most important conclusion to be drawn was that the benefits of forced lubrication were best realized with a circumferential groove, which enabled heavy loads to be taken at high speeds.

As an example, the curves in Figs. 3 to 5 give temperature, e.h.p. and quantity of oil passing with 126 lbs. per sq. in. loading, 750 r.p.m. and 40 lbs. oil pressure. The curves II. are with circumferential groove; the curves I. are with two horizontal grooves 2 1-2 in. apart on top of bearing, joined by a short circumferential arc.

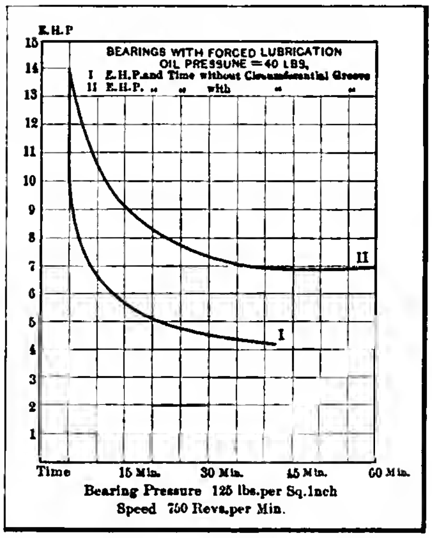


Fig. 5—Chart of the relation of power and time with lubricant circulating under a pressure of 40 pounds per square inch

The Wrong Way to

Fig. 1—In approaching an automobile to pass it, if it is desired to get into trouble, pass it on the right, as here shown

INFORMATION for the owner seems to be of the varied sort, with enough and to spare, especially if account is taken of the apparent fact that the "good advice" so freely offered betimes is rarely taken seriously. Perhaps the character of the material is below the level which merits notice; it may be that it is too freely offered, or the true answer to the enigma may lie in some long-forgotten channel. At all events, it seems as if some way ought to be contrived which will fill the want. That there is a vacancy is assured from the very fact that accidents do happen with almost slavish regularity, and when the reason is sought out, it generally results in disclosing a lack of appreciation of the good that is in the "rules of the road."

If the average beginner cannot be reached by any method of telling a direct story, it may be that a reversal of the direct method will serve the purpose. How not to drive, then, is the gist of this plaint, and in order to be able to tell it in the language that will carry conviction, it was considered necessary to take two automobiles out on the highway, and have the "staff photographer" record the doings. The illustrations offered with this article do not represent the actual happenings of autoists who violate the principles of safe and legal driving, but they do show how to go about it if accidents are courted.

Some of the Relations of Automobiles to Roads

The power plant of the automobile is there placed to propel the car; it furnishes the stamina, so that when it is desired to go, it is necessary to turn on the power. The power plant, then, is placed to accomplish a certain purpose, but it must be understood that it is also capable of being the source of damaging occurrences. When the automobile is brought up to speed, it is necessary to steer it along the roadway in such a way that it will keep on that part of the same that is fit to run over, and it is also desirable to avoid trying to occupy space that is taken up by another automobile or a horse and wagon.

If the automobile is going faster than a vehicle ahead, it follows that it is either necessary to slow down, or turn out in order to clear the vehicle ahead during the period that both vehicles are abreast of each other on the road. In order to slow down, if that is the choice, brakes must be used, and, while they are supposed to stand a considerable amount of rack, the fact remains that they do hard work, and they are likely to become deranged. If it is desired to generate an accident just at such a time, the right way to go about it is to have the brakes in a state of bad repair, so that, when it is necessary to bring the automobile to a stop, or to slow down, they will be incapable of performing their proper functions.

Fig. 2—In order to smash a front axle, or damage the steering gear, take to the tall grass to one side of the road and engage, at close quarters, a concealed boulder, as here indicated.

Fig. 3—How the automobile was elevated sufficiently for the front axle to lift clear of the boulder shown in Fig. 4

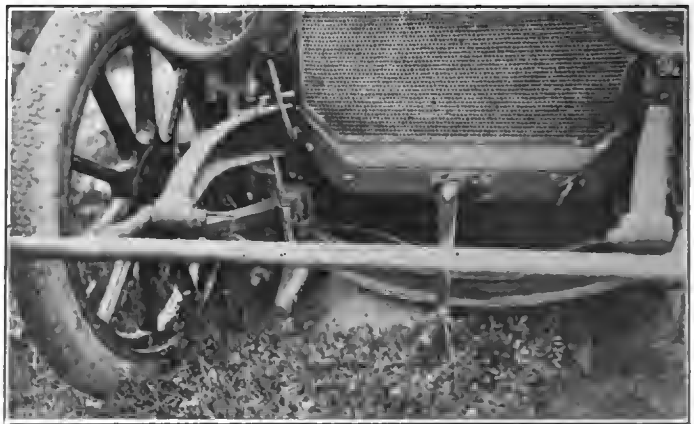


Fig. 4—The boulder on which the front axle rested after it was driven on the wrong side of the road in passing a car ahead

If it is desired to pass the vehicle ahead, the next question is, how will it be done if it is proposed to have a rear-end collision with the car ahead, or to damage the car which is in the position of having to pass the other. Fig. 1 is offered as the right way to pass a vehicle ahead in the process of looking for trouble. In this case, as the illustration portrays, the rear automobile was held in check until the roadway was narrow, and it was then turned to the right instead of to the left, then accelerated in order to make more speed than the car ahead, and started on its course to certain ruin.

Drive an Automobile

While it is true that the plan was merely to illustrate the way which leads to trouble on the road, the joke proved to be on the experimenters, and as the rearmost of the two automobiles plowed its way through the grass on the wrong side, it intercepted a boulder which was hidden by the tall grass, as shown in Fig. 2, with the result that the front axle of the automobile bounced up and landed fair on the top of the boulder after driving the same ahead for upwards of six inches, in addition to forcing it into the earth for a distance.

Trouble Came in the Form of a Boulder

Fortunately, the front axle was a stout one, and the only problem was to get the stranded automobile off the rock. This

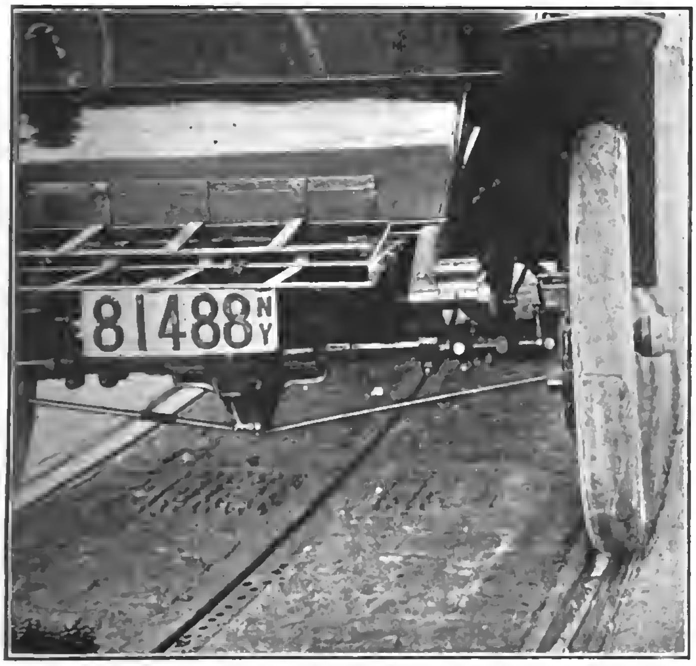


Fig. 7—To damage the tires beyond repair, run in the curve of a car track after it is frayed out, as shown

was accomplished in the manner as shown in Fig. 3, in which a wedge-shaped rock of sufficient height was placed back of the front wheel, and the automobile was then backed off of the rock; it raised up, and the rear axle then cleared the rock. A close examination of the axle indicated that it was not damaged, although the blow was a severe one, and the method is recommended as the very one which is likely to destroy even a good axle, in nine cases out of ten, but an axle of poor construction is bound to be fractured every time.

Just how the automobile looked when the front axle was resting on the rock is possible of discernment by a close examination of Fig. 4, although it proved too dark beneath the car to get a good photograph of the rock and the axle at that point.

The Best Way to Be a Graduate Road Hog

Among the accomplishments of the man who wants to drive wrong must be numbered the one which will enable him to get up a reputation for being what is tersely termed a "road hog." In order to show how it is done, the two automobiles were taken to a road that is narrow, and the one ahead crowded to the left of the road so that the one behind was offered no opportunity of passing excepting on the wrong side. Fig. 5 is a fair illustration of the method, and it is believed that any-


Fig. 5—How a road hog takes to the left of a narrow road to prevent any other autoist from passing him

one, even in the absence of any great skill, will be able to perform the feat at will. All that is required is an automobile and the desire to be mean with a certain studied ingenuity.

How to Damage the Tires With Small Effort

A very good way is to carelessly back up against a formidable obstruction as shown in Fig. 6. Find a narrow roadway, run up it for a distance and then decide to turn around, rather than to see it through. In turning around, throw in the reverse, speed up the engine, then throw in the clutch, and finally back the automobile up against any obstruction that happens to be in the line of travel. Still another good way is to run in the street car tracks just where they are frayed out, as on a curve. Fig. 7 is a good average example.

With the rubber market soaring skyward, and but small chance of a downward trend in the near future at any rate, it is believed that this illustration of the method by which tires may be cut to pieces in a short while should prove of great value to those who prefer to do things the wrong way.

One point, bearing upon the question of destroying tires, was carelessly overlooked. If the tires are more or less flat they will bow to this treatment much better. In order to hasten the destruction of the tires, run them insufficiently inflated. Ordinarily they are inflated (each one the same as the other) to about 80 pounds per square inch, considering the 34-inch sizes (other sizes to correspond), and this full and even inflation protects the tires under the most adverse conditions.


Fig. 6—In backing up, if it is desired to damage the automobile, be careless and back into an obstruction, as shown

Report of Cast Iron Test Bars*

(First Installment)

FOLLOWING closely upon the reading of the paper upon tests of cast-iron bars, many other experimenters presented their results in the same field of endeavor. Thus Prof. W. B. Gregory spoke as follows: The writer has recently made a large number of tests of cast-iron specimens of one-inch square cross section and with supports 12 inches apart, a few being also broken in tension. The results confirm the deductions of the author as to the relationship between breaking loads in tension and in cross bending. The ten-to-one ratio holds in these tests as in those given by the author. Table 1 gives the results of the cross-bending tests, the load being applied at the center.

TABLE 1. TESTS IN CROSS BENDING

Specimens 1 In. by 1 In., 12 In. Between Centers, Load Applied at Center

No.	Breaking Load Lb. per Sq. In.	Deflection In.
1	2,280	0.10
2	2,250	0.10
3	2,680	0.09
4	2,410	0.09
5	2,250	0.08
6	2,870	0.09
7	2,240	0.09
8	2,310	0.08
9	2,250	0.09
10	2,470	0.08
11	2,180	0.10
Mean	2,335	0.09

From the specimens broken in cross bending, six were selected from which were turned tension test pieces approximately one-half inch in diameter at the smallest section, their length over all being five inches. The threads at the ends were three-quarter inch outside diameter. The test pieces were made to fit loosely into the tension bars of the testing machine so that side stresses were entirely eliminated, and the specimens were broken in pure tension. The results are given in Table 2.

TABLE 2. TENSION TESTS

No.	Breaking Load Lb. per Sq. In.
1	22,900
2	23,300
3	22,800
4	23,550
5	24,600
6	22,050
Mean	23,200

The ratio of tensile strength to load in cross bending is

$$\frac{23200}{2335} = 9.94$$

This comparison can be made only on the basis of averages, as no record was kept of the numbers of the specimens broken in cross bending. The six tension specimens therefore represent six of the eleven specimens broken in cross bending. Specimen No. 9 of the cross-bending tests may be taken as fairly typical of the others. A chemical analysis was made of this specimen with the following results:

Total carbon	4.04
Silicon	1.76
Phosphorus	0.562

The mean deflection as given by the author averaged 0.45 inch for two sets of specimens and 0.44 inch for another set. The highest value of deflection in any case was 0.50 inch. Since the deflection varies as the cube of the length of specimens between supports, it follows that the deflection for specimens tested with supports 24 inches apart should be eight times the deflection for a length between supports of 12 inches. On this basis the specimens tested by the writer should have

$$\frac{0.45}{8} = 0.056 \text{ in.}$$

deflection instead of 0.09 inch average as the tests showed. Can this discrepancy be explained by the difference in chemical composition or is it due to other causes?

This raises the question of what deflection ought to be specified for one-inch square specimens with 12 inches between supports. Some specifications have recently been brought to the attention of the writer in which the minimum deflection was placed at 0.15 inch. Is this commercial cast-iron or does it call for a special mixture, expensive and hard to obtain?

The author has mentioned that the "skin of the metal" was of no appreciable thickness. I would like to ask if he has ever tried the effect of rattling on specimens. The process of rattling will remove the sand and the skin of the metal. In this connection the results in Table 3 may be of interest.

TABLE 3. TESTS OF CAST-IRON IN CROSS BENDING

Specimens Round, 1¼ In. in Diameter, 12 In. Between Centers. Not Rattled

No.	Breaking Load Lb.	Deflection In.	Remarks.
1	2,450	0.075	Cast in pairs on end
2	3,010	0.08	" " " " "
3	2,670	0.07	" " " " "
4	2,580	0.14	" " " " "
5	2,700	0.09	" " " " "
6	2,580	0.14	" " " " "
7	2,620	0.08	" " " " "
8	2,430	0.075	Cast flat
9	3,360	0.09	" "
10	2,750	0.08	" "
11	2,990	0.09	" "
12	3,170	0.09	" "
13	2,950	0.095	" "
14	2,960	0.12	" "
15	3,080	0.10	" "
16	2,580	0.075	Cast on end
Mean	2,805	0.093	

The tests given in Table 4 are on specimens of the same size as those in Table 3. The metal used was as nearly the same as the foundry could make it and the specimens were placed in a rattler and the sand and "skin" removed by abrasion. From these figures it will be seen that rattling has increased the strength of the specimens, the increase being 3474 — 2805 = 666 which divided by 2805, gives 23.85 per cent. This phenomenon has been noticed by other experimenters.

TABLE 4

No.	Breaking Load Pounds.	Deflection Inches.
1	3,750	0.09
2	3,330	0.095
3	3,400	0.08
4	3,520	0.09
5	3,640	0.09
6	3,640	0.10
7	2,760	0.075
8	3,670	0.095
9	3,060	0.09
10	4020	0.10
11	3,440	0.09
Mean	3,474	0.0904

The statement that rattling increases the strength by about 25 per cent. seems to be borne out by experiments. The increased strength is probably due to a removal of some of the internal stresses in the specimens and to the fact that the particles of iron, by the process of tumbling the bars together, are allowed to arrange themselves so that they are better able to resist stresses than they were before rattling.

Since the breaking load varies directly as the moment of inertia of the cross section of the specimen about the gravity axis, we have

I_g for the specimens 1¼ in. diameter $= \frac{1}{4}\pi r^4 = 0.7854 \times 0.625^4$ $= 0.12$

*Discussion following the presentation of a paper of this title at the October meeting of the American Society of Mechanical Engineers, Galveston. The discussion is by Prof. W. B. Gregory, the author of the original paper, and others. This paper was designed to show engineers that test pieces, whether cast in separate molds or in the same mold as the main casting, are not perfect indications of the character of the iron in the main casting. In other words, uniformity of results is not found in practice where we know of no reason why they should not be uniform. These test bars were used in the construction of over 3,000,000 pounds of pumping-engine castings, involving soft and hard irons for the various parts.

Ig for the specimens 1 in. square $= 1/12\, bh^3 = 1/12 = 0.0833$

Then

$$\frac{0.1203}{0.0833} = 1.44$$

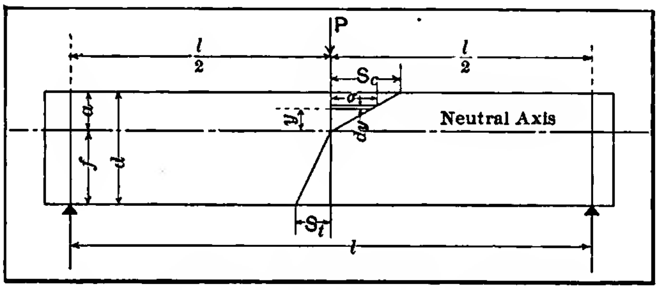
Making the comparison between the unrattled round specimens and the square ones, we have

$$\frac{2805}{2335} = 1.2$$

Comparing the rattled round specimens with the square ones we have

$$\frac{3474}{2335} = 1.487.$$

GEO. M. PEEK. The paper brings up a point which I have had in mind for some time, and which I have never seen explained in any of the text books on the strength of materials or any of the engineer's hand books. The formula is obviously not applicable to cast-iron beams, for the reason that it assumes that the neutral axis of a rectangular beam is in the center, which is true only when the beam is made of a material with equal tensile and compressive strengths.



Sketch of beam to show loading and neutral axis

Automatic Stability in Aeroplanes

(Second and Last Installment)

ADAPTED FROM THE GERMAN BY MARIUS G. KRARUP.

CONSIDERING the gyroscope, if it is forced to take a new angle in spite of its resistance, and this change of angle has to be large, it is liable to follow the lines of smallest resistance, in ways at present difficult to foresee, the difficulty arising largely from burdening it with work too heavy for its capacity in order to avoid a weight which could not easily be carried.

The uncertainties in applying the gyroscope principle are evidently best obviated by reducing the weight of the apparatus to, say, 10 kilos and asking of it a very much reduced amount of work, as may be done on the relay principle by suspending the gyroscope free to turn in relation to the whole machine but capable of actuating the control surfaces by the intermediation of compressed air provided by the power of the motor. In the absence of such feeler-organs as above referred to, it seems unfortunately possible, however, that any operation of the gyroscope may come too late if it can only begin when the machine as a whole has already begun to lose its balance.

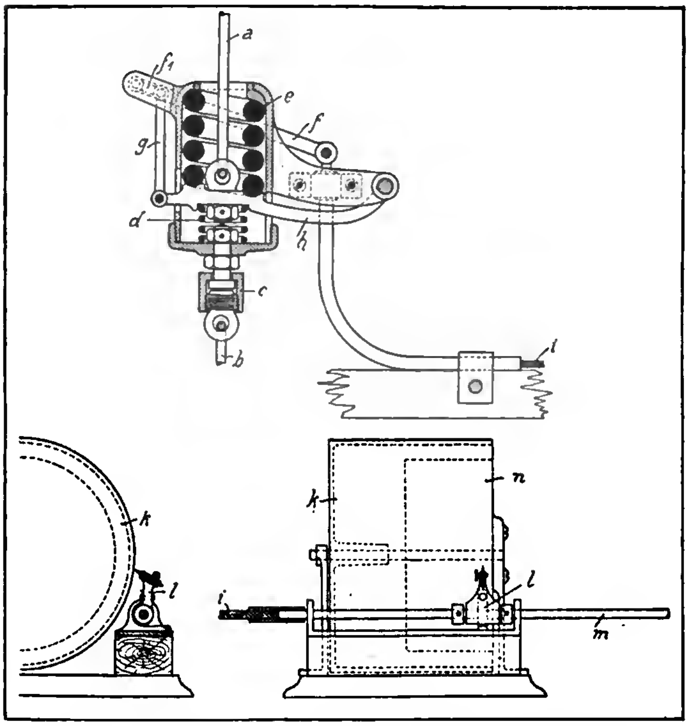


Fig. 2—Dynamometer for measuring stresses in aeroplanes

While this might interfere with the usefulness of the apparatus under an extraordinary combination of unfavorable circumstances, it is equally clear that the device would normally be very useful. The speed of flight is from 20 to 30 meters per second, and if the gyroscope requires only one-third of a second for actuating the control surfaces automatically, danger would in practically all cases be averted, especially if it is assumed that most accidents are due to wrong operation by the aviator and that the gyroscope intelligently applied would not be capable of making mistakes. The experiments made with chrome-nickel steel disks revolved at very high speeds in connection with steam turbines render it certain that the gyroscope can be made to function for a considerable time after the motor has been accidentally stalled, and that it will continue to serve its purpose for safeguarding a landing after such stalling of the motor has occurred.

While the gyroscope is an expensive apparatus, even in the small sizes proposed, it is not generally realized what sums it would save, if it is assumed that it will keep the aviator from committing errors in the control movements at critical moments. The disciples of aviation usually break at least one machine to bits before they learn to operate with safety. Something quite normal is that the learner applies the tilt rudder too strongly, so that the machine suddenly rises in the air, loses its speed and then tumbles down backward. According to the French method of teaching, the learner places his hand upon the arm of the instructor in a number of flights and is expected to await the time patiently when he shall be able to gauge the required control movement instinctively, before a machine is entrusted to him. No doubt, the small gyroscope is capable of obviating the drawbacks in this condition, but it would be advisable to make the most careful experiments before incorporating it in aeroplane construction. It might be taken on board and connected with a registering device, but not with the actual control apparatus, and the latter could be connected with a similar registering device, and the results could be compared. Finally, when it was found that the gyroscope functioned correctly, the control could be entrusted to it. But every automatic balancing device should earn its pilot diploma first.

Automatic stability once secured, most of the other safety measures which have been proposed become superfluous. An auxiliary motor seems an unnecessary complication, whether it is conceived as an independent prime mover or in some form of stored power operating when required, on the shaft of the main motor. If the brains and energy which would be needed for perfecting arrangements of this order were employed in improvements of details in the present simple construction, with weight added to the motor, if necessary to produce the maximum of reliability, and weight saved at all other points of the structure, wherever possible, there would seem to be more promise of dependable results.

The question is where and how weight can be saved. It is impossible to arrive at an answer to this question by figuring. No one knows what the force of a gust of wind is and how it attacks each part, nor how gradually a landing may be effected under this or that condition of weather and ground surface. It will therefore be necessary to treat the whole machine as a large dynamometer and to undertake experiments for determining just what is the force of the normal and abnormal shocks occurring in the operation of an aeroplane. An apparatus will be required for registering the shocks and stresses graphically, and probably the suspension and guy wires are the parts at which this may be most practically done. The pull on a wire may be measured without a break in the wire (as Mr. Conrad proposes to show on another occasion), but the most convenient arrangement, as sketched in Fig. 2, involves the attachment of the dynamometer between the wire ends *a* and *b*; *g*—*h*—f_1—*f* is a lever transmission which draws the Bowden wire *i* to and fro; *d* is an auxiliary spring, *c* the swiveled connection for wire end *b*. The registering device with drum *K*, clock *n*, pushrod *m* and stylus *l*, are actuated direct from the Bowden wire. More than one stylus might be used, of course.

An apparatus of this order may be placed at any point where it is desired to ascertain the stresses under different conditions of flight, starting and landing, and by continued experimenting on these lines it will be learned where weight may be economized and where strength should be added.

(The translator fears that any stress upon a wire connected as proposed will be immediately transferred to other wires or parts of the structure, as soon as the dynamometer begins to operate, and that the author's idea must be carried out in a different manner.)

To further augment the safety derived from the installation of a small gyroscope acting on the control areas and from improvements in details of construction under guidance of experiments with suitable dynamometers, it would probably be advisable to keep in mind the desirability of a design permitting the aviator to see the ground on which he is to land and over which he must travel for some distance at every start. But the best protection consists, after all, in cultivating that indefatigable habit of inspecting every part of the machine, wire after wire and nut after nut, of which Wilbur Wright has set the example.

The Tails of Aeroplanes Discussed

BY a number of experiments, most of the French and German aviators have satisfied themselves that a trailing tail secures steadiness of flight, and this construction feature has therefore been incorporated in nearly all fliers. Accidents happening to those machines whose tails remain short are pointed to as confirming the general opinion. An example is illustrated herewith, the photo showing the precipitous descent of a monoplane designed and piloted by Robert de Lesseps, one of the sons of the builder of the Suez Canal. Even the German and French Wright biplanes are now provided with caudal appendages, and it is a matter for conjecture whether the Wright biplanes of American manufacture will be similarly equipped or not. The French Wright machine illustrated herewith is not in reality, however, equipped with a tail, as claimed by the advocates of this feature who would fain place the Wrights in the light of imitators. A tilt-rudder has been added in the rear, to be sure, and will serve to steady flight, as the true tails do under average weather conditions, but this tilt-rudder is under control from the driver's seat and thereby obviates the principal objection to tails with immobile horizontal "empennage" or stabilizing planes; namely, that of adding an element which is under control by the wind and not by the aviator and therefore as much a source of danger in sudden gusts of wind as of comfort when the wind is steady or in a calm. With many aviation meets in progress or in prospect, each subsidized with valuable prizes, it is perhaps only natural that the European designers should adopt the tail as a palliative for shortcomings in the balancing qualities of their machines rather than try to devise a radical remedy, since they will not be required to fly at the meets or for the prizes in the kind of trying weather in which the drawbacks of the long tail and of all other inert wind-catching features in the construction will be put to the test. Appendages, such as that of the new French Wright model, in which the entire surface is under control, belong, of course, in a different class, and it seems likely that a single tilt-rudder in front and another in the rear—where it will also forewarn the aviator of sudden currents from behind—will prove preferable to a double tilt-rudder in front alone, particularly as the two tilt-surfaces may be operated by the same control movement.

Fig. 1—Precipitation of Robert de Lesseps' Short-Tailed Monoplane

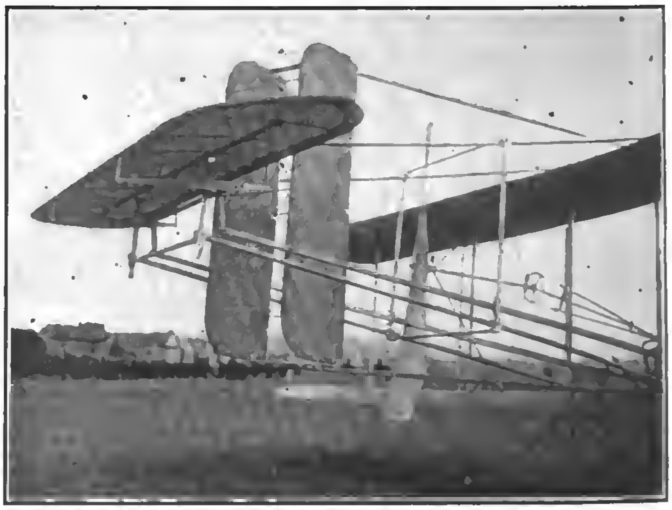


Fig. 2—New Rear Tilt-Rudder of French-built Wright Biplane

The New Motor Vehicle Law of New York

Its Provisions, Operation and Effect

By XENOPHON P. HUDDY, LL.B.

THE LEGISLATURE of the State of New York has enacted a new motor vehicle law and the signature of the Governor, which was affixed to this law on June 2, has finally settled the wrangling which has been going on in this State for a long time between opposing interests concerning automobile legislation. Not since the law of 1904 has the State of New York made any material change in regulating motor vehicles. One or two specific amendments concerning particular subjects have been enacted, such, for example, as allowing surety company's bail bonds to be given. The Legislature has also given a lien to garage-keepers, prohibited chauffeurs from using automobiles without authority and regulated toll for automobiles charged by toll bridges and roads. Aside from these nothing of importance since 1904 has been enacted by the Legislature at Albany except the new motor vehicle law which goes into effect August 1, 1910. This law is comprehensive and attempts to cover the entire subject. It repeals the law of 1904.

It may be said at the outset that the new automobile law is not in any sense a freak measure. On the whole it is a fairly good enactment. There are, however, some objections which may be made to certain of its provisions. It is undoubtedly a revenue measure of the highest type, but automobilists generally do not object to paying large registration fees such as are provided in this law, if the fees are devoted to the public highways. In consideration of the rather high fees—graduated according to horsepower—to be paid for registering automobiles they are exempt from any other tax, either State or local. This is a very wise and fair provision, since if high registration fees are to be paid there should be some compensation for so doing; therefore, automobiles have been relieved from property taxation, but whether this substitute for a property tax is legal is a very serious question. It is equivalent to saying that because automobiles pay a high license fee for using and maintaining certain property, they shall not be subject to ad valorem taxation on that property; or in other words, the license fees are not, in fact or law, license fees, but constitute property taxes.

The law starts out by defining the various terms used therein and the term "motor vehicle" includes all motor vehicles propelled by any power other than muscular, except motor bicycles, motorcycles, traction engines, road rollers, fire wagons and engines, police patrol wagons, ambulances and such vehicles as run only on rails or tracks. It will be seen that motorcycles are not included. They should not be included under an automobile law, and it was a precautionary matter for this law to expressly exclude them, for under the motor vehicle law of Michigan it is held by the Supreme Court of that State that the term motor vehicle includes motor cycles, unless expressly excluded.

Law Defines Chauffeurs and Drivers

The definition of the term "chauffeur" is very short, using less phraseology than the definition in the old law. The present law provides that the term chauffeur shall mean any person operating or driving a motor vehicle as an employee or for hire. This definition is inclusive and exclusive. Any person coming within the definition is a chauffeur. All persons who do not fit the definition are not chauffeurs, and consequently do not have to comply with the provisions of the law concerning employed drivers. I might say that the new law contains a defect which the old law possessed, and which defect is of great seriousness. Under the old law a person who was not a chauffeur and who did not own an automobile, could drive without obtaining a license. For example, a son might use his father's car and drive it all over the State without being compelled to obtain any kind of a license. So might a daughter do this, or any person may borrow or hire a car from another and drive it without being compelled to take out a license. The law has not remedied this situation except in cases where the *exclusive use* of a motor vehicle is given to another for a period greater than 30 days.

The phrase "exclusive use" means uninterrupted use. Therefore, it is nugatory and inoperative in attempting to remedy the defect of the 1904 law. No son or daughter or borrower who uses an automobile belonging to another person has the exclusive use of it for any great length of time. It is an occasional use of a motor vehicle by an unlicensed person which has caused much trouble. Then, again, the exclusive use must be for a period greater than 30 days. It is hard to conceive of a situation where a borrower of an automobile has the exclusive use of the same for a period greater than 30 days. If such a case should be contemplated it would be easy to arrange an interrupted use to get around any question of exclusive use for a period over the limited time. This feature of the new law is objectionable, and there can be no question about it.

Registration by owners of motor vehicles is made with the Secretary of State by filing a verified application containing a brief description of the motor vehicle, the character and amount of the motive power in figures of horsepower in accordance with the rating established by the Association of Licensed Automobile Manufacturers, the name and address and business address of the owner, and if the motor vehicle is to be used solely for commercial purposes the application shall so certify. It should be noted that the only qualification an owner must possess is age of at least 18 years.

The horsepower is to be calculated according to the rating established by the Association of Licensed Automobile Manufacturers. Evidently this law assumes that every one will take judicial notice of what the Association of Licensed Automobile Manufacturers is, and its formula for rating automobiles according to horsepower. Although the provision in regard to determining the horsepower may be perfectly valid, my opinion is it would have been in better taste if the formula adopted by the Association had been inserted instead of using the name of the Association of Licensed Automobile Manufacturers. This criticism may perhaps be more fanciful than real.

The fees to be paid for registering vehicles are: $5 for a motor vehicle of 25 horsepower or less; $10 for more than 25 horsepower and less than 35 horsepower; $15 for 35 horsepower and less than 50 horsepower; $25 for 50 horsepower and more; but when an automobile has been licensed under this law for a period of four separate years the annual registration fee thereafter is one-half of the amount. This does not apply to motor vehicles used solely for commercial purposes, the fee for which is $5 annually.

The owner of a motor vehicle used for pleasure is compelled to pay very much more for his pleasure than the proprietor of a commercial motor vehicle pays for registering the means which he places upon the streets for profit. It would seem that there should be no distinction between these two classes of motor vehicles in favor of commercial cars, and if any distinction is made it should be made in favor of the pleasure car, since an instrument which is earning money and represents an investment producing dividends should pay for its existence.

On the Sale and Transter of Automobiles

When an automobile is sold, the vendor must under the law give notice of the sale, with the name and address of the vendee, to the Secretary of State, and the vendee shall within 10 days notify the Secretary of State of the sale by filing a verified statement with the Secretary of State. The vendee must pay a fee of $1, upon receipt of which the Secretary of State will note the change of ownership. Upon the sale of a motor vehicle by a manufacturer or dealer, the vendee is allowed to operate the same for a period of 15 days after taking possession, until he has received his certificate of registration and number plates from the Secretary of State, but the motor vehicle must carry a placard bearing the registration number of the dealer or manufacturer. Application for registration must be made before the motor vehicle is used.

Provision is made for the registration of motor vehicles by manufacturers or dealers. The act reads that manufacturers and dealers *may* obtain a general license. The registration fee is $15. Duplicate number plates for manufacturers and dealers may be obtained from the Secretary of State upon the payment of $1 for each duplicate.

Non-resident owners are exempt from registering in the State of New York if they have duly complied with the laws of their home State and carry their home State credentials, provided their home State grants substantially the same exemption to residents of New York, but foreign corporations are not exempt.

This provision demanding the exemption by other States will have a most salutary effect upon New Jersey, where a special license must be obtained now for non-residents to enter that State. New York has always exempted non-residents, and the residents of New Jersey have always had the privilege of entering New York without obtaining any additional license. After the 1st of August residents of New Jersey will not be exempt in the State of New York.

The law provides that motor vehicles shall be equipped with adequate brakes, bell, horn or other device for signaling, and two lights on the front at night and one on the rear, displaying a red light visible from the rear. Two number plates must be carried, one forward and one on the rear. These will be furnished by the State, and the color will be changed annually.

Most important of all the provisions of the new law is that concerning speed. It is as follows:

"Every person operating a motor vehicle on the public highway of this State shall drive the same in a careful and prudent manner and at a rate of speed so as not to endanger the property of another or the life or limb of any person; provided, that a rate of speed in excess of thirty miles an hour for a distance of one-fourth of a mile shall be presumptive evidence of driving at a rate which is not careful and prudent."

The above speed provision, in the first place, will make it more difficult to convict automobile drivers of exceeding the speed limit, since exceeding 30 miles per hour for a distance of one-fourth of a mile is merely presumptive evidence of unlawful driving. An automobilist will be allowed to introduce evidence in defense to the effect that he was endangering no person or property, and if his speed was 50 or 60 miles an hour he cannot be convicted. It also should be borne in mind that a speed in excess of 30 miles must be maintained *for at least one-fourth of a mile*. No more will officers be permitted to catch automobilists on technical violations of the law for a distance of one or two blocks. When the automobile driver is caught it will be up to the police to prove their case, and it will be necessary to show, not only the excess of speed for a distance of at least one-fourth of a mile, but the prosecution must be prepared to show that there was danger created. Suppose no person was on the highway when an excessive speed was maintained. In the case of a chauffeur he might be found guilty because it might be said that he was endangering the automobile, the property of another. Whether a person driving an automobile could be convicted because he was endangering his own life and limb is a serious question, but it is possible that such a conviction would be legal.

Another question arises, and that is whether the excessive rate must be continuous for a distance of at least one-fourth of a mile. I believe it must be. If a driver slows down anywhere along the quarter-mile course to a rate less than 30 miles an hour, he cannot be convicted. Evidence introduced upon the part of the prosecution that the rate exceeded 30 miles an hour, which creates a presumption of imprudent driving, would not be sufficient to convict a driver since there is a presumption of innocence, and one presumption would merely balance the other. It is the duty of the State to prove its case beyond a reasonable doubt.

Power of Local Authorities Is Fixed

Local authorities, such as cities and other municipalities, may not impose any further tax or license on chauffeurs or exclude chauffeurs from the free use of the public highways, except where certain roads are set apart for horses, nor may local authorities in any way, respecting motor vehicles or their speed upon the public highways, pass or enforce any ordinance. There is a joker here in the law which will be pointed out presently. But municipal authorities may regulate automobiles offered to the public for hire. A certain highway may be set aside for speed contests under proper restrictions. Local authorities may also exclude motor vehicles from cemeteries and may also exclude commercial motor vehicles from parks, where the same reason exists for excluding other commercial vehicles.

The new law provides that it shall not impair the validity of any local regulation concerning the speed of motor vehicles made or hereafter to be made, which regulation would be authorized by law in any city of the first class. This is a rather peculiar provision. It does not authorize cities of the first class to regulate the speed of motor vehicles or to do anything else, and if such cities desire to regulate speed, they must find express authority from some other source. The new law is merely passive, and states that it will not itself invalidate any such regulations, but there may be other vitiating causes. This provision of the bill is certainly a joker, and the wonder is that it ever passed Governor Hughes, considering the stand he has taken in regard to according to the large cities power to regulate travel.

The local authorities of other cities and incorporated villages may limit the speed of motor vehicles, provided the rate is not less than a mile in 4 minutes. The maintenance of a greater rate of speed for one-eighth of a mile shall be presumptive evidence of unlawful driving. What was said previously in regard to the 30 miles limit may be said with equal reason to the *prima facie* speed clause here, but in order for a municipality or incorporated village to prescribe a lower rate of speed, signs must be posted, and the regulations must fix the punishment. Official copies of the ordinances must be filed with the Secretary of State 30 days before they take effect.

Chauffeurs must obtain an annual license, and are required to pay an annual fee of $5. The Secretary of State is to appoint examiners, who are to hold examinations at convenient places throughout the State. Chauffeurs must send a photograph with their applications, and the photograph must be taken at least 30 days prior to the filing of the application. The examination shall cover such questions concerning qualifications as the Secretary of State shall require. No chauffeur's license shall be issued to any person under 18 years of age. A chauffeur's badge is furnished and must be worn in a conspicuous place.

Registrations Expire on a Definite Date

All registrations of every character expire on January 31, 1911, and the fees up until that time are one-half of the annual fees provided in the law. Thereafter registrations expire annually.

For violating the speed law the maximum penalty of $100 is provided, and that is all. It is a misdemeanor to operate an automobile when intoxicated, and to run away after an accident and to refuse to stop and give the name and address of the operator is a felony, entailing severe punishment.

It is provided that a third or subsequent conviction of a chauffeur for violating the speed law, upon recommendation of the court, the Secretary of State shall forthwith revoke his license. This same punishment does not obtain in the case of any other person operating a motor vehicle.

The age limit for all operators, whether owners, operators, hirers or chauffeurs, is 18. Therefore, an owner may not register his automobile and receive a license to run it if he is under that age, but he can register the machine and employ a chauffeur to operate it, or allow an unlicensed stranger to use it.

The law goes into effect August 1, 1910, according to its expressed provisions, but it is enacted that applications for registration may be made, examinations held and number plates, license and badges issued at any time within 90 days prior to the time of the taking effect of the law. It is a serious question whether or not the whole law is valid, since it provides that it is to go into effect August 1st, and also gives 90 days in which those covered by the law may prepare themselves to comply with it. The Governor signed the law on June 2d, and there are not 90 days between that time and the first of August. That part of the law which allowed this 90 days is just as important as that part which says it shall go into effect August 1st, and if one is inconsistent with the other, it is very doubtful whether the law can go into effect August 1st, and if it cannot go into effect on that date there is no authority to put it into effect thereafter on any subsequent date.

No Autos in Roosevelt Parade

When Colonel Roosevelt comes home there will be no automobiles in line to receive him. At least there will be none in the parade, which will be an important part of the reception plans, according to a letter addressed by the secretary of Justice Gerard, who is in charge of the Reception Committee, to James M. Carples, representing the Licensed Automobile Dealers' Association.

Mr. Carples, on behalf of the association, had tendered some cars to the committee, and the following reply was received from the judge:

"Mr. Justice Gerard directs me to acknowledge receipt of your letter of May 11 in regard to your very patriotic offer of 60 automobiles for the reception of Colonel Roosevelt, and to express through the judge the appreciation of the entire Reception Committee for your most generous offer.

"I am very sorry to say that the committee in charge of the Roosevelt reception find that they will not be able to accept the use of these autos. Major-General Roe, in charge of the parade, does not think the automobile can go slow enough, and as he is in charge, the committee bows to his wishes to use carriages instead of automobiles.

"Assuring you of the appreciation of the Reception Committee, and regretting that the offer cannot be accepted, I am, respectfully yours,

"(Signed) JOHN J. MURPHY,
"Secretary to the Justice."

Coming Events in the Automobiling World

June 20-July 6....Detroit, Mich., Industrial Exposition, Detroit Board of Commerce.
Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911..Chicago Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

June 6-14........Atlanta, Ga., Reliability Run to New York City. New York Herald and Atlanta Journal.
June 7-11........Carolina Endurance Run.
June 10-11.......Fort Erie, Ont., Track Race Meet under management of Buffalo interests.
June 11..........Newark, N. J., Reliability Run, New Jersey Auto & Motor Club.
June 11..........Portland, Ore., Road-Races of Portland A. C.
June 11..........Wilkes-Barre, Pa., Annual Hill-Climb up Giants' Despair, Wilkes-Barre Automobile Club.
June 14-15.......New York, Reliability Run of Motor Contest Association.
June 14-30.......Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, Through the Southwest.
June 16-22.......Albany Automobile Club, Albany, N. Y., Sixth Annual Tour to Atlantic City and Return.
June 18..........Ossining, N. Y., Hill Climb of Upper Westchester Automobile Club.
June 18..........Baltimore Hill-Climb of Automobile Club of Maryland.
June 18..........Philadelphia, Race Meet, Quaker City Motor Club.
June 25..........Port Jefferson, Long Island, N. Y., Hill-Climbing Contest. Automobile Club of Port Jefferson.
June 25-26.......Roadability Run, Automobile Club of Philadelphia, to Lake Hopatcong, N. Y.
July 1-4.........Indianapolis, Ind., Track Meet. Cobe Trophy Race—Held on Speedway Track, Chicago Automobile Club.
July 1-10........Los Angeles, Cal., Road Carnival of Licensed Dealers.
July 2-4.........Los Angeles, Cal., Speedway Meet.
July 2-4.........Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.
July 4...........Auburn, N. Y., Hill Climb of Automobile Club of Auburn.
July 4...........Cheyenne, Wyo., Track Meet of Cheyenne Motor Club.
July 4...........Dallas, Tex., Track Meet of Dallas A. C.
July 4...........St. Paul, Track Meet of Minnesota State Automobile Association.
July 11..........Plainfield, N. J., Hill Climb of Plainfield Automobile Club.
July, Middle of...Richfield Springs, N. Y., Hill Climb.
July, Middle of...Grand Rapids, Mich., Road Race of Grand Rapids Automobile Club.
July 18-23.......Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 30..........Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.
Aug. 1...........Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5.........Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 4...........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Aug. 15..........Start of Munsey Tour.
Aug. 17..........Cheyenne, Wyo., Track Meet.
Aug. 31..........Minnesota State Automobile Association's Reliability Run.
Sept. 2-5........Indianapolis, Ind., Speedway Meet.
Sept. 3-5........Wildwood, N. J., Reliability Run and Speedway Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 5..........Wildwood, N. J., Track Meet.
Sept. 5..........Cheyenne, Wyo., Track Meet.
Sept. 5..........Denver, Col., Road Race, Denver Motor Club.
Sept. 5..........Los Angeles, Cal., Speedway Meet.
Sept. 5-10.......Minneapolis, Minn., Track Meet at State Fair.
Sept. 9-10.......Providence, R. I., Track Meet.
Sept. 10.........Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10-12......Seattle Wash., Race Meet.
Sept. 17.........Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept.............Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1...........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3...........Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8.........Santa Anna, Cal., Track Meet.
Oct. 7-8.........Los Angeles, Cal., Speedway Meet.
Oct. 8...........Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15..........Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 16-18.......Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 20-22.......Atlanta, Ga., Speedway Meet.
Oct. 23..........San Francisco, Cal., Road Race, Portola Cup.
Oct. 27-29.......Dallas, Tex., Track Meet.
Nov. 5-6.........New Orleans, La., Track Meet.
Nov. 6-9-13......San Antonio, Tex., Track Meet.

Foreign Shows and Races.

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 28-June 9...St. Petersburg, Russia, Automobile Exposition.
June 13-18.......Scotland, Scottish Reliability Trials.
June 20..........French Voiturette Race.
June 21..........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27..........Speed Trials at Kiev, Russia.
Aug. 1-Sept. 15...French Industrial Vehicle Trials.
Oct. 15-Nov. 2....Paris, France, Aeronautical Society Show.

THE AUTOMOBILE

Vol. XXII Thursday, June 9, 1910 No. 23

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President

A. B. SWETLAND, General Manager

231-241 West 39th Street, New York City

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Other Countries in Postal Union, including Canada - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

THERE never was a time when the farmers could do without roads, and that they exhibit rare patience with the kind which are designated as bad, is true; but the day naturally comes when patience ceases to be a virtue, and it is apparently in evidence that the farmer is awakening to his opportunity now that the automobile is backing him up; it is a common cause. That the farmer is merely satisfied to have the assistance of the automobile maker in his fight for good roads is scarcely up to the level of belief; there is no better customer of the industry than the farmer, and that he is showing his customary good judgment is proven by the character of the automobile he selects for his own work.

The "Good Roads Tour," which is now winding its strenuous way between Atlanta and New York, is the handiwork of citizens of breadth, and a debt of gratitude is the proper due to the New York *Herald* and the Atlanta *Journal* for the excellence of the work undertaken; it represents valuable time, enterprise, administrative capacity, and liberality of policy. That this tour is needed as a missionary effort in favor of better communication is evinced by the illustrations of the roads in the South as they are depicted in THE AUTOMOBILE this week. It is these roads that the tourists will have to travel over, and while it is true that there are many stretches of fine macadam roadway in the South, even so, the illustrations talk for themselves. The impression they give is one that is known to every farmer. The roads are not nearly as good as they ought to be—they cannot be too good.

IT looks like a consignment of impertinence to take pains, and to incur a measure of cost, for the avowed purpose of teaching a novice how not to drive an automobile. On second thought there may be some virtue in this plan; it may bring a novice to a more complete realization of the fact that he should fight off his natural inclination on the ground that the natural way seems to be the wrong one. Philosophers have never taken the trouble to state why weeds grow in a garden without any cultivation at all, or why men have to learn to do the right thing in every walk in life. Perhaps it is for the same reason that the natural product of the soil is weeds. The act which is performed as a matter of habit requires no premeditation, and as difficult as it may be to point out the right way, it is a matter of small moment compared with the amount of effort which is demanded to awaken a victim from the force of his habit.

In view of a natural bent, considering well the tenacity with which the fangs of habit fasten to the thinking apparatus of man, it is not too much to say that there is a measure of reason in the process which has for its basis the awakening of the sense to the habitual wrong. It is a common saying that one cannot do two things at one time; if this is so, one is debarred from doing right during the period of following a natural bent in the wrong direction. With this underlying basis, it does not seem a far-fetched undertaking to more or less tersely point out how ruin can stare an autoist in the face; were he conscious it would scarcely be necessary to go to the pains; perhaps this process will awaken him.

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LUBRICATION has more to do with success in the maintenance of an automobile than the average man is likely to realize, and in view of its dual angle, there is an excellent chance for confusion of mind in dealing with this problem. One not accustomed to the situation might readily be led to the conclusion that quality of the lubricant is about all that has to be taken into account. All the lubricating oil on this mundane sphere would be as pearls to swine in the face of an ill-contrived mechanism placed for the purpose of feeding the lubricating oil to the zones which work under pressure, offer a hiding-place for the silt of the road, and squeak for want of a slippery surface when the oil fails to arrive on time.

In addition to the requisite quantity of a suitable grade of lubricating oil there must be an efficient conduit which will lead the oil from its storage tank to the surfaces which work under pressure and which have to be not only lubricated, but sealed so that dirt may not get in. Profuse lubrication accomplishes these ends, and the probabilities are that pressure is necessary if the work is to be well done. Just now this question of feeding lubricating oil under pressure is being agitated in the haunts of the automobile engineer, and there seems to be a decided tendency in favor of a definite means by which oil under a controlled pressure will be forced to travel from its lodging-place in a storage tank to the wearing surfaces which are so prone to manufacture food for serious reflection, if there is any uncertainty involved. Next to a suitable contrivance comes the quality of the lubricating oil; there is no need to state that it ought to be almost superlative, but there is occasion for saying that fraudulent substitutions should be carefully avoided.

Editorial High Lights Casting Reflections

WHEN an exhaust valve refuses to stay tight, the conventional recommendation is "grind it in"; but when an autoist follows this liberally provided free ad-vice until he gets wearied of grinding, he begins to won-der if he is not really barking up the wrong tree. The chances are that it would be more to the point to ascer-tain why the valve fails to stay ground in for a reason-able length of time. If the valve stem is but poorly re-lated to the head, which will be true if the fillet which joins them is considerably restricted, what the autoist needs is a new and properly fashioned valve; but if the water jacket, which is supposed to maintain an even tem-perature all around the seat, is stopped off by core sand in the foundry, what the autoist requires is a new cylin-der. Valve grinding is an occasional process with a good automobile motor, but it is a continual nuisance with the other kind.

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Noise is said to be the most annoying part of an auto-mobile; it creeps in at the invitation of age but slowly in a well-made car; but it has the unhappy knack of starting to wear out its welcome much too soon in the other kind. The man of experience defers the evil day and puts money in his pocket at a single stroke. His receipt is very simple; it calls for a liberal supply of good lubricating oil. When a car reaches the point in its life where noise becomes unbearable to the autoist of some discrimination, if the economy bug has a speaking ac-quaintance with him he will most likely make the mis-take of commissioning a repair man to take the noise out of the automobile. When his money takes wings and he finds himself alone with the repairman's ideas annexed to a worn-out car, he will most likely make the final discovery that noise is not eliminated by tacked-on innovations, although the chances of having additional trouble to cope with may have increased. The whole situation is portrayed in the simple statement, i. e., the prospect of parting with good money overcomes judg-ment, and blinds the victim to the unalterable fact he would never be able to induce himself, even by a money argument, to put up with an ill-behaved, noisy auto-mobile, nor is it likely that a repairman, even of some ambition, will be able to silence the crokings of a worn-out car—the right solution will be found in a new automobile.

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We hear so much about explosion in connection with the automobile motor as explosion stroke, explosion due to ignition, explosion pressure, and like expressions, which, when properly analyzed, are cast out as failing to present anything in accord with the facts, that it is not to be wondered at if autoists at large are imbued with the idea that gasoline is an explosive and will explode. It will be safe to conclude that nitro-glycerine is an explosive, but no amount of research will permit one to arrive at the conclusion that the relation of gasoline to nitro-glycerine is any nearer than that of a jungle lion to an inoffensive Mexican burro. Nitro-glycerine is explosive because it holds a large amount of energy per pound, and for the further reason that it evolves, in the process of burning, all the elements which are necessary for its complete combustion. Gasoline does not contain sufficient oxygen, either free or combined, to complete combustion; if it burns at all it must be supplied with oxygen sufficient for the purpose, and this oxygen must come from some other source. It is free in the air, and it is accepted therefrom when in the natural course the gasoline is utilized for its intended purpose. Under the circumstances, and in view of the controlling facts, the embryo autoist, whose fears are prone to overcome him, may accept gasoline as a fuel to be handled with impunity, unless he mixes it with a sufficient quantity of oxygen to produce carbonic acid and water, and applies a flame to start the fire. The word "explosion," in connection with gasoline, is noth-ing but a figure of speech.

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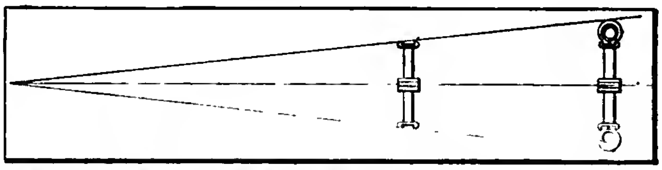
"Sea Island Cotton," as a statement, possesses a certain picturesqueness of language which carries conviction, particuarly when this fixed phrase is used in describing pneumatic tires. Its companion, "Para Rubber," has also a certain elevating sound, and it would be interest-ing to know to what extent Sea Island cotton and Para rubber are actually used in the building of pneumatic tires. It is understood that Sea Island cotton seed is used for the production of a certain high grade of cot-ton, and some of the German weavers of fabric use it in the production of the character of fabric which serves for automobile tire work. Departing from this phase of the problem for the time being, a certain curiosity leads one astray far enough to ask the average autoist if he thinks even Sea Island cotton fabric will stand up if the tires are run flat. Even if the tires are inflated, it does not necessarily follow that they are all so "blown up" that the diameters of the four wheels will be the same. A child would know that a cone-shaped spool, instead of rolling straight ahead, will describe a circular arc. If the tires on the four wheels are not blown up so as to result in equal diameter of all the wheels, they, too, will describe a circular arc in so far as their relation to the chassis will permit, and even if they are restrained, there will be sufficient disalignment to enormously reduce the life of the tires. To the man who wants to reduce the cost of tire maintenance it will be in the path of wisdom to stop dreaming about Sea Island cotton and Para rubber and go to work. The task which will have to be performed is represented in the simple process of inflating all of the tires so that they will sustain the weight to be borne, and making sure that the wheels be of one diameter.



Depicting the conical effect when one tire is well inflated and the other is more or less flat or removed from the rim

A Quiet Week in Detroit—A.L.A.M. Stirs Pudding

Abbott Claims Conspiracy to Stifle Trade

DETROIT, June 3—In the answer filed in the suit of the Columbia Motor Car Company, acting for the A. L. A. M., against the Abbott Motor Company, of this city, the latter company acting through its attorneys, Abbott & Abbott, Majestic Building, and associate counsel Offield, Towle, Graves & Offield, claims conspiracy to stifle competition, limit manufacture and sale of automobiles, and enhance profits of manufacturers operating under the Selden patent. This answer was filed yesterday by the Abbott company's attorneys and created quite a sensation.

More than this, the Abbott company claims that its own agents have been interfered with, and greatly hampered in making sales. The company asserts that the Selden patent has less than two and a half years to run and alleges: "That manifestly it is the intention and policy of the Columbia Motor Car Company and the Association of Licensed Automobile Manufacturers, who own and control its product, to bring suit under the patent and harass competitive manufacturers, compelling them to expend large sums of money in the courts."

Further, the company alleges that it is not the purpose of the complainant to bring these cases to trial, and petitions the court that the case be ordered to an immediate issue; also, that the complainant and the A. L. A. M. be restrained from threatening the Abbott company or its customers with further suits under the Selden patent, from in any manner hereafter interfering with agents or employees of the Abbott company, and from interfering with the credit of the Abbott company by letters, threats, etc.

A new point is made when the Abbott company asserts that the principal features of the Selden patent were disclosed in printed publications in this and foreign countries two years previous to the date of application for the Selden patent, and that the essential points thus became publicly known and were publicly used two years before the patent was asked for.

It denies the right of the company to bring suit against the Abbott company, charges Selden with postponing the issue of his patent for the "fraudulent purpose of extending the life of the letters when granted," and charges that he copied the ideas of other inventors. Further, it is claimed that the complainant company has no right to determine who shall have licenses under the patent, and charges that a large part of the fees received from such licenses are retained and used for the purpose of maintaining various committees known as: Price Committee, Trades Committee, Agency Control Committee, Association Patents Committee. The duties of these committees, the Abbott company claims, "consist solely in making arrangements and understandings whereby commerce between the various States and Territories and foreign nations in said automobile industry is sought to be controlled."

The answer was filed in the United States Circuit Court here yesterday.

News-Hunter Brings Down a Bag Full

Despite an unusually quiet week in Detroit, due, perhaps, to the long-continued bad weather, there was something going on during each and every one of the seven days just past. The biggest news items included the details of three new plants, one of them a mammoth steel plant, which would be of vast assistance to the industry as a whole. This was somewhat in the nature of a rumor, although well-known Chicago capitalists and steel men visited the city, inspected sites, and saw many local capitalists and business men. The men were A. W. Thomson and J. W. Alvord, both directors of the Inland Steel Company. While here they were entertained by Thomas H. Simpson, of the Michigan Malleable Iron Company, and George H. Barbour, of the Michigan Stove Works. Following closely upon their visit and the attending rumors, the Common Council took action with regard to the vacating of certain streets between Jefferson avenue West and the river, which makes it possible to have a clear tract of land there of between 14 and 18 acres, which can be increased to 20 acres by filling in to the river bank. The steel plant as projected was connected up to this city action. The location is an ideal one, near to the Detroit Iron & Steel Company's plant, while the Detroit Furnace Company is said to be seeking land in the vicinity. The Morgan & Wright factory is close by. Later, this rumor was denied, it being reported that the land in question was under option to Rogers, Brown & Company, who would erect an iron furnace. Either way, Detroit and the automobile industry will be the gainer.

The newly organized Grant & Wood Mfg. Co., of Detroit and Chelsea, in which A. O. Smith, of the A. O. Smith Company, of Milwaukee, Dr. J. B. Book, formerly of the E-M-F Company, Walter E. Flanders, president of the E-M-F Company, and others, are interested, announced the past week that they would embark in the manufacture of steel balls, in addition to the line of machine tools previously announced. This leads the company directly into the ball bearing business, bringing them into direct competition with other American bearing companies. With the strong E-M-F interests in the company, this move is taken to mean that the E-M-F cars for next year will be outfitted with the new ball bearings.

The two automobile plants to be announced will not be located in Detroit proper, one being for Port Huron and the other for Alpena. The latter city has accepted the proposition of C. H. Nunnelly and H. V. Grosbeck, of Mt. Clemens, and will furnish $20,000 in stock, a site, and a cash bonus of $50,000, while the promoters are to furnish $30,000. The car which will be built is to have a four-cylinder engine rated at 35 horsepower, runabout and similar bodies of three- or four-passenger capacity, and sell for $1,600.

Cass Motor Truck Locates at Port Huron

Out at Port Huron, the selected location of the Cass Motor Truck factory was announced. It is to be upon Lapeer avenue, and work has been started upon it. The company expects to give employment to 600 men at the start. The following directors have been selected for the company: John O. Turnbull, George Epstean, Frank B. Nichol and A. N. Spater, of Detroit; H. G. Barnum, Philip Higer and F. J. Haynes, of Port Huron.

Saginaw will be the scene of the next big operation of the General Motors Company, which has just announced that the sum of $800,000 will be spent upon the Jackson-Church-Wilcox plant there, where all General Motors steering gears are now being built. Some wonderment has been expressed at the action of Russell C. Durant, son of W. C. Durant, head of the General Motors Company, formerly Pacific Coast representative of the Anhut Motor Car Company, in suing that company for $5,000. This action was taken directly after a visit to his father to Flint. Young Durant claims that the $5,000 represents deposits on cars which were not delivered to him, and money spent in advertising. Being under age, Durant had to bring suit through a friend.

During the week, the Detroit-Dearborn Motor Car Company filed notice with the Secretary of State of an increase in its capitalization from $100,000 to $250,000.

A stockholders' meeting for June 15, in Jersey City, N. J., has been called by the United States Motor Company, to consider the advisability of increasing the capital stock from $8,000,000 common and preferred to $15,000,000 of each, making a total of $30,000,000. The common stock will be placed on a six per cent basis, July 1. As the fifth member of the executive committee, of the Detroit division of the United States Motor Company, John A. Boyle, general manager of the Briscoe Mfg. Co., has been selected. He has been connected with the Briscoe company since its formation, being one of Detroit's old hardware men. The other members of the executive committee are: Frank Briscoe, chairman; O. J. Mulford, vice-chairman; E. J. Corbett and Morris Grabowsky. E. [illegible] Martin is secretary for the committee.

Operators of automobiles for hire will not have such a cinch in the future as they have had in the past, according to a new ordinance, which the Corporation Counsel has been directed to draw up and which is nearly ready for action. When the taxicab regulation was drawn up, it was so worded as to apply only to automobiles equipped with a taximeter. This, coupled with some ambiguity in the wording, has allowed drivers of automobiles not fitted out with a taximeter to charge any fare they pleased, which they promptly did. The new ordinance is intended to remedy this defect.

The nearness of the State Fair, and the amount of advertising being given to it, in the way of advertising that the first showing of the 1911 models of automobiles will be made there, has done much toward booming the coming Industrial Exposition, to be held here June 20 to July 6, in which the automobile manufacturers and dealers have promised to participate. The latter are vitally interested, for the great influx of out-of-town visitors, particularly from the smaller towns, where agencies are not maintained, at this very seasonable time of the year, is expected to result in much business. The lighting plans for the exposition have been approved and the work is going on apace. It is intended to make this one of the big features of the show.

Owners of property along the Boulevard, Detroit's finest thoroughfare, have combined and formed an association, the object of which is to fight the further encroachment of garages, factories or unsightly driveways, which would make the drive as a whole less beautiful. The name of the association is the Boulevard Improvement Association, and they have already scored a signal victory in having the Common Council refuse permission for the building of several driveways, asked for by the Ford Motor Company, which is building an immense garage and salesroom on one of the prominent Boulevard corners. In this connection, it is said that the Packard Company is soon to follow in Ford's footsteps, the purchase of a large corner by Henry B. Joy being said to have this significance.

Dealers' Association Had a Beefsteak Dinner

Members of the Detroit Automobile Dealers' Association, more familiarly called DADA, were entertained at a beefsteak dinner by the Tivoli Brewing Company, at which it is said the refreshments partook more of a liquid nature than of solid.

Among those to join the colony across the river in their bid for Canadian business is the McCord Mfg. Co., which has just begun manufacturing operations in the new branch at Walkerville. A force of 60 men started work.

On Monday, a stock Flanders 20 roadster started from the factory for Quebec, there to start on a long trip to the City of Mexico. The intention is to show the ability of the little car to stand up nder any road conditions met with in the three countries, for which reason the tour has been named the "Under Three Flags Reliability." In the car are W. H. Lane, of the factory, as driver and pilot, and Paul H. Bruske, the new contest manager.

A very clever idea in the way of stopping speeding of automobiles in the State of Michigan has been evolved by the Secretary of State, who has sent out blanks to all townships and cities of the State, with a request that the names, addresses and other details of all persons who, within the past year, have been arrested for speed violations. It is the intention to compile this into a State blacklist, and have a copy on file in every city and township, so that as soon as a person is arrested for speeding, it will be possible to ascertain if he has ever been arrested for the same offense, and the details of the previous case. By keeping this record and list up to date, it is thought that justices will be able to inflict the proper fines, considering the previous record of the offender, and in this way reduce the amount of speeding.

Considerable dissatisfaction was expressed throughout automobile circles of this city over the actions of the A. A. A. Contest Board at the Indianapolis Speedway races of last week, and there is now considerable call for the rules pertaining to racing so that they may be read and understood. Even though not understood very generally now, the Contest Board is roundly condemned for the eleventh-hour decision, barring out cars which had been entered for some time, and whose appearance had been advertised and used as an attraction to draw people to the races. The Speedway management is not blamed for the incident.

The new plant of the Long Manufacturing Co. on Cass avenue, extending the entire block from Burrs to Amsterdam avenues, Detroit, Mich., is now ready for occupancy and in a few days will be running full blast. This plant is known as Long Factory No. 2, the main offices and principal factory remaining in Chicago, at 1430 to 1434 Michigan avenue. The Detroit plant is two stories and basement, 320 ft. on Cass avenue, by 145 ft. deep on Burrs and Amsterdam avenues. It contains over 100,000 ft. of floor space.

Overland Transcontinental at Chicago

In sixteen days of driving, eleven of which were rainy, Miss Blanche Stuart Scott and her companion, Miss Phillips, have reached Chicago in the "Lady Overland" car, en route from New York to San Francisco. The total distance traveled so far is 1987 miles. Only one mishap of any consequence has happened, and that one was not serious. The car slipped from the crown of a clay road during a rainstorm and cracked several spokes in one of the rear wheels.

Miss Scott was able to take the machine to a blacksmith's shop, where repairs were made under her supervision, and later the wheel was replaced. The iron band that was clamped upon the injured wheel, by order of Miss Scott, is shown herewith. The car and the young women show little effect of the trip thus far.

How the Overland's Battered Right Rear Wheel Was Stiffened

Makers Provide Cars in Brigades for Orphans

ORPHANS' DAY in New York City is noted for the good time the little ones experience, and there is no better way of indicating the attitude of the citizens of the Great Metropolis than to picture the situation as it obtains. It is a great misfortune that space will not permit of presenting the line-up of all the automobiles that were placed at the disposal of the Committee; it is not so much a question of limiting the amount of space which the presentation would take in THE AUTOMOBILE, but the whole paper would scarcely do the subject justice. That the matter should be dropped however, arguing that it is too formidable to handle, is far from the intention, and it is believed that the best way to indicate how well the makers of automobiles responded is to illustrate a few of the "brigades of automobiles" which were sent by the several concerns and their patrons.

Trucks Proved to Be of Great Utility Too

It is the general idea of the average citizen that a truck is a commercial affair, and that it is of no great use beyond toting a ton of coal, or "riding" groceries from the dock to the warehouse.

Possibly these good citizens will be surprised to find that some of New York's most precious possessions are able to experience a bushel of pleasure from using these trucks as substitutes for more elegant limousines and landaulets. The trucks behaved most generously; the orphans were well pleased, and it goes to show that things are not what they seem unless the mind is ripe to appreciate the true situation. Certainly the juveniles found the cushions soft and downy; to be sure the big-hearted drivers were well pleased with their cargo, and on the whole, when the whole situation is fittingly reviewed, the trucks were conspicuous features in the "Grand Review." Some of the makers went in big; they furnished all the pleasure automobiles they could collect together, and trucks were then called into play to fill in the gap. Fig. 1, as here presented, is of a White truck, which brought up the vanguard in supplemental relation to the "White Brigade," as shown in Fig. 3.

In like manner the Packard truck as shown in Fig. 5 was a companion to a long line of Packard automobiles. Then, there was an "Indian file" of Maxwell cars as shown in Fig. 2, not forgetting the Chalmers contingent as presented in Fig. 4.

Scattered along the line for a mile or more were the various makes of automobiles, some in large numbers, all to the extent that they could be commandeered for the occasion. There were cars as follows: Mora, Peerless, Rambler, Locomobile, Elkhart, Jackson, Matheson, Speedwell, Austin, Hupmobile, Croxton-Keeton, Regal, Herreshoff, Morse, Empire, Great Western, Knox, Midland, Parry, Fal-car, Ohio, National, Detroit Electric, Marmon, Woods Electric, Grout, Sebring, Mitchell, Cino, Selden, Chadwick, Cole, Stearns, Baker Electric, Standard, Haynes, Pierce-Racine, Pennsylvania, Patterson, Kissel-Kar, Winton, Cameron, Abbott-Detroit, Owen, Pullman, American, Thomas, Cartercar, Warren-Detroit, Studebaker, Inter-State, Corbin, Halladay, Waverly Electric, Columbus, and others.

It was a well-executed display of the magnanimity of the makers, backed to the limit by the agents and dealers, but the owners must not be forgotten; they were there, as many of them as could be assigned a place in the line, ready to do honor to the little guests who exhibited rare appreciation.

Louisville's Parentless Tots Entertained

LOUISVILLE, KY., June 6—More than 1,000 little orphans were made glad and given the time of their lives Saturday by the Louisville Automobile Club, who gave the little tots a free ride and a trip to Riverview Park. It was the annual outing of the club and the entertainment began at 1 o'clock in the afternoon, when scores of flag-bedecked automobiles went sailing down Broadway, after they had been loaded to the limit at the various orphanages in the city.

There was some disappointment on the part of Ben Watts and his committee in charge of arrangements, because of a heavy rain, but this did not dampen the spirits of the children. Following a long trip through the principal streets, the youngsters were taken to the park, which was turned over to them.

Reaching the northern entrance the big party was met by Col. Lum Simons, manager of the park. After the children had enjoyed the show at the vaudeville theatre they were treated to all of the cake, ice cream, candy and peanuts they could eat. Again the cars were filled with the Auto Club's little guests and once more the long procession was formed for the homeward trip. The rain had long since ceased and the children were given a taste of the original brand of joy ride as they were taken back to the various institutions.

The Louisville Automobile Club claims to be the originator of the orphans' outing about four years ago. It has been taken up by the different automobile organizations over the country, until now it has become almost a national affair.

Fig. 1—The big White truck carried its capacity

Fig. 2—The Maxwell contingent was well represented

Haradon Again Trade Association Head

In the short time that Wm. M. Haradon had occupied the presidency of the New York Automobile Trade Association, filling out the unexpired term of General Cutting, he has so impressed his fellow members, and the trade in general, with his aggressive spirit, and ability as an organizer, that little surprise was manifest at his being the unaimous choice of the association's stockholders, for re-election as the chief executive, at the annual meeting of the association, which was held at the Hotel Cumberland, Monday morning. C. W. Wurster, of Wyckoff, Church & Partridge, was re-elected first vice-president; W. W. Burke, of Carl H. Page & Co., second vice-president; W. H. Yule, of the B. F. Goodrich Company of New York, treasurer, and Walter R. Lee was re-elected secre-

Fig. 3—White Brigade was conspicuous in the line

tary and general manager for what will be his fourth consecutive term, C. Andrade, Jr., of the R. M. Owen Company, as counsel for the association, is also a director, with Messrs. W. A. Evans, of the American Locomotive Company; E. J. Harlam, of the Sagamore Garage Company; E. H. Broadwell of the Fisk Rubber Company; Peter Hoyt, of Hoyt & De Mallie Inc.; C. H. Larson of the Oldsmobile Company, of New York; W. C. Poertner, of the Poertner Motor Car Company, and A. J. Inderreiden of the Warner Instrument Company.

Of the 12 members of the board, 4 represent big garage interests, 4 are car dealers, and 4 are accessory manufacturers' representatives in this market. This arrangement will undoubtedly have a wonderful tendency toward materially harmonizing existing conditions between these three branches of the industry, and is the most potent argument the association has yet advanced in substantiation of its previously announced intention of regulating the retail selling, and garage business of this city, and exterminating many of the evils now existing, that have heretofore deterred good business men from risking capital in the proper development of this field.

Mr. Haradon announced his committee appointments at the meeting Monday. Interest centers chiefly in the Garage Committee, of which Synday B. Bowman has been made chairman; with him will be J. M. De Mallie of Hoyt & De Mallie Inc.; Benjamin Blumenthal, of the West End Auto Palace; Harry Strasbourger, of the Lenox Garage, and J. L. Joscelyn, of the Joscelyn Stable Company. The Accessory Committee will be made up of A. J. Inderreiden, of the Warner Instrument Company, chairman; Ernest H. Waterman, of the Hartford Suspension Company; E. R. Broadwell, of the Fisk Rubber Company; W. H. Yule, of the B. F. Goodrich Company of New York, and A. A. Hoffman, of the W. C. & P. Auto Supply House. W. C. Poertner, of the Poertner Motor Car Company, has been made chairman of the Contest Committee, with R. H. John-

Fig. 4—The Chalmers line-up was a parade in itself

ston, of the White Company, and C. H. Larson, of the Oldsmobile Company of New York, as his associates. The appointment of a Committee on Aviation shows the trend of the times. C. W. Wurster, of the W. C. & P. Company, who is probably the most enthusiastic and practical aeronaut in the city, has been named as chairman, while W. H. Yule, of the Goodrich Company, and A. J. Inderreiden, of the Warner Instrument Company, are his assistants.

Orphans' Day in Other Cities

The sixth annual Orphans' Day outing and picnic was observed in Pittsburg Wednesday, June 1, under the management of the Automobile Club of Pittsburg. Although the weather was very unfavorable, 135 cars were in line and over 800 children enjoyed the outing, twelve institutions taking part. The usual ride of about 25 miles around the parks and boulevards was broken by a stop at the Zoo. The afternoon was spent in Schenley Park, where luncheon was served.

Upwards of one thousand parentless little ones were the guests of the Quaker City Motor Club on June 8 at Willow Grove Park. Over 100 cars were donated by club members and the various local tradesmen, several of the Quaker City papers furnishing the lunch and the Rapid Transit Company donating the use of the park and its numerous attractions.

Arrangements for Orphans' Day, which will be held the latter part of June, under the auspices of the Columbus, Ohio, Automobile Club, are going on rapidly. It is proposed to give at least 2,000 children a picnic at the grounds of the country club.

Fig. 5—Leake Cadets Orphans' Band in the Packard truck

General Motors Threatens to Cut Loose from A. A. A.

THINGS are sizzling in the affairs of automobile racing and contests. There is an electric quality in the air whenever the subject is mentioned where high officials are wont to gather, and the crop of rumors as well as semi-verified reports contain the promise of several interesting developments.

The most notable eddy in the current is the whirl that is centered over the General Motors Company and the A. A. A. as a result of recent happenings at Indianapolis, Worcester, New Haven and prospective happenings in the coming Glidden Tour. Cars made and entered in the first three named of these meetings by the Buick Motor Company and other subsidiaries of General Motors have not been allowed to go in stock car events.

According to an official statement of the General Motors Company, the trouble came to a head over the interpretation of the rules under which the recent Brighton Beach 24-hour race was run, although since then several added factors have become involved in the puzzle. While the question raised at the 24-hour race was one of minor importance, inasmuch as the car disqualified by the referee did not finish very prominently, the appeal from his ruling is still undecided by the Contest Board and may lay the foundation for future difficulty.

But the real breach happened at Indianapolis when the Buick 16A and 16B entries were barred from the stock car races along with several other varieties of motor cars with which the same fault was found by the officials.

According to the statement of the General Motors Company the disqualification was not made in proper form and was delivered to the entrants in the shape of an article published in the press. The grounds for disqualification were based upon the alleged intent of the rules to define a stock car as one that was included in a certain percentage of the type of cars that had already been manufactured prior to the entry of the car in the contest. According to the statement, sharp protest was made in vain to the referee and a bond was offered to cover all contingencies, but a revision of the ruling was denied.

The statement closes with a demand for an amendment of the rules or a different construction of them.

Following the difficulty at Indianapolis, the Buick cars which were subject to the ruling, the Warren-Detroit entry and others have had an interesting experience. At the Worcester hill climb last Saturday one of the Buicks, the Warren-Detroit and the "100" Model Buick were entered. An official decision barred the Buick entries from participation in the stock car events and something happened to the Warren-Detroit. As a result the Buicks were withdrawn from the free-for-alls. At New Haven hill climb, Tuesday, word was sent that the Buicks would not compete, although they were regularly entered.

When this last announcement had been made the report was circulated vigorously that the Buick racing team had been ordered to withdraw from all competition and its entries for the Wilkes-Barre hill climb were annulled.

A spirited colloquy occurred in the official stand at Indianapolis during the recent race meeting on the Speedway when W. C. Durant entered his protest against the disqualification of the cars. He was sharply critical in his position, with Chairman S. M. Butler, of the Contest Board, on the other end of the argument. The situation was exceedingly strained for a while, but was eventually soothed down to a certain extent.

On the other side of the affair, Chairman Butler had the following to say: "The work of the Contest Board is based fundamentally upon the exact definition of the stock car. The competition of specially built cars with those of manufacturers who comply with both the letter and the spirit of the rules would be manifestly unfair to the parties who obey the rules. All stock car contests depend absolutely upon the strict obedience to the rules. Either we can define a stock car and live up to our rules, or we have failed in our purpose.

"With relation to the trouble now developing as a result of our rulings at Indianapolis and elsewhere, I wish to state that the cars barred from the regular stock races did not come within the definition of stock cars under the rules. I understand that the General Motors Company intends to withdraw from competition and that it has ordered its entries scratched in all future events. This move may mean a new association is being planned. I distinctly told Mr. Durant at Indianapolis that I was not present to take abuse from anyone and that the cars barred by my order had not lost the right of being considered on appeal to the Contest Board. I assured him that if the ruling was based on error, the facts in the case could all be brought out in a perfectly legal manner under the rules."

W. C. Durant was not in town or available to get his views on the subject, but an official of the Buick Motor Company confirmed the report that its racing team had been ordered to withdraw from competition. As far as the entries of the General Motors companies are concerned in the Glidden Tour, he could shed no light as to the intentions of his concern.

Chairman Butler, however, said: "There has been some acrimony concerning these entries. So far we have received no definite instructions as to the classes in which the cars are intended to go. For this reason, and as the list of competitors has already been arranged, I have instructed the officials to enter the two Buicks and the two Oaklands under the section to compete for the Glidden Trophy.

"If these cars are not presented and do not measure up to the specifications of the classes in which they have been entered they will be scratched."

Newark Club's Reliability Run

With an entry list of forty cars the reliability run of the New Jersey Automobile and Motor Club, which will be held Saturday, June 11, promises to be one of the most interesting events of New Jersey motordom for the year.

The course as laid out will be 145.1 miles and the cars will go over it twice during the day. The roads are varied, as has been detailed in previous issues of THE AUTOMOBILE, and they have been selected with the idea of giving the entered cars a thorough road test.

The start will be from the club house on Park avenue, Newark, at 5 o'clock in the morning and it is expected that the contestants will finish about 8 o'clock in the evening. Everything points to a strenuous time on the part of the contestants, and the result should benefit the industry.

Maine's First Real Hill Climb

PORTLAND, ME., June 6—Automobile contests have been inaugurated at last in Maine, and a typical hill climb was held Saturday, in which fifteen cars took part. So successful was the affair that it is likely to be an annual feature. The Sunday *Telegram* fathered the event.

Eight contests were run off and good time was made. The course was laid out on Blackstrap Hill, about six miles from this city. Three Buicks won first honors in their classes, and a Ford, Palmer-Singer and Inter-State also won. The entries were limited to stock cars and the drivers were all residents of Cumberland County.

The racing committee consisted of the following: F. A. Nickerson, William Taylor, H. F. Merrill, D. W. Hoegg, Jr., and A. G. Frost.

"Perkins Pays the Freight"—Be Discriminating

By HAROLD O. SMITH, President Premier Motor Mfg. Company.

CONTESTS present a very interesting and live subject for those who are connected with the manufacture or use of automobiles, and for others who are interested because of the fascination, and instructed because of what the contests tell, and enlightened because they pay the bills. It is a startling fact to state to a customer in the purchase of any car that the selling price must necessarily include a certain amount of material, a certain amount of labor, and a certain amount of other items classed as expense because they do not represent either labor or material. But it is also true that every item of expense enters into the cost of the motor car upon which the selling price is based.

Yet, it cannot be said that this is an unjust charge, and possibly the money spent in certain contests, tests, or proving-out, may be the cheapest of all the items charged against the production of the machine. For example, if the expenditure of a small amount revealed unsatisfactory features, or proved what was the most unsatisfactory, the cost of finding this out might be the price of a good and satisfactory car, as against an unsatisfactory or unreliable one.

As an illustration, in a product which is a combination of a number of chemicals, no one would consider presenting to the public, without preliminary tests, an article which must be a harmonious combination to be successful. Motor car contests correspond to those chemical tests, and a motor car must be a homogeneous unit, for its parts must be so designed and proportioned as to work in absolute harmony. Just one unsatisfactory feature may make an unsatisfactory machine, and contests have aided in the development and rapid progress in eliminating undesirable features. In the early days racing proved the quickest means of securing the required experience, though what was called racing eight or ten years ago would be thought a tame affair to-day.

Speed on specially surfaced courses produces abnormal results, subjecting a few parts to unusual strains, while the general construction is probably not tested as much as would be the case in a touring car under ordinary touring conditions covering an equal number of miles. There was a time when frequent mechanical mishaps, delays and road repairs were not only tolerated but expected, but that is past and the public demands cars which can be depended upon to perform on the road in the layman's hands with certainty.

Speed contests and hill-climbs are interesting and more or less instructive, but the conditions are obviously abnormal, while with touring reliability events the conditions most nearly approximate road use, and reflect in a very telling way the results which may be expected of the cars in the service of owners. For example, the Glidden Tour of 1909 required the cars to travel a distance of 2643 miles from Detroit to Minneapolis, Denver and Kansas City, and the schedule required the contestants to cover a mile in every three minutes of time upon the road between those widely separated points, without making adjustments except in a few cases. That a few cars went through without replacements or adjustments reflects in a wonderful way the reliability, simplicity, and durability of the American car, as well as its ability to perform satisfactorily; but still more wonderful was the showing when the same machines were subjected to the technical examination. They were charged for every derangement, loose or lost nut, bolt, or screw, and yet the penalties upon some cars represented almost nothing. This in spite of the fact that there are between three and four thousand different parts in every automobile.

These conditions were the nearest approach to those of regular touring, being over the public highways, and duplicates of the usual touring conditions except that the word "strenuous" should be added. The difference between the results of speed and reliability contests as a criterion in the purchase of an automobile might be summed up in the statement that in the former it is not always the car in the best condition which finishes first.

No Clean Scores in the St. Louis Run

ST. LOUIS, June 6—The St. Louis Automobile Club could hardly have selected a worse day for its third annual reliability run, held last Saturday. The run began in a drenching rain and finished in mud, much of the way up to the hubs. Only twenty cars started, and but twelve finished.

F. H. Semple, driving a Locomobile, was declared the winner of the Hagerman Cup offered for the car making the most nearly perfect score in Class A, touring cars. Samuel J. Pingree was awarded the Class B prize, the Plant-Walsh Cup. He drove a Chalmers. Semple's score was 967, and Pingree's 997. Not a perfect score was made. In addition to the contestants there were the press car, a Marmon, driven by Herman Schnure; a Franklin, driven by W. E. Brearley, for officials, and a half-dozen other non-contesting cars.

The Marmon car driven by A. R. Byrd, Jr., suffered a broken driving shaft and had to drop out at Eureka. Wall's Stearns car caught fire twice en route, and mud was used to extinguish the blaze in each instance. Miss Ada Britton, Pope-Toledo, the only woman driver in the contest, dropped out at the first control.

The run was over a circular route from St. Louis through St. Louis and Jefferson counties and return. The distance was 109.1 miles. Under ordinary circumstances the road for the greater part of the way would have been almost perfect. Early Saturday, however, rain began to fall in torrents, and continued until after noon. By that time the country roads had become softened, and it was a fight through mud, and, in many places overflow from swollen streams.

The distance and time required were as follows: First control, Fenton, Mo., 17.7 miles, 65 minutes; second control, Byrnesville, 17.6 miles, 58 minutes; third control, Cond, 18.6 miles, 85 minutes; fourth control, Creve Cœur, 21 miles, 62 minutes; fifth control, Florissant, Mo., 21.5 miles, 63 minutes; sixth control, King's Highway and Forest Park boulevard, 12.5 miles, 45 minutes. Total number of miles, 108.9. Total time allowed, 358 minutes. The summary:

ENTRANTS IN CLASS A

No. Name of Car	Entrant	Standing
6—Locomobile	F. H. Semle	967
9—Matheson	R. L. Smith	964
28—Cadillac	John H. Flachmann	944
24—Cadillac	F. H. Pingree	938
21—Cadillac	A. A. Kelly	927
7—Marmon	W. A. Meletio	902
5—Mitchell	C. M. Barnard	872
35—Locomobile	C. H. Albers	869
22—Kissell	Dr. O. T. Upshaw	862
3—Cadillac	J. L. Boland, Jr.	...
18—Packard	Jos. Dickson, Jr.	...
17—Marmon	A. R. Byrd, Jr.	...
10—Stearns	Chas. W. Wall, Jr.	...
29—F-A-L-	J. L. Adrien	...
12—Pope-Toledo	F. H. Britton	...
20—White	P. D. C. Ball	...

ENTRANTS IN CLASS B

No. Name of Car	Entrant	Standing
25—Chalmers	Sam S. Pingree	997
19—Hudson	S. E. Wolff	715
23—Buick	W. H. Boehmer	...

Good Roads

(*Continued from page* 1035.)

erected, some of which were improvised out of farm wagons, others in divers hasty ways, but they were all decorated and occupied, the ladies in their best, the children in Sunday garb, all provided with ammunition in the form of flowers with which they pelted the participants of the contesting automobiles as they trailed along, maintaining a fixed alignment, and gracefully accepting the tribute, entering into the spirit of the occasion.

The noon control was at Spartansburg, N. C., where the tourists were given a magnificent reception, and a luncheon was tendered on the grounds of Converse College, which is the most noted girls' educational institution in the South. The privilege of the Spar City Club was extended to each of the contestants as the respective cars entered the grounds; the evidence of privilege was in the form of an embellished card. As a further evidence of the welcome offered, fifteen automobiles, holding the leading citizens of Spartansburg, with Mayor J. Boyce Lee, Hon. Charles O. Hearon of the National Highway Commission, Hon. T. J. Harris, Jr., and Victory Montgomery in the leading car, met the tourists at Greer, made them welcome in brief but fitting speech, and escorted them to the college grounds.

The general committee of entertainment included Mrs. A. W. Smith (chairman), Mrs. V. M. Montgomery, Mrs. J. W. Simpson, Mrs. Warren Dupre, and Mrs. C. H. Henry. The general committee was staunchly supported by the ladies who presided over the tables. It will be remembered that a luncheon was tendered the tourists a year ago under substantially the same conditions, so that the affair on this occasion was particularly enjoyable.

Cordial greetings were extended by the citizens of Gaffney, Blacksburg, and Gastonia. When the head of the line reached the main street of Gastonia it was confronted by a galaxy comprising a hundred pretty girls, all dressed in white, and waving small American flags; the town was decorated as befitted the occasion, and a sign stretched across the main street bearing the words "Speed Limit 25 Miles an Hour—Run As You Like, Our Motto." McAdenville, a thriving industrial center on the approach to Charlotte, closed down its mills during the passing of the paraded cars, and the citizens gathered en masse to witness the passing of the automobiles. Likewise, at Kings Mountain, and in fine, at every village on the wayside, decorations were profuse and appropriate, and the citizens made a holiday of the occasion.

What the Tourists Encountered on the Second Day

On the second day, from Anderson, S. C., the first car left at 7.30 a. m. The roads to Spartansburg, the noon control, a total distance of 67.3 miles from Anderson, were in very good condition, and the tourists found no trouble to get there on schedule. After leaving Spartansburg and passing through the towns of Cowpens, Gaffney and Blacksburg, the tourists crossed the State line into North Carolina, the distance being 103.8 miles from Anderson.

The roads in North Carolina were the worst so far on the tour, being full of treacherous holes and bad turns, and in many places it was necessary for the cars to carry chains in order to pull through mud holes resulting from the recent rains. About 25 miles out the travelers struck a fine macadam road which carried them into Charlotte, a total distance of 156.6 miles for the day's run. All of the cars finished the day's run in perfect running condition with the exception of one car, a Stevens-Duryea, No. 63. There were seven cars penalized in to-day's run, as follows: No. 21, Pope-Hartford, 17 points; No. 29, Stoddard-Dayton, 48 points; No. 39, Selden, 17 points; No. 43, Maxwell, 164 points: No. 48, Ohio, 108 points; No. 55, Ohio, 48 points; No. 69, Columbia, 20 points.

The running time for to-morrow, June 8, from Charlotte, N. C., to Martinsville, Va., a distance of 145.6 miles, is 9 hours for Classes 4, 5, 6 and 7; 9 hours 54 minutes for Classes 2 and 3, and 10 hours 48 minutes for Class 1. The running time for the third day will be the same as the first two days of the tour, with one hour added for noon and luncheon control at Winston-Salem. The additional penalties for cars on the first day's run, June 6, are as follows: No. 47, Pullman, 304 points; No. 44, Velie, 688 points.

There are eight official cars in the tour: a White Steamer, 40 horsepower, carrying Major John S. Cohen, of the Atlanta *Journal*, and Hamilton Peltz, the manager of the tour; Ray M. Owens in Reo Pilot; Columbia carrying Referee Charles Jerome Edwards, and other officers; a Pierce-Arrow carrying James R. Gray, owner of the Atlanta *Journal*, and his family; a Lozier car with tires; a Welch-Detroit carrying Alex Schwalbach of New York, secretary and starter, and a White gasoline car carrying the Technical Committee.

Dead Horse Hill's Record Still Stands

(*Continued from page* 1037.)

cester Automobile Club are as follows: Daniel F. Gay, president; Chester E. Greene, vice-president; Henry F. Blanchard, secretary, and Milton C. Snyder, treasurer. The summary:

CLASS A—Open to any gasoline motor car (other than motor cars with solid tires, wheels 36 inches in diameter and over) which complies with the definition "stock car." This class ran in the following divisions:

No. Car	Driver	Time
	Event 1A—$4,000 and over	
1—Thomas Flyer	John J. Kingsley	1:06 4-10
	Event 2A—$3,001 to $4,000	
1—Stearns	R. H. Higgins	1:58
	Event 3A—$2,001 to $3,000	
1—Atlas	Elmer G. Knox	1:31 2-10
	Event 4A—$1,601 to $2,000	
1—Jackson	R. M. Lovejoy	1:10 9-10
2—Oakland Roadster	Howard A. Bauer	1:30 8-10
	Event 5A—$1,201 to $1,600	
1—Cameron	E. S. Cameron	1:38 6-10
2—Parry	Eddie Ditteau	1:56 7-10
	Event 6A—$801 to $1,200	
1—Cameron	F. F. Cameron	1:33 9-10
2—Oakland	Howard A. Bauer	1:43
3—Maxwell	Martin Dorley	1:47 1-10
4—Buick	Duncan Hooker	2:24 6-10
	Event 7A—$800 and under	
1—Cameron	Albert White	1:49 1-10
	Event 9—Free-for-All	
1—Fiat	Caleb S. Bragg	:58
2—Alco	Harry F. Grant	1:02
3—Jackson	R. M. Lovejoy	1:08 8-10
	Event 10—Amateur Event (Owners to drive)	
1—Stanley Steamer	Jay Clark, Jr.	1:09 9-10
2—Lancia	Nelson Slater	1:33 3-10

CLASS B—Open to any chassis of a gasoline car which is in accordance with the definition of a "stock chassis," to be governed by the following table of piston displacement and minimum chassis weight:

No. Car	Driver	Time
	Event 12B—161 to 230 cu. in., 1,400 lbs.	
1—Staver-Chicago	F. A. Wheelock	1:25 1-10
2—Cole "30"	Frank D. Costello	1:26 1-10
3—Lancia	Réné La Loumier	1:40 3-10
4—Maxwell	Thomas Costello	1:41
	Event 14B—301 to 450 cu. in., 2,000 lbs.	
1—Jackson	E. P. Blake	1:11 4-10
2—Berkshire	Stuart N. Clapp	1:23 6-10
3—Oakland Roadster	Howard A. Bauer	1:29
	Event 15B—451 to 600 cu. in., 2,300 lbs.	
1—Alco	Harry F. Grant	1:02 1-10
	Event 18—Free-for-all, gasoline stock cars only	
1—Alco	Harry F. Grant	1:01 2-10
2—Thomas Flyer	John J. Kingsley	1:04 8-10
	Event 19—Record of hill	
1—Fiat	Caleb S. Bragg	1:00 3-10
2—Alco	Harry F. Grant	1:01 8-10
3—Stanley Steamer	Fred H. Marriott	1:09 3-10
	Event 20—Amateur Event, gasoline cars only	
1—Thomas Flyer	John J. Kingsley	1:05 8-10
2—Lancia	Nelson Slater	1:33
	Event 21—Exhibition Event, Stock cars, steam or electric	
1—Babcock Electric	F. A. Babcock, Jr.	2:00 9-10

Giant Crowd at Shingle Hill Climb

NEW HAVEN, June 8—Fully 50,000 persons witnessed the fourth annual hill climb of the Yale Automobile Club, yesterday, on Shingle Hill, near West Haven. Six automobile events, five of them for stock cars and one free-for-all, were carded. There was a very large attendance from out of town and in addition to many citizens of New Haven and surrounding cities, the college students were present in force.

The hill course is 5,320.50 feet long and is picturesquely located five miles west of this city. It consists of a series of rises, finishing with a gradient of 162 feet. About midway of the course there is a dangerous "S" curve cut through the rocky hillside. This had been much improved and straightened since last year, but still afforded an element of peril to the racers.

The timing device was simple but was not along the lines of the automatic arrangements that have been used elsewhere. The plan used involved the registration of the time by two officials.

The Yale Auto Club Committee which had charge of the climb was composed of: L. S. Cullen, chairman; C. D. Winslow, H. H. Logan, T. W. Case, John Hays Hammond, Jr., and W. A. Main.

The officials of the meeting were as follows: Referee, C. H. Gillette, president of the Hartford (Conn.) Auto Club; clerk of the course, C. D. Winslow; assistant clerks of course, L. S. Allen, D. B. Prentice, O. Jimenis, H. D. Matheson, R. N. Hall; starter, F. J. Wagner. Representative of the F. A. M., J. M. Boyce; timers, N. Young, C. Tenis, R. Page; judges, C. M. Robinson, counsel for New Haven Automobile Club, W. T. Dill, Paul S. Thompson, W. A. Main; telephone operators, R. K. Haas, R. Dougherty, R. Brown; chief of patrol, W. J. Ralston.

Buick Driven by E. C. Bull winning in Class E

Knox to the front in the Class F event

Amplex captured the honors in Class G

Correja, the Class D winner, driven by T. Taylor

Summary of Results of Yale Automobile Club's Hill Climb

Class D, for stock cars listed at $1,600 and under

No. Car	Driver	Time
8—Correja	J. Taylor	1:13
18—Buick	E. C. Bull	1:18 4-5

Class E, for stock cars listed at from $1,601 to $2,000

19—Buick	E. C. Bull	1:14
22—Buick	A. McMullen, Jr.	1:15 2-5

Class F, for stock cars listed at from $2,001 to $3,000

3—Knox	H. J. Belcher	1:06
10—Chalmers	W. Knipper	1:10

Class G, for stock cars listed at from $3,001 to $4,000

16—Amplex	T. Jones	1:09 1-5
12—Palmer-Singer	Pollman	1:09 3-5

Class H, for stock cars listed at $4,000 and over

5—Houpt-Rockwell	F. Ives	1:07 2-5
1—Simplex	R. B. Stern	1:08 1-5

Free-for-all

2—Simplex	George Robertson	:51 4-5
14—Fiat	Caleb Bragg	:52 2-5
3—Knox	H. J. Belcher	1:01 4-5
10—Chalmers	W. Knipper	1:10 1-5

New York Relay Run

n the recent successful Central New
H. Wilson, driving a Thomas car,
fortunate enough to win more than
rizes going to different contestants.
e eleven laps of the run was set and
tody of Mayor Edward Schoeneck,
start on Saturday morning, May 28.
pe containing the secret times was
e found to be the winners:

Winner.	Car.	Time.
. H. Wilson	Thomas	1:44
W. Quick	Buick	2:46
Stilson	Stevens-Duryea	1:28
l Rothschild	Winton	2:07
E. Messer	Franklin	1:36
. Friendly	Selden	2:05
y L. Conde	Brush	1:28
. Caldwell	Pullman	3:19
Butts	Elmore	1:34
. H. Wilson	Thomas	1:51
. Willis	Oakland	1:47

of a watch fob, suitably engraved
nners on or before July 1. Medals
. Gardner, driver of the Franklin
driver of the Rapid truck; J. A.
r (Franklin), and Walter A. Phil-
Highway Commissioner Frank D.
pleting the entire run.
eat impetus to the cause of good

y for Sentinel Run

—Official entry blanks for the Wis-
sociation reliability contest for the
on July 18, 19, 20, 21 and 22, have
West, chairman of the special con-
be held under the rules and regula-
of the A. A. A. The entrance fee
ust be sent to Mr. West at 1215
Milwaukee, Wis., before midnight
cars will be numbered in the order

f the Contest Board of the A. A. A.,
t as technical examiner before and

n Milwaukee on the morning of
e days of running, 780 miles will be
s the Milwaukee *Sentinel* Trophy,
ers and members of the association
izes. Matthew C. Moore, president
ct as pilot. Mr. Moore blazed the
f May and the result of his observa-
pamphlet form for the benefit of

in Oklahoma Run

une 6—With one perfect road score
examination that followed the close
rd in charge of the Reliability Run
ile Association, 814 miles over the
Sunday, the official result, declaring
Dull, to be winner of the trophy
oman. Only six of the twelve cars
), and three out of these were dis-
e. The Franklin, which finished with
test, as will the Velie.
.: Franklin, 1,000; Velie, 998; Velie,
Parry, 989; Oakland, 983; Ford, 962.
echnical Examination: Parry, 976;
Velie No. 1, Oakland, and Franklin
e.

25 Entries in the

RICHMOND, VA., June 7—The entries for the Carolina Endurance Run, from Richmond, Va., to Raleigh, N. C., and return, were closed Wednesday night, June 1st, at midnight, and twenty-five contesting cars will take part in the second contest given by the *Times-Dispatch*, Richmond, in the interest of good roads in Virginia and North Carolina. As was the case in the Virginia Run, the American Automobile Association and the Richmond Automobile Club will furnish officers for the run, which will be under rules of these organizations.

Several of the contestants in the previous run did not enter the Carolina contest owing to the fact that no cars were available at several of the garages of the firms entering cars for the Virginia contest. F. E. Nichols, whose Reo won the sweepstake cup before, could not enter for this reason, while the Ford Motor Company made no entry on account of dissatisfaction with the ruling of the officials in the previous run. Miss Anne Dunlop, of Petersburg, the only lady contestant of the Virginia contest, will drive her car over the course, but not as a contestant.

The twenty-five cars entered will carry about eighty-five passengers, of whom about twenty-five will be wives and daughters of the contestants.

A meeting was held on Monday evening at which those taking part in the run were instructed by the referee. All cars were delivered to the technical committee for examination on Monday at noon, and were thoroughly gone over.

The route selected is a most picturesque one, a number of rivers being crossed and many places of historic interest passed. The road from Richmond to Petersburg is in splendid condition and after crossing the Appomattox River, through Petersburg and to the Greensville County line, fairly good roads are found, and when this is passed the best roads in Virginia are reached. The Roanoke River is crossed by a fine steel bridge, at Roanoke Rapids, a beautiful bit of natural scenery, and from here the road stretches like a white ribbon to Panacea Springs. The second day the roads are equally as good, the charming cities of Warrenton and Henderson being visited, as well as Wake Forest College and the Falls of the Neuse, the night being spent at Raleigh, N. C. On the third day the course will extend through Durham and on to Chapel Hill, where a brief stop will be made to allow a visit to the University of North Carolina.

The return to Durham is made over a fine stretch of macadam pike, and at that city Mayor Griswold will entertain the party with luncheon. Oxford will then be visited, and recrossing the Roanoke River the night will be spent at Clarkesville, where the entire population has extended an invitation of hospitality. The last day will include the old Boydton plank road, a unique stretch, Boydton, South Hill, Lawrenceville, Petersburg, and the return to Richmond, the cars reaching the starting point before 5 p. m.

Upon arrival of each car it will be turned over to the technical committee for examination and comparison, and with the reports of the observers, the judges will decide the awards.

The officials of the Carolina Run are as follows:

Dr. H. W. Bassett, referee; Otis M. Alfriend, A. A. A. representative; Robert B. Alport, chief observer; W. B. Nelson, timer and checker; Jonathan Bryan, pacemaker; Otis M. Alfriend, E. W. Farley and Dr. H. W. Bassett, technical committee.

Dr. Stuart McGuire will furnish the pilot car, and Car No. 3 will carry the officials.

Apropos of the forward impulse given the good roads cause by the Carolina run, reports from various points throughout the Old Diminion show much new road construction, which is welcome news to autoists.

In Washington County, the supervisors are planning to construct $200,000 worth of new roadway, beginning work this year,

Carolina Endurance

while adjoining, Washington County, just over the Tennessee line, Sullivan County is spending $300,000 for this purpose.

Greensville County, Va., will build twenty-eight miles of good roads, the contract being let at $1,200 per mile. Spottsylvania County will have over twenty-five miles under construction shortly, at a cost of about $1,750 per mile. Much of the new roads will be of macadam and gravel.

In Fairfax County, six miles of road will be put in first-class shape, and reports from many other points show marked improvements in the roads in almost every county in the State during this year.

Though the matter has not reached any definite proportions, autoists in this city are said to be talking over the holding of a show here. With the automobile so popular among almost all classes in the State, such a venture would no doubt prove a highly successful one.

OFFICIAL ENTRY LIST IN CAROLINA ENDURANCE RUN

No.	Cars.	Entrants.
1	OLDSMOBILE	Dr. Stuart McGuire
2	E-M-F	Jonathan Bryan
4	BUICK 17	T. E. Williams
5	REGAL	S. Stagg
6	RAMBLER 53	E. J. Allen
7	RAMBLER 54	E. J. Allen
8	RAMBLER 54	C. B. Richardson
9	BUICK 17	Foster Motor Car Co.
10	CHALMERS 30	E. L. Pelouse
11	CHALMERS 40	Dr. R. C. Bryan
12	CHALMERS 30	J. T. Palmatory
13	BUICK 17	Rufus Williams
14	OVERLAND	J. J. Tignor
15	OVERLAND	Dr. Benjamin A. Hord
16	MAXWELL	Dr. Samuel McAnally
17	OVERLAND	Dr. W. H. Parker
18	BUICK 17	J. R. Williams
19	WHITE	B. A. Blenner
20	OLDSMOBILE	B. A. Blenner
21	STEARNS	B. A. Blenner
22	OLDSMOBILE	J. J. Ballou
23	HUPMOBILE	Richmond Motor Co.
24	SPEEDWELL	Speedwell Motor Co.
25	HUDSON	E. D. Hotchkiss, Jr.

There are numerous and varied makes of autos visible on the streets of Richmond, Va., but among them the most noticeable by their number in their class are the Hupmobile and the Buick. Richmondites buying a small car almost invariably choose the former, while the latter appears in many different styles and sizes.

Two Protests in Worcester Climb

Protests have been filed with the Contest Board against the Jackson and Lancia entries, which performed so well in the recent Worcester hill climb. Discussing the matter, Chairman Butler said:

"The Jackson car, model 59, is shown in the catalogue of that company, stripped to its lowest terms. The contention is made that the car that took part in the stock car event answered the specifications of that model as contained in the certificate on file with this board and advertised by the company, and this technicality seems to bring it within the letter of the rules even if it was outside as far as the spirit is concerned.

"The Lancia car is made abroad and is sold f. o. b. New York in form similar to a stripped chassis.

Many Enter Wilkes-Barre Climb

Wilkes-Barre, Pa., June 6.—Entries for the fifth annual hill-climbing contest of the Wilkes-Barre Automobile Club have been coming in rapidly and the outlook is that there will be more cars and a greater number of famous drivers in the contest on Saturday, June 11, than for any of the previous events. The first entries were received from the Knox Automobile Company, which will have cars in the free-for-all, the event for the Hollenback Trophy, and for cars with a piston displacement of 301 to 450 cubic inches. Fred Belcher will drive them. The National "Forty" car has asked for entry blanks for the Hollenback Trophy, the free-for-all, for runabouts costing $3,000 to $4,000, and for runabouts costing $4,000 and over. The Houpt-Rockwell Car, Stanley Martin driver, has been entered in the free-for-all. The General Motors Company expects to enter cars in several events, and Louis Chevrolet will drive them. Other drivers who are expected to compete in the climb are Bruce Brown, who holds the record for the hill, made last year with a Benz; Ralph DePalma; Bragg, who has not yet tried the course; George Robertson, and others. The entries closed Monday, June 6, at midnight, with the secretary, P. S. Ridsdale.

The course is now in excellent shape, the water breaks have all been removed and replaced with underground drain pipes, and the cool damp weather has aided in packing the course until it is in fine condition. General C. B. Dougherty, Commander of the Third Brigade, N. G. P., will be in charge of the policing arrangements on the day of the climb and will have a large force of State constabulary on guard. The hill will be open for the contestants to practice on Wednesday, Thursday and Friday of this week, and special police will guard it.

"Munsey Historic Tour" Plans Under Way

Philadelphia, June 6—Plans for the 1910 Munsey tour are now well under way. The contest, which, by the way, will be officially entitled "The Munsey Historic Tour," will be run under Grades 2 and 4 of the A. A. A. rules—contestants in Grade 2 being penalized for time, road work, final operative tests and final technical examination, this group consisting of cars entered by manufacturers and agents; entrants under Grade 4 consisting for the most part of cars privately owned, but which will be compelled to follow the same route as the Grade 2 cars, with no supplementary tests or technical examination.

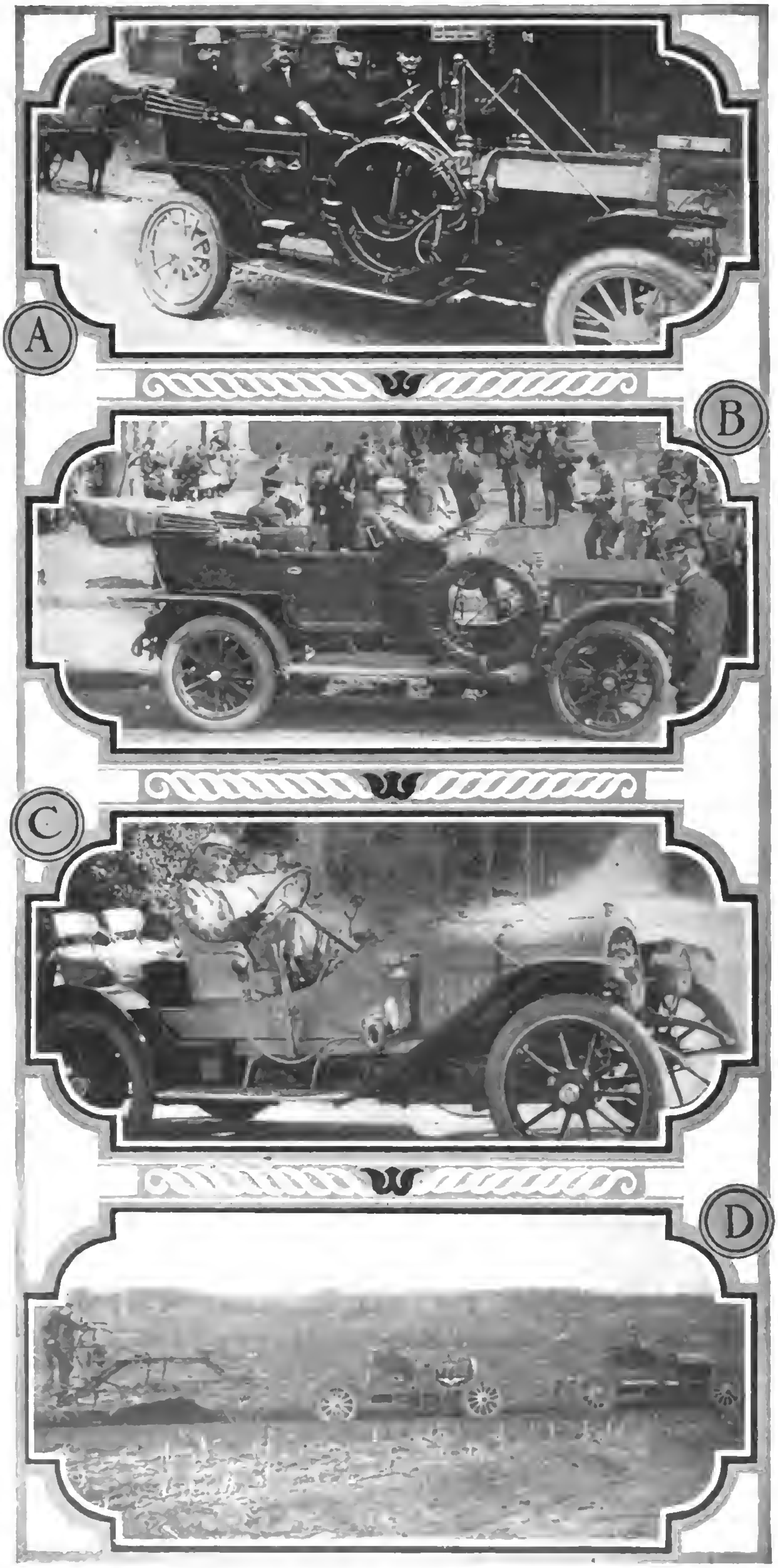
The tour will start from this city August 15, and end in Washington, D. C., two weeks later. The itinerary, as at present outlined (slight changes may be necessary where the pathfinders discover that hotel accommodations in summer resort towns may be inadequate), includes the following principal cities and towns: Philadelphia; Morristown, N. J.; West Point, N. Y.; Lenox, Mass.; New London, Conn.; Boston, Mass.; Portsmouth, N. H.; Portland, Me.; Plattsburg, N. Y.; Saratoga, N. Y.; Binghamton, N. Y.; Harrisburg, Pa.; Gettysburg, Pa.; Baltimore, Md., and Washington, D. C.—approximately 1,700 miles.

The historic feature of the run will doubtless appeal strongly to the tourists, such revolutionary landmarks as Independence Hall, Philadelphia; the battlefields of Trenton, Princeton, Morristown, Stony Point, Bunker Hill, Concord and other lesser conflicts being on the route; not to mention Gettysburg, Frederick and other fields of strife which will recall the terrible days of 1861-65. The pathfinder will start from this city June 15.

Experts Will Discuss Good Roads

Savannah, Ga., June 6—All is in readiness for the annual meeting of the Federation of Good Roads which will convene in Savannah Wednesday.

The sessions will be full of interest and will be held in the Guards' Hall, where talks on practical road-making will be the order of each day's session. Judge W. F. Eve is president.



A—Party of Omaha City Officials in Inter-State Car Inspecting the City
B—President Taft Going Home From Church in His White Steamer, Millbury, Mass.
C—Frank L. Chance, Famous Baseball Player, at the Wheel of His Pope-Hartford
D—Great Western Cars Pulling Plows in Work Near Indiana Factory

MAKING A DEMONSTRATION

(A) As exemplifying the widespread use of the automobile by municipalities and municipal officers the first picture shown is that of Omaha's mayor and chief of police in an Inter-State car. At the wheel is J. J. Donahue, chief of police of that thriving Western city, while the man beside him is the mayor, J. C. Dahlman, often spoken of as the "Cowboy Mayor." The other occupants of the car are George Rogers and C. J. Karbach, secretary of the fire and police commission. All three of the city officers shown are enthusiastic over the application of the automobile to many difficult problems of city administration.

(B) In marked contrast to all of his predecessors, President Taft has taken to the automobile not for isolated use, but for continuous and permanent use, availing himself of its help at any and all times. In this use, too, he shows considerable partiality to the White steamer, the picture showing him about to enter his White car at Millbury, Mass., upon the occasion of his recent visit there. The picture shows the Chief Executive leaving the Unitarian Church with his aunt, Miss Delia C. Torrey.

(C) Now, the baseball man is in the limelight, this being essentially his time of year, all of the major and minor leagues having just got fairly started. The picture shows one famous player who has taken to the automobile, Captain Frank L. Chance, manager, captain, and first baseman of the Chicago National League club, more familiarly known as "The Cubs." The car of Mr. Chance's choice, the one at which he handles the wheel, is a Pope-Hartford, purchased during the Winter at Los Angeles from the Pope agents there.

(D) In the modern scheme of testing out a car before calling it finished, nothing is too strenuous for the ubiquitous tester to tackle, nothing feazes him. Here is shown a pair of them, employed by the Great Western Automobile Company, Peru, Ind., helping out on some heavy plowing. The front machine is attached to the second by means of a chain while the rear automobile has a stout wire cable connecting it with the plow. This road work is excellent in two ways; it makes the roads better for other people, and it serves as a very good test-out for the cars.

The Carnegie Steel Company officials are going to have a tour through the Pittsburg district and the Mahoning and Shenango valleys. They will start from Pittsburg June 16 and will make a run to Bedford Springs, Pa., 120 miles and return.

In the Realm of the Makers

The American Dismountable Rim Company, of Cleveland, Ohio, was incorporated with an authorized capital of $50,000 by George B. Harris and others, to manufacture a patented automobile rim.

The Pierce Motor Company, of Racine, Wis., has completed its plans and specifications for 1911 Pierce-Racine cars. The first model will be issued about July 1. It is said that the 1911 car shows few changes over the 1910 car. The draftsmen and designer are now turning their attention to plans and specifications for 1912 cars.

The Cartercar Company, of Pontiac, Mich., has taken an option on several blocks of land adjoining its factory, and plans are now being made for extensive additions to the plant. The work will be pushed rapidly, and it is the intention to have the additions completed in time to begin turning out the 1911 models early in the Fall. It is expected that the additions will enable the output to be doubled in 1911.

The Federal Rubber Company has opened its own branch in Atlanta, Ga., at 170 Peachtree street, where will be carried a full and complete line of automobile tires and tubes of its manufacture, together with a full line of solid and truck tires, as well as its complete line of molded goods. This branch will be in charge of G. M. Seewald, late of the firm of Alexander Seewald Company, formerly local representatives of Morgan & Wright.

Branch managers of the Diamond Rubber Company recently held a conference in Akron. Among those who attended were: E. P. Weber, Boston; E. H. Fitch, Philadelphia; N. E. Oliver, Buffalo; L. K. Ritterhouse, Pittsburg; C. B. Myers, Cleveland; C. H. Smith, Chicago; W. E. Roby, Minneapolis; H. J. Lee, Atlanta; E. B. Tozier, Cincinnati; A. L. Gustin, Kansas City; H. J. Woodard, New York; J. G. Goudie, Detroit, and C. E. Matterson, San Francisco.

The Royal Rubber Company, one of the newer rubber plants of Akron, will soon start the erection of extensive additions to its plant, which occupies the old buildings of the Empire Mower & Reaper Company. The Royal company proposes to increase its output to include motorcycle and automobile tires. Up to the present time it has confined its output to druggists' supplies. O. C. Alling, of New York, is president of the company; J. H. Baird, New York, vice-president and superintendent; T. O. Evans, Akron, secretary, and J. C. Gibson, Akron, treasurer and general manager.

A by-law authorizing the sale of three and one-half acres of the recently acquired 20-acre factory site to the Regal Motor Company has been passed by the Windsor (Ont.) Council by a vote of 378 for and 21 against. The deal will be closed and the company will break ground for a plant.

O. H. Sebring, head of the Sebring Automobile Works, of Sebring, Ohio, has announced that a plant 500 feet long will be built in Sebring for the manufacture of the "Sebring Six." Mr. Sebring says the plant will employ 700 men and will cost $200,000.

The Middleby Automobile Company, of Reading, Pa., has recently completed extensive improvements to its factory, including a foundry, paint shop, upholstering and wood-working department. This means the employment of about fifty more men. The company is now turning out a large touring car, a toy tonneau, a single and double rumble and a surrey.

Nashville's first auto factory was assured by the taking out of a charter for the Southern Motor Works last week by officers of the company now at Jackson, and prominent Nashville capitalists. The capital stock of the new company is fixed at $400,000, and Exile Burkitt, of Jackson, has been elected president, A. H. Robinson, of Nashville, vice-president, and W. H. Collier, manager. The incorporators of the company are: A. H. Robinson, Exile Burkitt, Johnson Bransford, J. H. Ambrose, J. L. Wisdom, G. M. Neely, G. W. Killebrew, and J. W. Love. The old Phœnix cotton mill has been secured and will be fitted up for the factory. This work is already under way and early next month the removal of the machinery from Jackson will begin.

Doings in the Garage World

The Toledo Garage & Supply Company has opened a garage at 713 Jefferson avenue, Toledo, where in addition to doing a garage and supply business it will conduct a repair department.

The Krouse Motor Car Company, 317-321 North Broad street, Philadelphia, is the first concern to take advantage of the improved pavement on Market street and has just established a branch house on that thoroughfare at No. 615. William C. Chambers has been appointed manager.

The Weber Implement Company, the St. Louis agent for the Mitchell, has been appointed representative in Eastern Missouri and Southern Illinois for the Rapid truck. A garage will be maintained at 4921 Delmar boulevard, where a repair shop and truck maintenance department will be installed. J. E. Burton will have charge of the truck department.

The Whittaker Motor Car Company has changed its name to the American Garage Company, and is now installed in a pretentious garage at 5875-81 Delmar avenue, St. Louis. The building contains 15,700 square feet of floor space, and will accommodate 90 cars. In addition to the agency for the Everett "thirty" the company has obtained that of the Rambler. An electric charging plant will be maintained. The members of the firm are A. G. Whittaker and Ira L. Bell.

Among the Various Agencies

S. H. Marvel, 1607 Hunting Park avenue, Philadelphia, has been awarded the local agency for the Wisco, a Janesville, Wis., product.

George B. Clay and H. E. Browne have taken the Philadelphia agency for the Cameron car, with headquarters at 1318 Ridge avenue.

The Commercial Automobile Company has secured the agency for the Edison storage battery in St. Louis territory. The company will retain the agency for the Frayer-Miller truck.

C. S. Cummings, of the Seattle branch of the Metropolitan Motor Car Company, reports that he has secured the local agency for the "Lancia" car. This concern has recently added $5,000 of automobile accessories.

Harrington & Green, with temporary offices at 310 Odd Fellows' Temple, have just acquired the Philadelphia sales rights for the Firestone-Columbus. P. M. Green and E. Harrington constitute the new company.

The Gray Motor Car Company has taken the St. Louis agency for the Kline-Kar. W. Ashley Gray, the moving spirit of the company, formerly was connected with the Dorris company. He is maintaining offices in the Liggett Building.

George R. Dunville has been appointed to the agency in St. Louis of the Kisselkar. This agency formerly was held by the Acme Automobile Company, which has retired from business. Mr. Dunville is located at 502 South Seventh street.

THE HARRIS "SILENT SALESMAN"

To attract attention to its long-established and well-known product, the A. W. Harris Oil Company, of Providence, R. I., is giving away free to its dealers the excellent store and garage fixture illustrated

herewith. It is called the "Silent Salesman" counter display, and should prove of inestimable value to dealers in attracting attention to the Harris product. Dealers desiring to install this sale-provoker will be supplied on request.

Seen in the Show Window

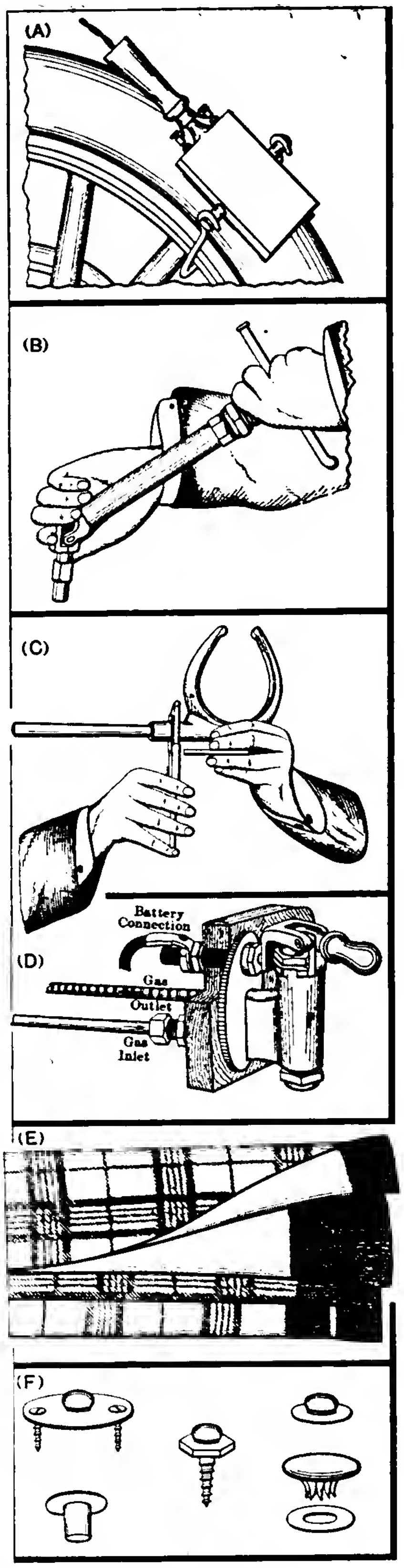
AWAKENING to the cost of tires, autoists are permitting themselves to study economy, and the ways of the wise. Among the things that help out in the battle for lower cost of maintenance is the vulcanizing equipment, which permits of healing the wounds of the tires before "mildew" chews up the fabric. The Auto "Eleck-Trick" Vulcanizer (Fig. A), made by James L. Gibney & Brothers, Philadelphia, Pa., is offered to that class of autoists who prefer to consult the interest of their own pocketbook rather than to call upon the makers of tires for advice when it is too late to do anything else about it.

This vulcanizer is operated on the electrical principle, uses either direct or alternating current, and the voltage is that which is used in electric lighting everywhere.

BEFORE starting out for an extended tour, it is in the path of wisdom to examine the tool kit to note if all the wrenches are present and accounted for. The "Auto Clé," with its ten possibilities, is so designed that it will handle that number of different sizes of hexagon heads of nuts, and they may be tightened up in any position. As a socket wrench, the one as here illustrated (see Fig. B) is recommended for its utility, and it may be had from dealers who make a point of looking after the interests of customers, but the safest plan is to have a set (they come in a mahogany case) in the tool kit.

COMMON prudence demands that an extra set of tires be taken along, and how to store them is a matter that sorely puzzles the average autoist not a little. Nelson S. Gotshell, Chicago, Ill., having struggled with this matter, finally solved the problem in the manner as here shown, and he now offers the "Non-Stop Adjustable Tire Carrier" (C) to those who appreciate the thief-proof properties of a secure tire carrier. It is made in black enamel, polished brass, and nickel finish, and is taking hold of the affections of the autoists who have the least trouble on the road.

DEMAND for a satisfactory gas lighting system has been long and persistent, and the Motor Specialties Company, Motor Mart, Boston, offers a solution of this problem which has the endorsement of the New Englander, who is noted for his acumen. The "Flash Auto-Lighter," as shown at D, comprises a dashboard equipment which is compact, good-looking and rugged. The connections for the gas and battery are all on the back, so that they are accessible under the hood, back of the motor, but they are protected from the weather and the tinker. The lights are turned on or off by a single movement using a lever, and the whole equipment is within easy reach of the man at the wheel.



(A) "Elec-Trick" Vulcanizer
(B) The Ten-Way "Auto-Cle"
(C) "Non-Stop Tire Carrier"
(D) The "Flash Auto-Lighter"
(E) N. O. B. Mills' Rubber-Lined Robes
(F) Usefuls for Home Auto Upholstery

EVERY autoist purchases his favorite car on a fine day, and he aims to take advantage of bright weather when he goes out for a ride. If he is caught in the rain it is possible that he will not be prepared for the worst. The Northern Ohio Blanket Mills, realizing that the sun will not shine all the time, make provision for inclement weather, and provide far-sighted autoists with all sorts of blankets and shawls, both warm and weather-proof, and in the many styles, one of which is here shown (E). Rubber lined robes are a prime favorite. They look well, keep out the wind, and last for years.

FOR the autoist who wants to do his own repair work to the upholstery of his automobile, or the body maker who deals in materials of this sort in a large way, the fasteners made by the United States Fastener Company, Boston, Mass., are offered in great variety, some of which are shown here (D). Many autoists, especially those who have a garage, a place for everything, and everything in its place, keep fasteners in one place; they come handy at an unexpected moment.

THE ease-loving automobile owner, who does his own driving, and yet balks at the job of pumping tires, will welcome the announcement of the Prest-O-Lite Company, of Indianapolis that they have perfected and placed on the market a new Prest-O-Tire tube, which in actual service has proven to be a veritable little giant in the filling of automobile tires. It is somewhat larger than the original type marketed by the company, carrying sufficient gas to satisfactorily inflate any of the larger size tires, above the 36 x 4, now coming into such general use. While this new Prest-O-Tire tube is a trifle bulkier than the early model, it is yet so small that a half-dozen tubes can easily be carried in a tool box, being only 1 5-8 inches in diameter and a foot long. The same puncturing valve can be used on both tire tubes, so that it is not necessary for a new valve to be purchased. It is sold upon the well-known Prest-O-Lite plan of exchange. That is, when exhausted it can be exchanged for a new one at almost any dealer's, merely by paying a small exchange fee, this scheme having proved eminently satisfactory in the company's Prest-O-Lite business.

THE AUTOMOBILE

Good Roads Tour Reaches New York

GAYLY decked with flags and streamers of all colors and bearing numerous evidences of their unusually hard experience on the long trip from Atlanta, sixty-five of the seventy-three original starters in the National Good Roads Tour, held under the auspices of the New York *Herald* and Atlanta *Journal*, swung past the reviewing car in front of the *Herald* building, Monday night, and were formally dismissed after being checked.

Many occupants of the cars still wore their travel-stained clothing, but a number had taken advantage of the stops along the way to refresh their appearance, especially the ladies, and at the finish of the long run they looked as if they had only motored from the City Hall. But the cars seemed like veterans just in from a hard campaign. Their official numbers and banners were awry and in other ways they showed the effects of their experience up in the mountains.

A STOP AS THE AUTOMOBILES ROUNDED A CURVE APPROACHING CHARLOTTE

Tourists Coming Into Winston-Salem

Natives View the Start from Spartansburg

But their motors were running smoothly and true and so far as their efficiency was concerned a large majority of the machines seemed perfectly capable of duplicating the trip without re-tuning.

Sixty-five of the original starters trundled past the finishing mark while eight cripples were left at various points en route, forced to yield to the exigencies of Jupiter Pluvius and accidents of the road.

The effect of such a tour cannot help but be an aid to good roadmaking throughout the country and especially in the sections traversed by the route of the tour.

The purpose of the enterprise was to foster and crystallize sentiment for good roads, the importance of which is universally recognized, and it is believed that the New York *Herald* and Atlanta *Journal* are combined in a fine effort.

The reception of the tourists at New York was conducted upon elaborate lines. The final day's run from Philadelphia was accomplished over excellent roads, the quality of which is reflected in the fact that 48 of the contesting cars had perfect road scores for that section of the trip.

The head of the column reached Perth Amboy ready to cross to Staten Island before noon, and the Richmond County Automobile Club was summoned in a hurry to act as escorts. It had not been thought that the tourists would arrive in this vicinity until later in the day, and the early appearance of the cars caused a lively scurrying among the club members.

The classification, running time and penalties follow:

CLASSIFICATION OF AUTOMOBILES WHICH WERE ENTERED

Class 1—Nos 20, 23, 31, 33 and 37.
Class 2—Nos. 7, 19, 22, 41, 43, 64 and 67.
Class 3—Nos. 8, 9, 10, 12, 14, 24, 50, 51, 53, 57 and 59.
Class 4—Nos. 16, 17, 28, 42, 44, 47, 48, 52, 55, 62 and 65.
Class 5—Nos. 2, 5, 15, 21, 25, 34, 35, 36, 39, 40, 46, 49, 56 and 69.
Class 6—Nos. 11, 13, 29, 38, 58 and 61.
Class 7—Nos. 1, 3, 4, 6, 30, 32, 45 and 63.
Non-Starters—Nos. 18, 26, 27, 54, 60, 66 and 68.

RUNNING TIME OF THE VARIOUS CLASSES OF CARS

June 6, 7 and 8—Classes 4, 5, 6 and 7, 9:00; classes 2 and 3, 9:54; class 1, 10:48.
June 9—Classes 4, 5, 6 and 7, 10:00; classes 2 and 3, 11:00; class 1, 12:00.
June 10—Classes 4, 5, 6 and 7, 11:00; classes 2 and 3, 12:06; class 1, 13:12.
June 11—Classes 4, 5, 6 and 7, 8:00; classes 2 and 3, 8:48; class 1, 9:36.
June 13—Classes 4, 5, 6 and 7, 4:30; classes 2 and 3, 4:57, class 1, 5:24.

Roads Were None Too Good En Route to Charlotte

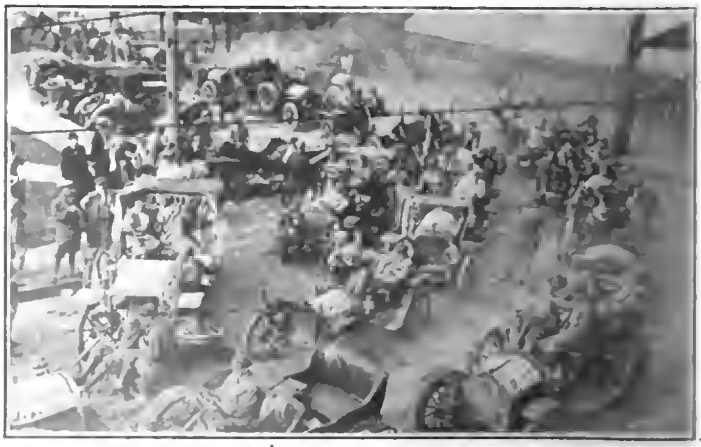
PENALTIES AS AWARDED FOR EACH DAY

June 6—No. 21, 50 points; No. 25, 43 points; No. 42, 77 points; No. 55, 12 points; No. 65, 77 points; No. 67, 193 points; No. 47, 304 points; No. 44, 688 points.

June 7—No. 21, 17 points; No. 29, 48 points; No. 39, 17 points; No. 43, 164 points; No. 48, 105 points; No. 55, 48 points; No. 69, 20 points; No. 44, 267 points; No. 55, 333 points.

June 8—No. 44, 2 points; No. 48, 175 points.

Pacemaker Calls Halt to Parade Into Spartansburg



Tourists Lined Up at Charlotte

Pacemaker Crossing Bridge Out of Charlotte, N. C.

Regal Checking In at Gettysburg

June 9—No. 2, 83 points; No. 3, 160 points; No. 4, 50 points; No. 11, 107 points; No. 12, 92 points; No. 14, 253 points; No. 15, 73 points; No. 16, 149 points; No. 17, 63 points; No. 20, 5 points; No. 22, 145 points; No. 24, 201 points; No. 25, 312 points; No. 31, 146 points; No. 34, 171 points; No. 35, 134 points; No. 36, 89 points; No. 38, 104 points, No. 40, 68 points; No. 45, 133 points; No. 46, 115 points; No. 48, 524 points; No. 52, 181 points; No.

A Noonday Halt Between Towns

56, 16 points; No. 58, 278 points; No. 61, 100 points; No. 62, 169 points; No. 65, 265 points.

The penalties as here given for June 9th have an allowance coming to them of 41 points, due to the fact that the judges were unable to get through on time, although it is true that they transferred their flag to 4 or 5 cars each time that they were stalled, and the difference in time, due to the delay, makes the 41 points which are to be subtracted from the points given.

The cars which came through on time, and have a clean score for June 9 are as follows: Nos. 13, 19, 30, 49, 53 and 57.

June 10—The cars which started and went through with a clean score for this date were Nos. 11, 13, 14, 15, 16, 17, 22, 25, 30, 34, 35, 38, 56, 62, 2, 3, 4, 6, 19, 20, 45, 46, 49, 53, 57, 61 and 65.

June 11—The cars which started and went through with a clean score were Nos. 2, 3, 4, 5, 8, 11, 13, 14, 15, 16, 17, 19, 22, 25, 27, 28, 29, 30, 31, 34, 35, 36, 38, 40, 45, 46, 49, 53, 56, 57, 61, 62, 63, 65, 24 and 28.

June 13—Points against cars which did not have clean scores were No. 21, Pope-Hartford, 32; No. 39, Selden, 74; No. 50, Cole, 1; No. 52, Oakland, 27; No. 69, Columbia, 12.

CARS WHICH WERE ACTUALLY IN THE BIG RUN

No.	Car.	No.	Car.
1	Packard	34	Corbin
2	National	35	Stevens-Duryea
3	Thomas	36	Halladay
4	Packard	37	Brush
5	Knox	38	Winton Six
6	Pope-Toledo	39	Selden
7	Lambert	40	Speedwell
8	Regal	41	Ford
9	Lambert	42	Jackson
10	White Star	43	Maxwell
11	American Traveler	44	Velie
12	Maxwell	45	Thomas
13	Pope-Hartford	46	Mercer
14	Maxwell	47	Pullman
15	Columbia	48	Ohio
16	Buick	49	Pullman
17	Chalmers-Detroit	50	Cole "30"
19	Ford	51	Reo
20	Hupmobile	52	Oakland
21	Pope-Hartford	53	Cadillac
22	Hudson	55	Ohio
23	Brush	46	Columbia
24	Kissel-Kar	57	Mitchell
25	Speedwell	58	Palmer-Singer
27	Thomas	59	E-M-F
28	Firestone-Columbus	61	White Gasoline
29	Stoddard-Dayton	62	Cadillac
30	Lozier	64	Buick
31	Maxwell	65	Maxwell
32	Locomobile	67	Maxwell
33	Hupmobile	69	Columbia

The Hudson, No. 22, Waiting for the Word

Checking Out at Martinsville

CHICAGO TROPHY TO BE WON BY THE BEST CAR IN THE RUNABOUT CLASS

CINCINNATI, O., June 15—Starting from here on June 14 and finishing at Chicago, Ill., on June 30, the Seventh Annual Reliability Tour Contest under the auspices of the A. A. A., for the Charles J. Glidden Trophy for touring cars, and the Chicago Trophy for runabouts and miniature tonneaus, with 38 cars in line, represented for the most part 1910 offerings, divided into 26 contestants and 12 automobiles marked "Official." Of the contestants there are 14 strugglers for the coveted Glidden Cup and 12 debaters for the Chicago Trophy. The names of the contesting cars in the respective divisions are as follows:

Automobiles Entered in the Chicago Trophy Class

No. 100, Moline; No 101; Moline; No. 102, Moline; No. 103, Lexington; No. 104, Cole; No. 105, Parry; No. 106, Falcar; No. 107, Maxwell; No. 108, Cartercar; No. 109, Cartercar; No. 110, Lexington; No. 111, Westcott.

Automobiles Entered in the Glidden Trophy Class

No. 1, Premier; No. 2, Premier; No. 3, Premier; No. 4, Chalmers; No. 5, Chalmers; No. 6, Cole; No. 7, Maxwell; No. 8, Cartercar; No. 9, Parry; No. 10, Glide; No. 11, Ohio; No. 12, Ohio; No. 14, Pennsylvania; No. 15, Cino.

Details Observed When the Cars Were Being Inspected

In general, the models entered for both trophies carry the vintage of 1910, and are of the same type as seen on the streets in the different cities every day. The three Moline entries for the Chicago trophy class are 1911 models, differing from Moline 1910 cars in that the stroke of the piston is longer than formerly, the cylinder sizes being 4 inches bore and 6 inches stroke. As a further advance over last year, the chassis frame is of the drop type. There are only two 6-cylinder cars in the contest, a Premier and a Pennsylvania, both Glidden contesters. All of the automobiles entered in the Chicago Trophy class are of the 4-cylinder type, excepting a 2-cylinder Cartercar, and it is worthy of particular note that this is the first time that a friction drive has competed for Glidden honors. All three Cartercars are fitted with the usual friction gearset which is so well known in the cars of this make.

Ignition is by magneto in every automobile entered for both prizes excepting for the 2-cylinder Cartercars. Among the types of magnetos employed, the Bosch system is on 9 of the contesting cars, 11 are fitted with Splitdorf magnetos, Remy has 2, Eisemann 1, and Kurtz carries 1. From the above it will be observed that this is a magneto year.

The fuel systems employed on the cars include 16 Schebler carbureter outfits on as many of the cars; the Mayer carbureter is on the 3 Chalmers contestants; the Maxwell cars have their own make, and the Stromberg carbureter is on two of the automobiles, and the rear guard is brought up with 1 Miller and 1 Brush.

It was in 1904 that the first annual run was started from New York and Boston and finished at St. Louis, covering 1,318 miles, counting from New York. In 1905 the tour began and ended in New York; its itinerary included Hartford, Bretton Woods, Concord, and Worcester. It was for this run that Charles J. Glidden put up the now famous Glidden Trophy, and it was awarded to Percy P. Pierce, driving a Pierce car, the distance being 871 miles. In 1906 the tour started at Buffalo, ran east through the principal cities in Central New York, north along the shores of Lake Champlain, and crossed the frontier line into Canada, swerved to the east from Montreal to Quebec, then south into Maine, finishing at Bretton Woods, a distance of 1,135 miles. In this tour, Percy P. Pierce defended his possession of the trophy with a Pierce car. As a second interesting part of the 1906 event, Paul H. Deming, chairman of the Touring Board, put up a trophy which was awarded to C. W. Kelsey driving a Maxwell car. In 1907 the tour started at Cleveland, ran west to Chicago, thence in an easterly direction, crossing the States of Indiana, Ohio, Pennsylvania, and Maryland, passed through Baltimore on its way to Philadelphia, and ended by crossing New Jersey to New York City, covering a distance of 1,570 miles. It was in this year that the deed of the Glidden Trophy was so changed that the award was made to the club whose team fin-

ITINERARY FOR THE 1910 TOURING CONTEST

Starting Dates A.M.	Starting Points	Intermediate Stops	Miles	Finishing Points	Day's Miles
June 14	Cincinnati	Lexington	83.3	Louisville	162.0
June 15	Louisville	Bowl'g Green	130.0	Nashville	193.9
June 16	Nashville	Columbia	41.6	Sheffield	119.7
June 17	Sheffield	Corinth	62.1	Memphis	161.7
June 18	Memphis	Clarendon	112.2	Little Rock	207.7
June 19	Little Rock			Hot Springs	53.3
June 20	Hot Springs	Prescott	84.0	Texarkana	138.3
June 21	Texarkana	Paris	97.2	Dallas	217.1
June 22	Dallas	Terral	130.1	Lawton	200.7
June 23	Lawton	Chickasha	64.6		
		El Reno	112.4	Okla. City	145.3
June 24	Okla. City	Enid	100.1	Wichita	216.0
June 25	Wichita	Emporia	108.8	Kansas City	234.5
June 26	Kansas City				
June 27	Kansas City	Maryville	126.5	Omaha	242.3
June 28	Omaha	Guthrie Cen.	105.3	Des Moines	159.0
June 29	Des Moines	Marengo	96.2	Davenport	219.8
June 30	Davenport	Rochelle	102.8	Chicago	179.7
				Total,	2851.0

16 Running Days—average per day, 178.2 miles

ished with the greatest number of points to its credit. The Automobile Club of Buffalo was represented by 2 Pierce "Great-Arrows," 2 Thomas "Flyers," and 1 Packard.

In 1908 the tour started at Buffalo, ran south to Pittsburg, east to Philadelphia, north to Albany, east to Boston, north to the White Mountains, and south to Saratoga, covering 1,670 miles. The club teams for this year were the Buffalo Automobile Club No. 1, comprising 3 Pierce-Arrow cars, the Columbia Automobile Club team, comprising 3 Peerless cars, and the Chicago Motor Club team made up of 2 Haines cars and 1 Oldsmobile; the result was a tie. An attempt was made to wipe out the tie by running the cars from Saratoga to Syracuse to Buffalo, and then over the original course until all but one team was eliminated. The Buffalo team was at the starting line for the run the morning following the finish at Saratoga, but the other teams failed to show up, and the Buffalonians refused to cross the line. The cup, under the circumstances, could not be awarded, and it remained in the archives of the A. A. A. The 1909 tour started from Detroit, Mich., ran west to Chicago, north to Minneapolis, south to Council Bluffs, west to Denver, crossed Nebraska to Kansas City, covering a distance of 2,637 miles. In the meantime the Glidden Trophy deed of gift was amended so that it might be won by an individual, and it fell to the Pierce-Arrow entrant.

FACING THE TECHNICAL COMMITTEE AT CINCINNATI BEFORE THE START

Various Incidents of the First Day

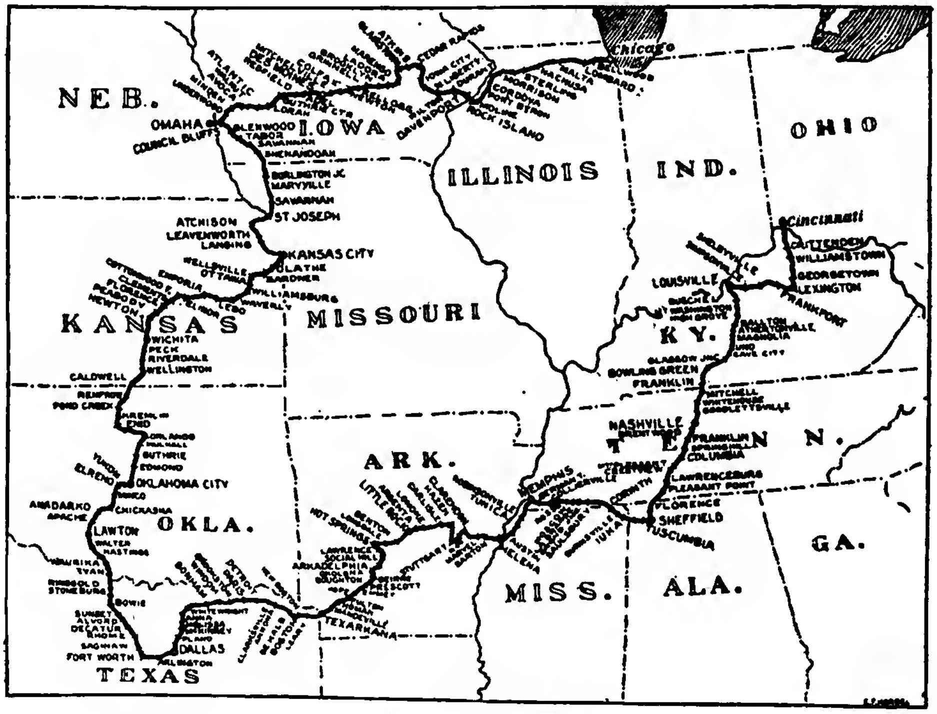
The four cars which lost out in the Glidden class were: No. 4, Chalmers, driven by Matson, by dropping a pin out of the emergency brake rod; No. 6, Cole, was fined 30 points for having to twice clean out the gasoline line to the carbureter; No. 9, Parry, which took on gasoline after leaving Lexington, and No. 14, Ohio, was given 22 points for taking on gasoline outside of a control, repairing water pump, and retiming magneto, which had to be done because a paper pin in the magneto shaft broke.

Those who lost out in the Chicago Trophy ranks were: No. 104, Cole, which, in trying to pass between a Moline car and an approaching horse vehicle, collided with the latter, breaking a wheel, which cost 1,042 points. The wheel was replaced by a new one which was procured from Louisville, and the work was so quickly done that the car covered lost ground and checked in on time; No. 106, Falcar, lost 60 points by having to put on a new magneto, a collar on the original one having slipped, putting the timing out and necessitating the replacement; No. 110, Lexington, lost 4 points for dropping a pin from the brake rod, which was replaced; and No. 111, Westcott, was burdened with 6 points for making two carbureter adjustments.

Interest Runs High Along the Route

It was the privilege of the tourists to admire the Blue Grass country around Lexington, to have a glimpse of the big stock farms with their whitewashed fences, colonial types of houses and to speculate on the witticisms of the local wags who sat on the fences and watched the automobiles go by. The colored folks straggled in from their haunts for quite a distance, and playing a subdued rôle, which is their part in the South, they were picturesque from the point of view of the tourists, which did not prevent them from presenting their own version of the affair.

From the crossing of the bridge to Covington, which took the tourists out of Ohio into Old Kentucky, was but a matter of a few minutes, and a Southern atmosphere surrounded the caravan at once. The roads were extremely good, taking them as a whole; piles of broken stone here and there along the way gave the impression that they were being maintained, and an occasional man engaged in breaking stone lent substance to the conclusion. The prognosticators of the party said that there must be a great many automobiles in Kentucky, and they based their conclusions on the behavior of the horses which were passed as the tour went on; the horses were not afraid of the automobiles, they were used to them.



MAP OF STATES AND PRINCIPAL CITIES THROUGH WHICH THE TOUR GOES

Wonderful View From Skyline Drive Near Canon City, Showing Mountains and Valleys

In Wonder House of Nature

By B. B. MORRIS

CANON CITY, COLO., June 13—Among the wonders of Colorado—that land where wonderful things seem ordinary in comparison with the superlative charms of the real attractions—is the Skyline drive, which threads the summit of the mountains adjacent to this city.

The roadway, smooth as a billiard table and thirty feet wide, is about 800 feet above the level of the bottom of the canon upon which the city stands and 8,000 feet above the level of the ocean.

Through the marvelously dry, clear air of Colorado, that sparkles and stimulates like bubbling wine, the view from the Skyline drive affords a series of pictures, excelled nowhere on earth. From the vantage point of the ridge the sight is unobstructed for miles, and looking out across the gorge the picture of the mountains, with their bases shrouded in purple shadows and their heads standing sharply into the eternal white, is inspiring enough to form the basis of the World's future masterpiece of painting.

One of the magnificent tours available for automobiles is one starting at Denver and passing through Colorado Springs. All the way southward on this leg of the journey, the tourist is in sight of the very backbone of the continent. From the spike-like points of Long's Peak, which lies back of Denver, to the shadows of Pike's Peak, near Colorado Springs, the scenery is gorgeous, although the course lies along as flat a bit of desert as exists outdoors.

Turning westward at Colorado Springs and skirting the foothills of Pike's Peak, the tourist enters the gorge of the Arkansas and the marvels of nature increase apace with each mile traversed. Canon City nestles snugly in a little valley that was hollowed out long before history began and is almost entirely surrounded by walls of porphyry, granite and limestone that tower into the cloudless sky. The Skyline drive was built by the labor of convicts to a large extent and has been carefully constructed in every detail.

At the foot of the precipice, upon which the drive runs, is the Royal Gorge boulevard. another magnificent touring road. An excursion into this part of the country would be incomplete without a trip over both these masterpieces of scenic road-building. The way from Colorado Springs to Canon City is being constructed and the few gaps that now exist will soon be filled with excellently surfaced roads which will take some of the adventure out of the tour, but which will add much to the comfort and equanimity of the traveler. The return to Denver might be the eastern route, via Elizabeth and Parker. The whole trip is slightly less than 300 miles long.

During the recent run of the Santa Fé Trail Association the participants had a glorious experience. Many of the members explored portions of the adjacent mountains where even the hardy cayuses of the prospector might have found trouble in going and all were full of enthusiasm about what they saw and found.

The pictures on this page give some idea of the party making the trip, it being a very large one, of the kinds of roads met, of the scenery which they delighted in, and many other things which would be a great source of pleasure to the Eastern man.

Assemblage of Cars on the Prairie as Used by the Santa Fé Trail Association

Automobile Apparel

Tussah Wrap

Coat of Blanket Cloth

Touring Coat

White Auto Coat

WITH the touring season rapidly approaching it is not too much to expect that the lady autoist will migrate department storeward in quest of raiment in keeping with prevailing style tendencies, and more nearly in accord with the dictates of road experience, having in mind the fact that the sun does not shine all the time. As an indication of some of the possibilities which should be of more than passing interest to the woman autoist, the reproductions here offered are claimed to be up to the minute.

On short motor drives out to the country club, or other nearby points, a coat of tussah or mohair in white or a creamy tone, with gay linings and turned-over collar and cuffs to match the lining is all that is necessary. The model shown is of biscuit-colored tussah, and completely covers the lingerie frock beneath. The lining and cuff and collar facings are of changeable blue and green taffeta, while the hat is in two shades of blue.

The looser the coat, the smarter the effect it seems. Paul Poiret has produced many of these loose, raglan-like models this season. The feature of the raglan cut is the seamless shoulder, producing a baglike fit over shoulders and arm. This coat may be donned over the daintiest frock without fear of crushing it. It is built of a lightweight, waterproof fabric, woven to withstand dust and rain. The hat, a closely fitting turban of mixed red and white straw, has a trimming of Chantecler pompons.

Dust-proof Hood

White coats are vastly becoming and look most fresh and charming against the summer background of trees and lawns. The white coat illustrated is made of English mohair and is a very dainty little model for summer wear about town. The bonnet is a Gage model of cream lace straw with ribbon trimmings in green.

No Parisienne thinks of going to the races without a pretty motor wrap tucked away in the tonneau, to don after sundown when the air grows chill. These big, wool coats are immensely chic, and that shown in the illustration is one of the very smartest of the new models. It is built of light, yet delightfully warm, wood brown blanket stuff, and the model is an entirely new one, with apron panel at the front, strapped collar, and mannish sleeve buttoned together at the wrist.

As a head covering, the hood which is shown here is designed to meet the needs of the fair autoist who has a penchant for roughing it. It is not only rainproof, but affords adequate protection when the wind blows stoutly, likewise it is invincible to dust, so that it presents all the advantages of the protective devices in use among racing drivers. To the woman of snap it offers additional advantages; a deft fold and a fanciful twist will so alter it that it will present any one of a diversity of shapes. This hood, which may be had in many waterproof fabrics, is being brought out by Sands & Maxfield, 86 North Eleventh street, Newark, N. J.

›tudies in Aviation Theory and Practice

By MARIUS C. KRARUP

he aeroplane is, at the present stage ıed mainly by staying on the ground The aviator who follows a different many chances. Tumbler aeroplanes, in geons, have not yet been produced, and ' were produced, that the power plant ıld continue to function properly in · that the aviator himself would find the loop-the-loop man of the circus. : to cope with the problem of equilibri- ır, a score of European and American furnished the solution long ago, but in analyzing the problem, is not often d constructive. The scientific airships , but they don't fly. They are mostly nd designed with the weighty portions rer to the ground than the sustaining could not much more than rock the ıter of gravity. The practical ques- s, because aeroplanes do fly. With re- f aeroplanes, science knows that it may of high speed. The consoling word l then that the aeroplane propelled at r hour or more will be able to brave unity, but aviators willing to try how r each of the various sorts of blustering us, partly because no one knows that d speed, or pass through the necessary safety, and also because nearly every ıd on one occasion or another that the e was not good enough for the weather

order when it is pretended that an ac- problems of equilibrium for aeroplanes ed, the very respectable performances of various aviators in the way of long- er not absolutely calm do seem to es- art partially mastered by operators of property of the machine itself. Prom- inion that the preservation of equilibri- an art, and that unskilful aviators will alling precipitously to the ground. Be- s the means for accomplishing equilibri- ın at present attained, it seems neces- -cut understanding on this point. The ıishes perhaps the nearest parallel. Its ous waves is not absolute. The art of sists in maintaining it. Something more aeroplane. The bird is, perhaps, self- rings are outstretched, its nervous and ed. But shot it falls, and falls fast. An automobile is pretty well balanced on the ground, as a rule. Few object to its lack of equilibrium. Yet, it can be upset. The sense of sight in the driver and his ability to steer constitute the safeguards against loss of equilibrium with an automobile.

Approaching the subject through these parallels, it seems clear that the equilibrium to be asked of the aeroplane must be superior to that of the automobile, mostly because the aviator has not the automobile driver's chance to see and estimate in advance the foes of equilibrium which beset his path; also because in his case he can not often steer clear of these foes, as they may overtake him. The aeroplane must be self-righting or easily righted after a serious disturbance of its balance, because serious disturbances are unavoidable in bad weather. But if the aeroplane was so completely self-righting that the aviator could not steer himself to destruction, this would mean, evidently, that he could not steer at all beyond a certain very small angle of deviation from his course in any direction.

The aviator who contends for the "art" of preserving his balance is at least partly right. But can he preserve it with the machines at present at his command? Practice says no; only in fine weather. Theory says no; only in fine weather. This must be made clear. Any disturbance which throws the machine up in front or up in the rear should, according to the art, be corrected by means of the tiltplanes, but if the disturbance exceeds the range of efficient rudder action (which is about 20 degrees on either side of normal, air-cleaving position) while the momentum operates in nearly the old direction (and this is the nature of a disturbance) the value of the tilt-planes for restoring equilibrium is for the moment—a most precious moment—reduced to nil. The art is helpless, unless, as noted below, much reserve power is instantly available. If the machine is carried sideways with a gust, the tilter becomes equally useless. If the lateral equilibrium is disturbed, the effect of ailerons or warping of the planes is reduced instead of strengthened. If all three disturbances take place at once, in the degree mentioned, all three inabilities ensue. Only one factor serves equilibrium in these cases, and that is independent of the aviator, at least so far as its direction is concerned. This is the power. In the aeroplane of to-day, it acts constantly in the same relation to the main planes, and if the propeller thrust is sufficient, the machine will be shot forward, in any position given it by the wind, and the control planes, by virtue of the speed given the machine in the new direction and by the aviator's art, may be used to bring the machine gradually back to equilibrium. But, if the thrust is insufficient to cope with the position of the machine, the chance for escape vanishes.

For example, if the machine is pointed steeply upward, the propeller thrust may be insufficient to maintain the speed required for sustentation, and in that case the tilt-plane control will do no good.

(To be continued.)

Special Motors and Twin Motors

30 feet span and 5 feet fore-and-aft and area of about 300 square feet, besides ould not be counted on for support, are ight of 450 pounds, exclusive of motor, ine and aviator. The maximum weight erefore, be estimated at 1 1-2 pounds. er operating conditions, say for starts nt the most difficult periods in flight, a lift allowance of 3 pounds for each missible. By adding 50 square feet to a biplane's wing area at the rear edge, where the addition does not add materially to the resistance against propulsion, there is thus a net gain of 75 pounds lifting capacity. The designer who contemplates the employment of a motor whose weight has been cut down to 75 pounds, with more or less risk of inferior operation due to this reduction of the motor weights which have been found conducive to reliability in automobile practice, is always confronted with the other alternative of increasing the lifting capacity of his machine instead. And the means at his command to this end are so numerous and so easily applied that

the introduction of uncertainties in the power plant, even to the slightest degree, seems to be purely a relic from that past stage in aeronautics when all efforts were concentrated upon getting lift enough to leave the ground, it being at that time still unknown how easily this could be accomplished. If the designer, for reasons of equilibrium (which is a little intolerant of broad planes) does not wish to gain all the carrying capacity, which he may need for the sake of employing a thoroughly tried motor, by adding area at the rear edge of his planes, he has tilts and curvature of the planes to work with. His plans may contemplate a normal flying or starting tilt of 7 to 10 degrees. By raising this to 10 to 13 degrees, he will gain an additional lifting capacity of at least 1 pound per square foot, and while he will also need a little more power to propel his machine at the higher tilt at any contemplated speed, the net gain, assuming that he will employ the same power as first planned, will amount to at least 1-2 pound per square foot. Owing to the power consumed in the propulsion of those elements of the structure which create resistance to its propulsion without helping to lift, there is a net gain from higher tilt as well as from higher area. There is a similar net gain from higher curvature. If the designer's plans contemplate planes with 1-30 curvature, as is customary, he may add about 2 pounds gross carrying capacity per square foot and probably about 1-2 to 3-4 pound net—power requirements for a given speed considered. If it is supposed that the designer chooses to gain a total of 1 pound additional carrying capacity from all of the three sources at his command, as he may easily do in most instances without going to extremes in any construction features, he will have provided for carrying 300 pounds more of motor weight, and it remains with him and his judgment whether he will place these 300 pounds into one highly reliable motor or will prefer to divide the chance of motor troubles between two independent engines. As no automobile motor has been developed as yet which works dependably at its top rating, including top speed and maximum explosive charges, and especially none whose lubrication and cooling are quite automatic and satisfactory at maximum power development, it seems that for the present the employment of twin motors, whether intended to work simultaneously and synchronized or with one as an auxiliary to be switched into operation when the other gives out, represents that class of expedients which should be restricted to the field of experimentation, preferably for a considerable length of time, in a laboratory on *terra firma*.

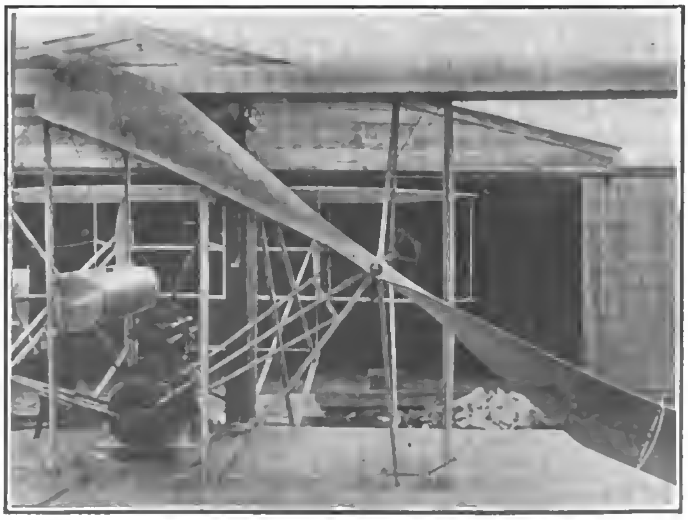
As an example of a flying machine in which all the elements which produce carrying capacity have been utilized in high degree, the Demoiselle, designed by Santos Dumont, may be mentioned. With a high tilt, apparently more than 15 to 20 degrees, and a high curvature, varying in the different portions of the planes, it carries a weight of about 660 pounds with a wing surface of only about 108 square feet. The motor has 35 to 50 horsepower. Its tilter plane and steering planes are at the rear. But, by utilizing all the factors mentioned almost to the full, Santos Dumont has gotten into a new difficulty, having left very little range for the action of his control planes. If the machine dips by reason of the action of an irregular gust of wind, there are not sufficient means for compensating this tendency, the means having been exhausted by normally using the high tilts for sustentation which should be used only for control. And this accounts for the relatively poor results achieved with this inexpensive type of flying machine.

New Wright Machines at Indianapolis

VISITORS at the aviation meet on the Indianapolis Speedway, during the present week, were offered an opportunity to see five Wright biplanes navigating the atmosphere. The Wright company entered this number of machines, it is stated, and they were operated by as many members of the company's team of performing aviators who have been trained by the brothers themselves.

Interesting details of construction of these machines are shown in the accompanying photographs. The view of the tilter planes shows the addition of two small vertical surfaces, which are immobile "stabilizers" not heretofore favored by the Wrights. These surfaces will retard lateral, irregular motions under average weather conditions and will steady the effect of steering control movements, especially for beginners. At the rear of these machines a horizontal plane is added, which serves a similar steadying purpose for up-and-down movements, under average weather conditions, but it is also subject to control in the same manner as the front tilter planes are. This change is the same as was illustrated in these pages last week in a view of the new French-built Wright machines. In the view of the propeller shown herewith it will be noticed that the blade is hollow transversely, as indicated by the white curved line, but this is not a new feature. It dates back to Lilienthal and greatly increases the efficiency, especially at low speed. Another interesting feature is the use of tubes for guiding the chains and permitting the crossing of the chains for one of the propellers.

Small vertical "stabilizers" added to the tilter-plane control in new Wright fliers



Propeller in Wright fliers with transversely curved blades. Tubular chain guides

How to Disregard the Rules of the Road

Presenting four dangerous situations, each of which is in violation of the rules of the road, offering an excellent opportunity to wreck the automobiles, and injure the occupants thereof, especially in mucky weather when the pavement is slippery, and particularly if the drivers ignore Newton's laws.

AUTOMOBILES are sufficiently high-priced to make a dent in the memory of the man who pays for one, provided it is wrecked on the road as the result of a deliberate violation of the rules which are laid down for safe driving. Acting on the theory that information cannot be imparted efficiently by a direct method, it is deemed expedient to show the wrong way, so that the driver who wishes to wreck his automobile will have no difficulty in selecting some one of the situations which will best serve the end sought.

Before discussing the situation in detail, it will be necessary to bring out one or two points in relation to road performance which ought to be well understood, if it is desired to have a first-class wreck. The tractive effort of an automobile depends upon the character of the tires used, their condition, and the weight or, better yet, the distribution of weight, upon the four wheels of the car as a primary consideration. Next, the road condition must be studied. Asphalt pavement, when it is dry, defeats slipping very well indeed; but in a wet condition, especially if the pavement has not been cleaned, the oil-like consistency of the débris will retard to a marked degree any attempt at bringing a speeding car to a state of rest, which condition, in the face of the fact that an automobile cannot be stopped within a certain distance anyway, if it is going at a certain speed, represents all that is necessary if a collision is courted.

Last year an attempt was made to show in a practical way that which was perfectly well understood theoretically, i. e., the distance in which a car may be brought to rest is settled by the speed at which it is going, and not by the struggle of the driver to apply the brakes with greater force, if the exigency is greater. The test was conducted on Long Island under well-defined conditions in the presence of a committee of skilled engineers, and it reresulted in average results which may be stated as follows:

Distance Required to Arrest Motion of Vehicles

Seven-passenger touring car at 40 miles per hour	67 feet
Seven-passenger touring car at 20 miles per hour	16 feet
Two horses and carriage at 25 miles per hour	64 feet
Motorcycle at 40 miles per hour	66 feet

After many attempts it was found that horses could not be stopped any quicker than automobiles, and it was also ascertained that motorcycles followed the same law, so that the practical test, which was conducted under a many-angled set of conditions, merely demonstrated that theoretical deductions will serve as a good guide, provided the road condition is properly represented, considering any given automobile, and of course the test served as a further indication of the efficacy of the law of the moving mass, hringing into prominence the limitations of brakes, which under certain conditions, become incapacitated, as when they are applied with too much force, thus causing the wheels to skid, when the braking effect is reduced to a minimum, whereas the driver may labor under the impression that he is accomplishing the maximum.

Fig. 1—How to shoot out of a lateral and hit a passing automobile even if it is on its own side of the street

In estimating what will be the performance of an automobile while it is being brought to a standstill, it is necessary to consider the situation from two points of view—(a) if the automobile is traveling in a straight line and (b) if the automobile is going around a curve. The shortest possible distance in which the motion can be arrested will be as fixed in (a); in other words, when the automobile is traveling in a straight line. The conditions (b) will depend upon the radius of the curvature, as well as upon the distribution of weight on the wheels of the automobile, and the adhesion of the tires to the roadbed. On a curve the centrifugal force of the mass must be lower than the force of adhesion of the tires on the road, if skidding is to be avoided. If the driver is particularly anxious to have his automobile skid into the gutter, all he will have to do is to speed up to the point where the centrifugal force of the mass will be greater than the adhesion of the tires to the road. If the radius of the turn is short, and the roadbed is slippery, it will not be necessary for the driver to do much speeding.

Some automobiles perform differently from others, depending upon the distribution of weight upon the four wheels as they contact with the roadbed, and upon the center of gravity of the car as a whole. It is almost unnecessary to furnish a means of predicting just what the speed will have to be to induce skidding on a curve. The average driver seems to be able to accomplish this condition without having to memorize a formula which will offer the facility of forecasting it. At all events, if v represents the speed of the car, in miles per hour and r the radius of the

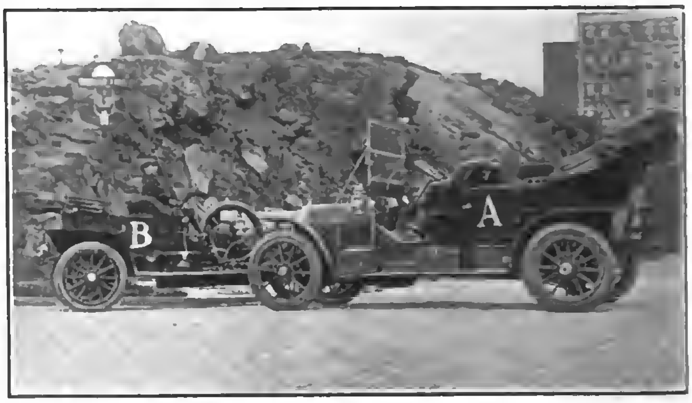


Fig. 2—How to cut in ahead of an automobile and prevent it from stopping quick enough to save trouble

curve in feet, with W for the weight of the automobile, then taking gas equal to 32.2 (the gravitational component) the following will hold:

$$v = \sqrt{\frac{2016\,g\,r}{W}} \div 1.46.$$

This is the velocity which will equal the adhesion of the tires and make skidding imminent. Of course there are a number of variables, and if the road is slippery and bad the velocity will be greatly in excess of that necessary to produce skidding.

A very interesting situation is suggested by Fig. 1. The automobile, which is emerging out of a side street, is also in direct line with a car which is going about its business on the main street. In this particular case the pavement was in good shape.

and while the driver was making a strenuous effort to stop his automobile, it is fortunate for both cars that he succeeded in doing so before the car which came down the lateral intercepted the one which is traveling on the main street. The driver of the car on the main street had a right to be there; the one which came down the lateral was in duty bound to drive cautiously.

Referring to Fig. 2, a second possibility is depicted in which the car A is shown as going up the street on the right side, which is legal driving. The car B, however, was traveling in the opposite direction, and on its right side until it came to the lateral, toward which it was turned. The car A was in its legal position, but the driver of car B was looking for trouble and turned sharply to the left, crossing the street in front of car A, putting the automobile in just such a position as would produce a collision, which was avoided in this case because it was not done on purpose.

A direct reversal of the conditions as shown in Fig. 2 are presented in Fig. 3, in which the car A is traveling up the avenue on the right side of the street, but the car B, when it came to a cross street, cut in ahead of the car A, for the purpose of turning out of the avenue into the lateral. It was obviously wrong driving, and it is just this character of road performance which is bound to lead to serious accidents in the majority of cases.

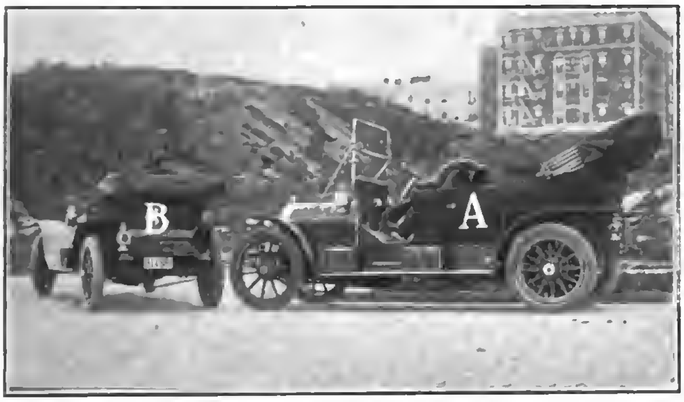


Fig. 3—Another ingenious way to get in line with a passing automobile and cause a wreck

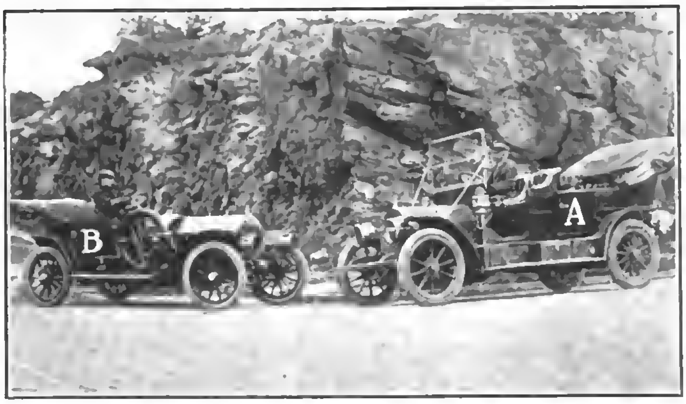


Fig. 4—One of the cleverest methods in vogue. This way almost invariably leads to a serious wreck

A very good way to wreck an automobile, with an excellent chance of bringing down a brace of them, is shown in Fig. 4. In this case the car A was traveling up the avenue on the right side, which is legal driving, and the car B shot out of the lateral, cut the in corner, which is wrong driving in any event, placing itself in line with the car A in such a way that the required distance in which to arrest motion was not afforded. Were this done in real life, instead of being premeditated, the seriousness of the situation is only too apparent. To bring wreckless driving to the absolute limit, it is necessary to do all of the wrong things that are here indicated, and, in addition, maintain the brakes in a state of bad repair, as they are in many cases in practice.

In the Process of Rejuvenating the Old Automobile

By J. B. MERCER

Working drawings of an up-to-date fore-door type of automobile body arranged for a Franklin Model H car. The new design is contrived for the convenience of an owner of an old automobile of this make if it is desired to bring the style and appearance up to the minute.

WHEN the body is out of style, the automobile is out of vogue; the only way to take advantage of the further service which the automobile may be capable of rendering is to build a new body and substitute it for the one which is at the bottom of the trouble. It is a dangerous undertaking to build a new body for a given make and model of automobile without first drawing the body to scale, making sure that it will fit on the particular automobile for which it is to be made. In a word, boots may be ordered by number with a fair measure of certainty, but automobile bodies cannot be built that way.

Referring to Fig. 1, which represents the Franklin Model H type of car as it would appear were it equipped with the fore-door style of body as here depicted. The specifications, covering the construction of this body, call for sheet aluminum, steel angle pieces, and castings to a certain extent, built up on a simple structure, such as may be hand fashioned of wood in an ordinary repair shop. Figs, 2, 3, and 4 are of the side, front, and top in elevation. Referring to Fig. 2, the framing is indicated by dotted lines. The pillar A makes the framing around the door; this is a continuous bent piece of ash extending from the top line of the seat all the way around, and terminating at the dash B. The pillar A is fitted to the curve of the seat, and the outer surface is finished so that it is in the plane of the seat panel. To prevent the joint from showing in the finished body work, this construction is rcommended, since it allows the moulding which is placed on the seat to offset sufficiently to provide a good joint. Below the seat line the pillar is fitted back on to the underbody for a distance of 3-4 of an inch, which is agreeable to the further effort, as when the moulding is placed along the edge of the panel from the dash to the seat, when it will rest in line with the vertical moulding of the seat.

The pillar forms an offset measuring from the side of the body equal to the offset of the seat at its point of contact with the same, and the dash in front is brought out to the same line. The fastenings of the pillar to the body are by screws which pass through the panel and into the body framing. The underbody (as it will be found in the Model H Franklin car) will not have to be changed, and one of the advantages of this construction lies in the case with which the new work may be added. The dash will have to be new, however, and it should be 3-4 of an inch thick, measuring up to the dimensions given in the drawing. The lock-post C is framed into the pillar at the bottom, and to the side rail at the top. The surfaces of the sides, and the door, should be covered with No. 16 gauge aluminum, fastened under the moulding at the top, to the curvature of the dash, and to the outer edge of the pillar. It should be turned in around the doorway, and at the joints of the front of the side of the seat.

The upright curve moulding, which gives effect at the pillar, should be riveted to the panel. On the right side, the framing and the moulding should be the same as on the left side, excepting that there is to be no cut in the door on the left side.

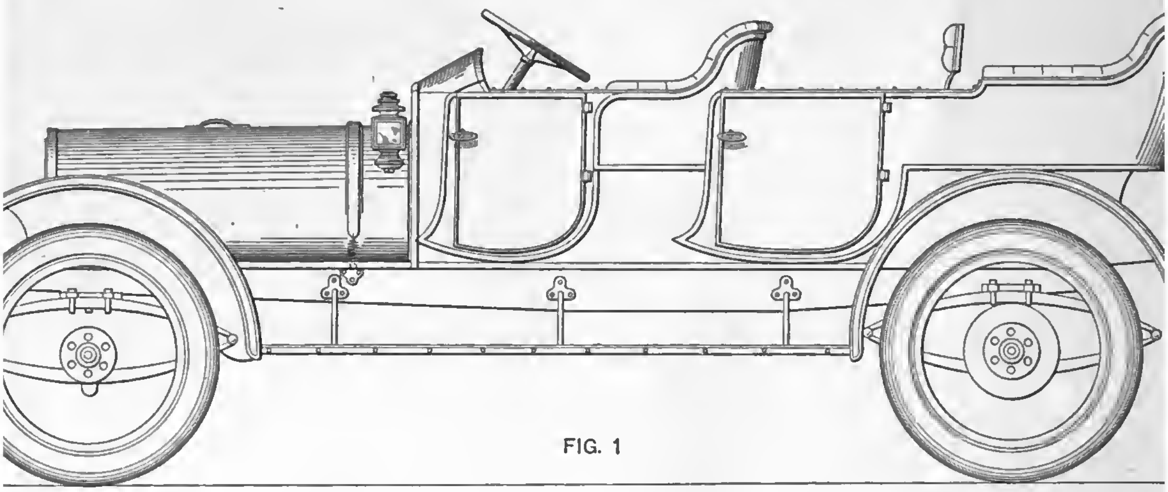


FIG. 1

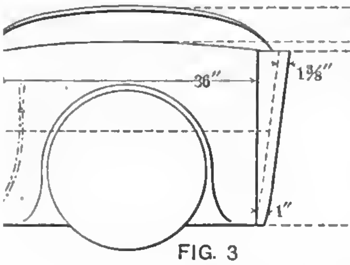


FIG. 3

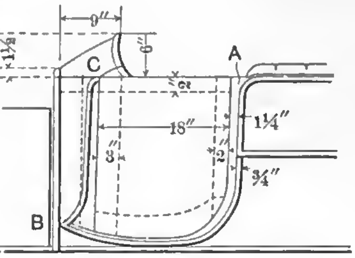


FIG. 2

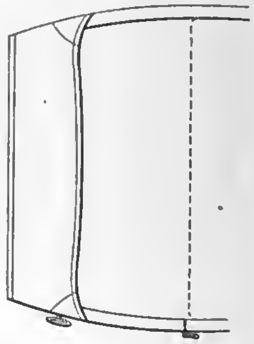


FIG. 4

Franklin Model H as it would look were the body as here shown made and used

framing is indicated by dotted lines, with dimensions govern the work. As a further aid in the process, view should be consulted and its dimensions conformed ler to bring out in a more pronounced way the modern ody work of this character, the hooded dash is so de- to cover more of the side than is general in practice, cut or parted on a line with the door opening. The ion is fastened to the door top piece, and is so de- to move outward with the same. The hinges, lock or, and handle are in keeping with the general design, tisan who undertakes the work should exercise some process, in order to maintain a certain similarity of ughout.

The operation of the side levers of the automobile a problem in fore-door work, but in this case the s the problem is clearly presented in Fig. 3, showing c levers in dotted lines, and the other falling outside of It is the change gear lever which passes to the inside, a by the dotted lines. The quadrant is below the base l body, and the slit which must be made in the body working room for the change gear lever, while it cuts of the frame, the weakening effect will be but slig drawing shows. The side panel, just where the slit co contrived as to cover as much of the opening as poss is accomplished without making a bad showing, an equally to the point, very little of the framing is cut a

essness in the Automobile Repair Shop

n automobile is sent to the repair shop to be over- is frequently the case that the body work is so thor- used that retouching becomes necessary. This is a mstance as compared with the practice which prevails the body finished first and then start overhauling the t ends in ruin of the new finish of the body. The the workmen, together with accumulations of grease, delible in the relatively soft finish of the body; it is just ter of repair shop that will do work in this way, that nake the fatal mistake of working on the chassis be- newly-finished body is in a sufficiently hard state to such abuse. Unfortunately, and to some extent to owner of the car believe that the work is progressing, -finished body is placed on the unfinished chassis in cases. It would not be so bad were the body kept in the oom until the chassis is overhauled.

Accessibility is a Much Sought-for Je

Is it not rather strange that makers of automobile tenaciously to the conventional designs which do n accessibility of the parts which are the most likely to order? Why should a carbureter, for illustration, be tween a red-hot exhaust manifold and a chassis frame, if it is of the type that is provided with four or five adjustments, and is so contrived that the new owner to go through a series of maneuvers for perhaps two days after the automobile is delivered into his keeping. this very inaccessibility of the carbureter is at the bott reason why the automobile is delivered to the purchas a state of incompleteness that he will have to tune i wants to go anywhere. Why should not the designer c tuning up if he is so short of ingenuity that he is co place the carbureter (of the type which must be adju place where it cannot be got at?

Forced Lubrication—Trend in English P

By R. K. MORCOM

(Second Installment)

Dealing with the problems of lubrication with especial reference to force feed methods, showing how plain bearings are designed, and the results obtained. Very simple oil grooves are shown, and it is claimed that all that is necessary is a circumferential groove which will allow the oil to enter, so that a supply of oil is assured at the point of minimum film pressure. This is the second installment of the article as it was abstracted from a paper by R. K. Morcom, and read before the Inst. of Auto. Eng. (British), May 11, 1910.

THE chief points favoring forced lubrication brought out by the trials were its rapid adaptability to various conditions, its very positive maintenance of the all-important oil film, and the simplicity of the provisions necessary to ensure perfect lubrication. With splash and gravity systems elaborate oil grooves, troughs and oil ways are required, and often they are cut without due regard to theoretical considerations. With forced lubrication very simple oil grooves are satisfactory. All that is necessary is to provide a circumferential groove whereby a supply of oil is ensured it whatever point the minimum film pressure exists; the oil at this point will be 'orced right along the bearing, ensuring a perfect supply. Where nore circulation is required, one or more horizontal grooves may e cut in the bearing at suitable points, forming practically an il pad, and also by increasing the circulation, having an importnt cooling effect on the bearing. Circumferential oil grooves hould not form a continuous band, but should be staggered, thus reventing the formation of a ridge on the journal due to lapping action.

Figs. 6 to 8 give suitable designs of oil grooves for forced lubrication.

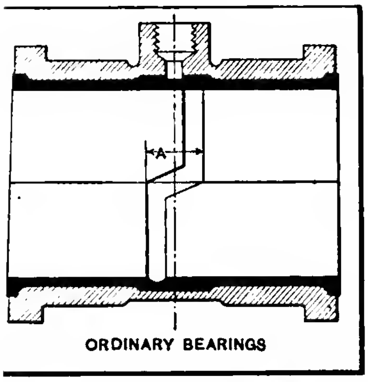
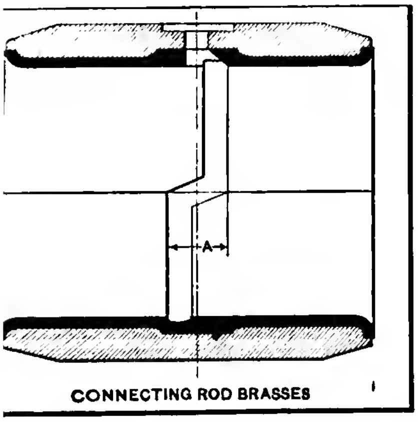


Fig. 6—Ordinary bearing with white tal lining, designed for forced lubrition

From various experiments it has been shown that bearings with forced lubrication will carry greater loads per square inch than others (this is largely due to the cooling effect of the copious supply and the certainty of the distribution), and it is interesting to consider the forces acting upon bearings in a motor car engine and those existing in a stationary engine of larger size. The load curves in Figs. 9 11 are fairly typical. The short period of reversal is noticeable the petrol engine diagrams. The loads and rubbing speeds in neither case are very high, and are exceeded in many so-called slow-speed engines, and considerably exceeded in steam turbines.



g. 7—Connecting rod bearing with e metal lining, designed for forced lu- ition

The extent to which forced lubrication is applied varies with different makers. Some apply it to main bearings only, and others to main bearings and crankpins; others carry it to the gudgeon pin, and in some cases it is also carried outside to detail sion.

There seems little rea pump is included in the d the pressure at any rate gine.

To consider the appli parts of the engine in de ings in a forced-lubricati closed in, and provided exists can be kept very cl or trough systems dirt n collect in the open oil quent trouble. The oili forced lubrication is ver tive, whereas with splas care is often required to ensure a correct s these and other bearings in which reversals ta film is maintained by forced lubrication.

For oiling the gudgeon pins which are heavi comparatively small reciprocating motion (see to be said in favor of forced feed. There is to "cake" and often carbonize on the crank ca ton head, and the drip system usually arrang lubrication may be a source of trouble, carbo bon dropping into the oil ways, and causing wear or clogging of the oil hole. Also, the oil is heated by the piston, and may be very hot and thin when it reaches its point of application.

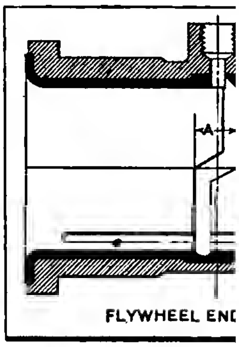


Fig. 8—Flywheel end length, with white me ranged for forced lubric

With forced lubrication supplied through a hollow rod or external pipe, a supply of clean, pure oil is ensured. One of the great merits of forced lubrication is that it is easy to prevent excessive oil being carried up while with splash lubrication the difficulty of quate supply to the gudgeon pins often leads cation of the pistons, and subsequent trout valves and ignition. A sheet of metal with placed just to clear the big ends has been fo practice.

The forced system requires means for preventing the efflux of oil from the main bearings. This is easily done by properly designed end plates, and baffles or thrower rings on the shaft.

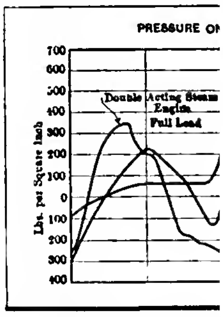


Fig. 9—Curve of p pin, indicating the s pressure

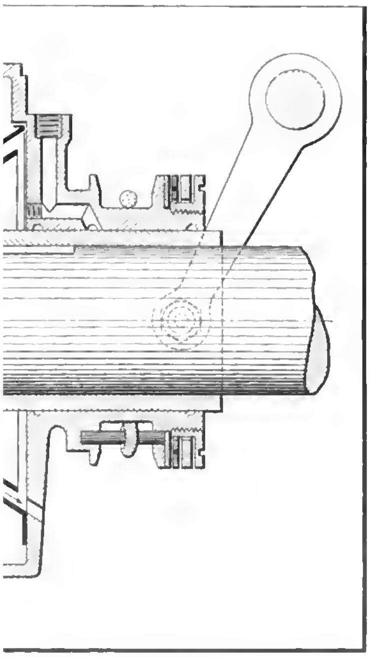
The stream, responding to force, will be modified by other forces.

Foreign Exchanges—Cut to the Bone

Digest Along Technical Lines for the Engineer

Hallot's quick-stopping and tire-saving brakes——Cellite, an uninflammable cellulose product made in Germany——Incidental advantages from offset cranks——Eberhard's book on air propeller design——Mathematical endorsement of roller bearings in France——Short and long stroke——Artificial rubber.

mechanism t an ordinary n locking the ame time has e pressure of in accordance 1 case and—by ordinary brake f bringing a needed, much ie without it, a French captain of artillery, and nobiles and railway cars. Briefly, e that of a centrifugal brake brought 1 in turn actuating a normal brake red type. The leverages regulating ioes may be increased, or the diamty be increased, without fear of ext sudden application of the mechanp the wheels from rotating, whether erwise, since under all circumstances ie live wheel axle which determines sure. In the accompanying illustraed by the driver to push the clutch he flanged sleeve, which is keyed to the intermediate ring. By this action pressed against the adjacent surcssure proportional to the driver's time the weights, which are provided are free to move radially between 1 to the flanged sleeve, are thrown lrical surface of the friction ring. is engaged to rotate with the wheel ugal pressure is sufficient to make it rotate is transmitted by a cable everage sufficient to produce a very strong effect if the centrifugal action of the weights is pronounced. It seems from the description that the driver's braking effort, when applied to the lever, is simultaneously applied to an ordinary brake, which in automobiles may be the external wheel brake or may operate internally in the drum, parallel with the centrifugally actuated brake, by dividing the drum surface into belts, one of which receives pressure from the ordinary brake and the other from the centrifugal brake. In whatever manner the ordinary brake action is arranged, its surfaces and leverages are so adjusted that this brake alone is incapable of locking the wheels at high speed. It is stated that the coefficient of friction between a brake shoe and a drum is much increased when the rapidity of motion of the revolving parts is reduced, and that this accounts for the very slight initial effect of ordinary brake action (the momentum alone, it is said, being insufficient to explain the observed results). In accordance herewith the combined action of the centrifugal brake and the ordinary brake, both operated at the same time, is shown graphically in the accompanying diagram, which also shows the curve of the simple customary brake action for comparison. A lengthy description of the Hallot system is given in *La Vie Automobile* for March 12 and a mathematical discussion of the interdependent forces set in motion by this compound braking system is presented in *La Technique Automobile et Aérienne* for April 15.



mitting braking effort to the more akes. Hallot brake system

Celluloid which does not burn may find new employments in automobiles and aeroplanes and is already displacing the old inflammable celluloid for cinematograph films. It is no longer a product of gun cotton, camphor and alcohol. The cellulose base is in the form of special acetates (acetic acid taking the place of nitric acid in the whole process), held in solution in tetrachlorides of acetylene or in suitable mixtures of denatured alcohol, acetic ether and amylic acetate. The material, called cellite, was developed by Dr. Eichengrün, a German savant, and is produced industrially by Bayer, Liesegang & Badische Anilin Company, of Darmstadt, Germany. Instead of the expensive Japanese camphor, the inventor has succeeded in making a synthetic camphor whose composition may be varied so as to produce celluloids, or cellites, more or less hard, and even as elastic as rubber. For other purposes than photographic films, in which perfect transparency is required, the new material will be cheaper than the old. The author intimates that the Eastman Company and the American Celluloid Company, the world's principal producers of films, may have been licensed to use the new process. In Franch, Dr. Clément Botrelle has developed another uninflammable celluloid in which there is substituted for the ethyl ether usually employed in the manufacture an ether of silicious base (Botrelle uses a hex-ethylic disilicate) which, when it evaporates, does not only bind the nitrated cellulose together, but also coats it with silica.—*Le Génie Civil,* May 14.

Elaborate investigations of offset of crankshafts by v. Doblhoff were referred to in these columns in the issue of May 26. In his continued report on this subject the author enters upon consideration of the reactions upon the motor and the motor suspension of the changed torque elements of the crankshaft, these reactions being among the causes of vibration in automobiles and therefore important. It is noted that with offset crankshaft the piston pressure enters as a factor in constructing the parallelograms of the tangential forces acting and reacting at the crankpin, while in a straight motor the piston pressures are the same on both sides of the shaft and compensate themselves. The conditions differ somewhat, as between single, double and four-cylinder motors, and according to whether the cylinders are cast singly or in batteries, some of the stresses being balanced and annulled when the cylinders are cast *en bloc.* To arrive at his formulas the author is compelled to assume certain dimensions of the motor parts and he averages these from a number of actual four-cylinder designs. On this basis he develops graphically complete diagrams and curves showing the modifications in nearly all of the forces set going in five types of motors; namely, one normal motor, one with crankshaft offset one-fourth of the crankthrow, one with one-half offset, one with three-fourth offset and one with offset equal to the whole crankthrow. The friction of pistons (apart from the friction due to the expansive pressure of piston rings) is shown to decrease rapidly with small offset and then again to increase very rapidly at high offset, due of course to the high values on the compression and exhaust strokes. The balancing of the four-cylinder motor is shown not to be affected by the offset. A table is presented giving the numerical values for the various forces involved, and the total result is in favor of one-half offset, as previously mentioned. As incidental advantages, perhaps superior to the gains in mechanical utilization of power, the author mentions that the camshaft may be placed nearer to the crankshaft, if valves are all placed on one side, opposite to the offset, where they also ought to be for thermic reasons. By this disposition the camshaft gears can be made smaller, and no intermediate gears will be required, while noise will be reduced. To get these advantages in full measure it will, however, be necessary to cut a slit for the connecting-rod in the lower portion of the cylinder wall, and the author shows how this should preferably be done. The offset motor should be designed to turn "right" instead of "left," as is customary. Then the cylinders can be placed a little to the right under the bonnet; the camshaft, the valves and all auxiliary organs, as pump and magneto, can be placed to the left, where they are accessible, and there will be ample room left for the steering pillar and gear to enter the bonnet to the right, and the exhaust can be taken rearward on the left in the usual way without interfering with pedals and steering gear.—*Der Motorwagen,* May 10 and 20.

The square motor seems definitely abandoned. The ratio of stroke divided by bore oscillates from 1.2 to 1.4 for single cylinders, with an upward tendency. The long-stroke motors have shown what they can do in the recent voiturette races. A 100 x 120 gives about 12 horsepower: a 100 x 140 gives already 14 horsepower; a 100 x 180 exceeds 18 horsepower; and finally a 100 x 250 gives more than 30 horsepower with a fuel consumption lower than that of the 100 x 120. While the 100 x 250 will not become general, it is an assured fact that the 100 x 120 and even the 100 x 130 will presently prevail over the square type. In four-cylinder and six-cylinder motors the increase in the ratio of stroke to bore is still more notable. Motors of 75 x 125 and even 75 x 150 are current to-day, also 65 x 105 and 65 x 130. In brief, theory says long motors with high piston speed, and practice does not contradict the theory.—*La Vie Automobile,* May 14.

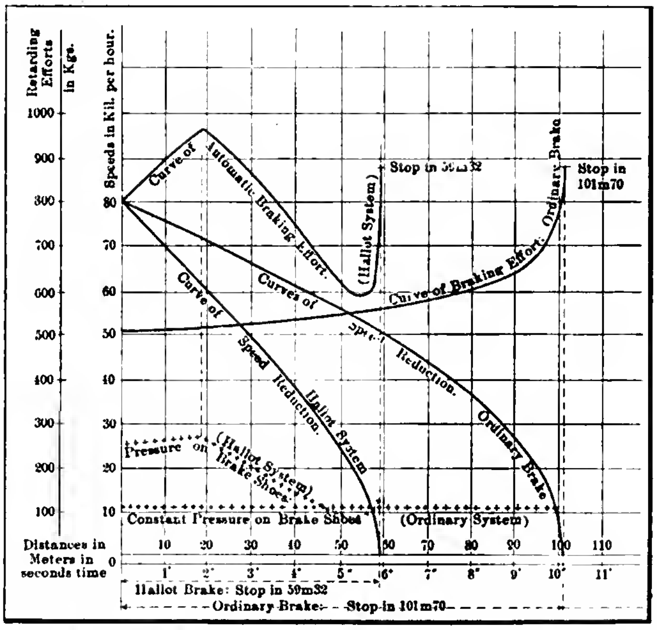
In a treatise on ball and roller bearings in *Technique Moderne* for April the author calls attention to the frequency with which the maximum stresses figured on by designers and according to which the dimensions of the bearing members are selected, are calculated from normal running conditions of the vehicle, while the balls or rollers and the races are in reality subjected to much heavier strains when the brakes are applied. In calculating formulas for maximum loads he sets aside the tensile strength and the elongation of the steel used in the bearing members as unimportant in comparison with the elastic limit and the modulus of elasticity and arrives at the result that, for a given diameter of the bearing and also given transverse dimensions, a roller bearing in which the rollers are rounded and run in races of similiarly rounded cross-section, and in which a suitable cage is provided, will not only support loads nearly four times as large as those a ball or ordinary roller bearing will endure, but may also be more easily mounted and dismounted.

Those interested in synthetic rubber and its economical production will find in *Engineering* (London) for May 13 an exposition of the work which has been done in this direction, with a list of the workers who have been or are engaged in it, the chemical difficulties met when organic substances are subjected to violent reactions, and a statement of the latest results.

When a glass bell in which a fly is captive is placed on a most minutely accurate pair of scientific scales, it weighs exactly the same, whether the fly sits on the wall or flies around the air in the bell. From an article by F. Bendemann in *Zeitschrift des Vereines Deutscher Ingenieure.*

"To build an aerial propeller without a more or less hollow pressure surface would nowadays scarcely occur to any designer," says C. Eberhardt in the preface to his important work, "Theory and Calculation of Air Screws, with Examples and Experimental Results from Practice." The author, whose untimely accident was recently announced, had for a number of years been the leading designing engineer in connection with the German military dirigible balloons, and as such had opportunity to verify in practice those design formulas for propellers which are placed at the disposal of the reader in the work referred to. If he had not found a very close correspondence between theory and practice he would not have dared, he says, to recommend his results for practical application by others. Throughout the book the mathematical deductions are presented as simply as possible, while the reasoning is submitted step by step to the reader's judgment. Good judgment is more important to the working engineer than mathematics, the author admits, but can only be developed on the basis of rich experience in the special field in which it must be exercised. Lilienthal's experimental research on the subject he has usually found correct and applicable, as far as it goes. And in accordance with this early investigator, the arching of the propeller surface should decrease in degree as the linear velocity increases. In the propeller of the Wright machines it is found, however, that the arching or curvature is about 1-26 near the hub and increases to about 1-20 at the ends, which is not considered correct, but probably is dictated by considerations of strength and the comparatively small importance of the propeller's efficiency in the portions whose velocity is smallest.—Published by M. Krayn, Berlin, W.; price 6 mark.

A certain steam motor builder in one of the northern counties still uses "flat" drills, even for drilling holes that should bear some resemblance to a circle.—*Commercial Motor,* June 2.



Comparative diagram of stop action with the Hallot system and with ordinary brakes

ɔns That Arise—General in Scope

Outlining the importance of using pure ingredients in the manufacture of storage battery solutions, and affording methods of testing in order to locate iron, copper, mercury, nitrates, and chlorine in electrolyte. The effect of temperature is discussed and acid strength for each temperature change is taken up.

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es Fahrenheit as the temperature at on?

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make these comparisons without hav- ı?

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that foreign substances, were they alter the weight of the nevertheless it is not nce on the scale of a this service. The only ɛnce of foreign ingre-

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/, iron, copper and such urities in the materials the batteries.

tes, chlorine, iron, etc.,

› be present in the cells om the makers, due to the forming solution. the use of salt water, ıe water used to dilute plenishing of the elec- it is more likely to be de by a process using anufacture. Iron may carelessness; the aver- of determining if the cells are "dead," using a screwdriver as a means of short-circuiting the plates or elements of the battery; the screwdriver will be partially dissolved in the electrolyte. Iron is also present in sulphuric acid, which is made from iron pyrites; this character of sulphuric acid should not be used in the manufacture of sulphuric acid electrolyte. Mercury may come from the thermometer bulb; if one is broken during the taking of temperature, this trouble will be imminent. Hydrometers, as used in battery work, should be shot-ballasted; mercurial poisoning will then be avoided. Copper comes from the close proximity of the copper leads and brass terminals used in connecting up the batteries.

[103]—Which of the impurities is the most damaging?

Nitrates, perhaps; chlorine is very detrimental; mercury is much to be avoided; copper is not so bad; iron has a very bad effect upon the strength of the supporting grids.

[104]—How much of these ingredients may be tolerated in batteries?

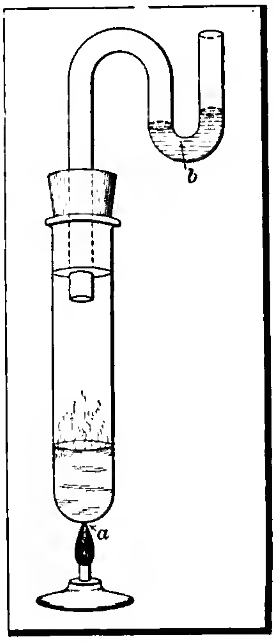
The merest trace will have its effect in time; just enough to strongly indicate the presence of a nitrate, chlorine, or iron, will be sufficient to demand that the battery be subjected to a purifying process.

[105]—By what method can a battery be rid of such undesirable elements?

(a) Charge the battery to drive out all the sulphion; (b) substitute pure electrolyte for the contaminated solution; (c) repeat this performance as many times as may be necessary, discharging the battery each time in its fresh bath of electrolyte before substituting the new and pure electrolyte. During each new charge some of the impurity will be driven off.

[106]—How may a test for chlorine be made if it is suspected to be present in a storage battery and it is desired to purge the battery of this dreaded impurity?

To a small quantity of the electrolyte of the battery in a test tube, add a few drops of nitrate of silver in solution: a curdy white precipitate, if it forms, will denote the presence of the chlorine. The white formation is soluble in ammonia water, and is precipitated out by nitric acid. This precipitate is chloride of silver, which will melt to a horny mass, and when exposed to light, turns violet.



Nitrate test tube which is used when it is desired to locate a mere trace of nitrate in electrolyte

[107]—By what method may iron be detected in a battery?

The per salts of iron are foxy red. In solution with yellow prussiate of potassium the yield is dark prussiate of blue, and this fact leads to prompt detection. Proto salts of iron, on the other hand, are green, and their solutions precipitate with red prussiate of potassium; use solutions of potassium in making the respective tests.

[108]—In what way may mercury be detected if it is present in a battery?

Mercurious salts deliver a black precipitate if limewater is added. The precipitate will be olive green if iodide of potassium is used instead of lime water. For mercuric salts, on the other hand, the precipitate will be yellow if lime water is added, and it will be scarlet if iodide of potassium is added.

[109]—What is the nature of the test which is utilized to detect copper in a battery?

To the electrolyte add liquor potassæ. A blue precipitate will fall down; it will prove out as copper if it turns black when boiled.

Report on Cast Iron Test Bars

(Second and Last Installment)

IN order that we may be able to construct a formula to be used in the design of a beam made of material whose crushing and tensile strength are not equal, we must know the ratio be-veen them. It may be reduced as follows (referring to Fig. 1, ıne 9 issue, page 1053):

Let M = bending moment $= \frac{Pl}{4}$ for load at center of span.

P = load at center.
l = length between supports.
S_c = compressive strength.
S_t = tensile strength.
b = breadth of beam.
d = depth of beam.
a = distance to extreme fiber on compression side.
f = distance to extreme fiber on tension side.
K = ratio compressive strength to tensile strength.

All dimensions are in inches.

We have the moment of resistance on the compression side

$$\int_o^a b\sigma y\,dy = \int_o^a bS_c\frac{y^2}{a}dy = \frac{ba^2}{3}S_c$$

d in like manner we find the moment of resistance on the ısion side to be $\frac{bf^2}{3}S_t$. Since these two resistances are on ›osite sides of the neutral axis they must be equal, or

$$\frac{ba^2}{3}S_c = \frac{bf^2}{3}S_t \text{ or } \frac{a^2}{f^2} = \frac{S_t}{S_c} = \frac{1}{K}$$

$$\therefore f = a\sqrt{K}$$

ince the sum of these two resistances must be equal to the ding moment we have

$$M = \frac{ba^2}{3}S_c + \frac{bf^2}{3}S_t$$

stituting KS_t or S_c

$$M = \frac{bS_t}{3}(Ka^2+f^2) = \frac{Pl}{4}$$

$$Pl = \frac{4}{3}bS_t(Ka^2+f^2) = \frac{8}{3}bS_ta^2K$$

$$d = a+f = a(1+\sqrt{K})$$

$$\therefore a^2 = \frac{d^2}{(1+\sqrt{K})^2}$$

tituting again

$$Pl = \frac{8}{3}bd^2\frac{K}{(1+\sqrt{K})^2}S_t$$

$$S_t = \frac{3}{8}\frac{(1+\sqrt{K})^2}{8K}\frac{Pl}{bd^2}$$

e substitute 1.747 for K we get $S_t = \frac{Pl}{1.155\,bd^2}$ or Clark's ıla.

cing the average compressive strength of cast iron as ›o lb. per sq. in., and the average tensile strength as 28,000, = 4, we have

$$S_t = \frac{Pl}{1.185\,bd^2}$$

Applying this formula as Mr. Nagle does Cla we have

$$\frac{2372 \times 1.185 \times 2 \times 1 \times 1}{2.4} = 23$$

As will be seen, this formula gives results with those obtained from the test.

A. A. CARY. It is unfortunate that the value study of metals and alloys, by use of the pyro scope, is not more widely appreciated. I fe that by such means all variations such as note paper can be most satisfactorily accounted for. the fact is now generally recognized that m chemical composition may possess widely dif properties which are quickly recognized by m ination.

Chemical analyses, as given in Table 1 of t doubtedly of considerable value in the investiga but without a physical examination our knowle of the metal to withstand stresses and strair tain. Not only will investigations of this k cause of the variations noted in Mr. Nagle's pa give us the information needed to produce a uniformity.

PROF. T. M. PHETTEPLACE. It would be int whether a thorough sand-blasting would hav different results seemed to be obtained by clea of the material.

THE AUTHOR. Since the paper was written portunity to examine some instructive record (of three each) of round test bars. The bars in diameter, rough, on 12-inch supports, the bre corrected for actual diameters. The deflectio rected.

BREAKING LOADS IN POUNDS, DEFLECTIO TO 0.15 IN.

1........	3,276	3,185	3,044	4,400	4,005	2,913	3,276	3,3
2........	3,367	3,276	3,162	3,100	3,913	3,003	3,185	3,2
3........	3,276	3,534	3,255	3,500	3,640	3,115	3,026	2,9

The three bars in each set were cast in thre No. 1, or the upper line, being cast from the ladle, No. 2 from the middle, and No. 3 from will be observed that in eight of these eleven lected from the two nearest in agreement, came of the pour, and that all of the extreme varia in either the first or last pour. If we have or would differ as much as 22 per cent, while if out of three nearest in agreement, those two more than 2 per cent. or 3 per cent.

I am very glad that Mr. Peek has taken up solution of fitting a formula to the facts. Wh stration or Clark's is the correct, or the bette attempt to say, but it is a pleasure to find that agree so well with the facts. I trust that this p ish the old form of formula from the text bo

Professor Gregory has made an oversight in t my bars. Being twice as wide as his, the deflect very great variations: as 4 by 0.09 = 0.36 to by 0.09 = 0.72 to 0.45.

I have had no experience with bars 1 inch by 1 but I think that 0.15 inch deflection would be in machinery castings.

The Relation of Weight to Roadability

Editor THE AUTOMOBILE:

[2,289]—Generally speaking, is a light or a heavy weight car preferable for use on sandy roads? The various advocates fail to agree on this point. Surely there must be some principle involved. Perhaps some reader of THE AUTOMOBILE will be able to evolve a reasonable answer. FRANCIS E. LESTER.

Messilia Park, N. H.

There must be sufficient traction to transfer the power of the motor, as it is demanded in the process of driving the automobile, to serve the end. This is a matter which is controlled by the weight on the driving wheels. Every automobile, be it light or heavy, seems to satisfy this demand. If the going is bad, there must be power enough to drive the automobile when the wheels sink into the roadbed. If the wheels are of large diameter, the situation seems to be improved. Under the circumstances it would appear as if three points must be considered, i e.:

(a) The power must be adequate for the purpose.

(b) The traction must be enough to prevent the road wheels from slipping.

(c) The diameter of the road wheels must be large enough to keep the grade within that which an automobile can negotiate; they travel up grade all the time that they are in a depression.

A Question in Relation to Front Wheels

Editor THE AUTOMOBILE:

[2,290]—Will you state why makers of automobiles set the front wheels out of the vertical plane? J. B. WILSON.

Toronto, Canada.

It is desired that the wheels ride on "plumb" spokes; the road is given a camber; the wheels are set to the same angle from the horizontal, in order that they will ride on plumb spokes.

Why Are Cylinders Beveled at the Bottom?

Editor THE AUTOMOBILE:

[2,291]—I went into a garage the other day and the repairmen were working on the cylinders of a motor, and I noticed that there was a bevel at the bottom of the cylinders. What is it for?

Buffalo, N. Y. CURIOUS.

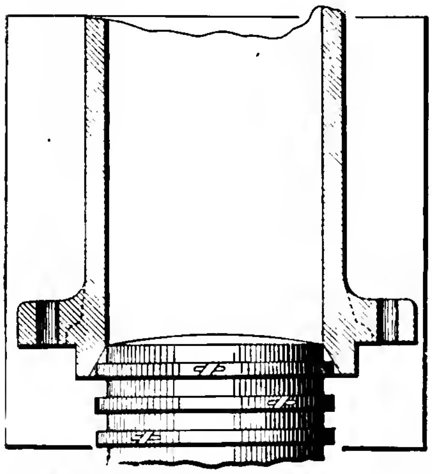


Fig. 1—Showing bevel at the bottom of the bore of the cylinder which is there to help enter the piston

The use of the bevel is shown in Fig. 1. When the piston is being put back into the cylinder the piston rings will be in the expanded position, and without the bevel it would be almost impossible to insert the piston without at least damaging the rings. With a suitable bevel and the use of two pieces of flat steel, the pistons may be put back into the cylinders, and the rings will close in without trouble.

Series Connection for Ignition Batteries

Editor THE AUTOMOBILE:

[2,292]—What is the right method of connecting ignition batteries, using, say, five dry cells? NEW OWNER.

Erie, Pa.

See Fig. 2. The inter-connections are from zinc to carbon in each case; one lead from the interrupter goes to the zinc at one end and the other lead to the carbon.

Gasoline Will Cause Carbon Accumulations

Editor THE AUTOMOBILE:

[2,293]—I do not see how the use of a limited amount of good lubricating oil will result in an accumulation of carbon in the combustion chamber of a motor, but the carbon does accumulate, and I am at a loss to account for it. SUBSCRIBER.

Nashville, Tenn.

Referring to Fig. 3, A represents the motor cylinder, B is the piston and C is the mixture which is too rich in gasoline, and carbon is precipitated out. The figure to the left, in the same view, is of a retort in which D is the carbonaceous material which is placed in the hermetically sealed chamber for the purpose of distilling off the more volatile matter, and the residuum is carbon. The door C of the chamber must be tight enough to exclude air. E represents a fire built on a grate in a fire box under the chamber D. Fuel is placed on the grate through the door B: draft is through A, and the grate up the chimney G; ashes are shown at F. The combustion chamber of a motor is to all intents and purposes a chamber such as that shown at D, and if carbonaceous material is placed in the combustion chamber C of the motor cylinder, without enough oxygen to burn the carbon, the residuum will be the very carbon complained of, nor does it matter that the carbonaceous material is in the hydrocarbon form known as automobile gasoline. The way to avoid this carbon formation is not to use too much gasoline.

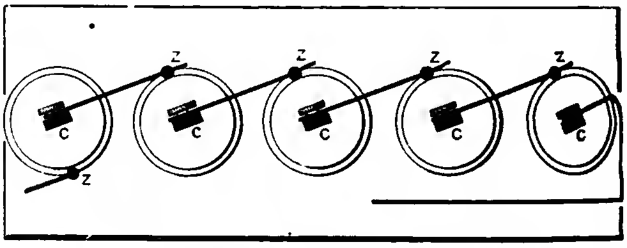


Fig. 2—Showing series connections of dry cells of battery as used in ignition work

Depends Upon Pressure or Gravity Feed

Editor THE AUTOMOBILE:

[2,294]—Will you please answer the following questions through the columns of your paper:

1. How are gasoline tanks on automobiles located with reference to the floor of the car? Are the bottoms of tanks above, below or on the level with floor in general?
2. What is the usual capacity of gasoline tanks now in use?
3. What are the shapes in use?
4. Is there such a thing as standard sizes, or does each company make its own particular shapes and sizes?

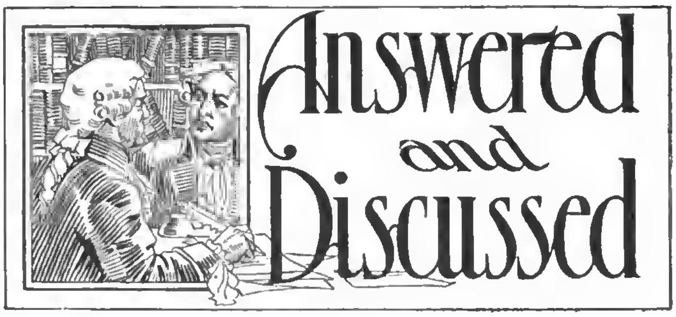
Bridgeport, Conn. JAMES S. HALL.

1. In gravity feed work the gasoline tank must be located at least one foot above the float bowl of the carbureter, which condition is independent of every other consideration. In pressure feed work the gasoline tank is located below the deck of the body, and generally below the top of the chassis frame.

2. The capacity of the gasoline tank for a 50-horsepower touring car is about 20 gallons. For a 30-horsepower touring car it is about 16 gallons, and for a 20-horsepower car it is about 10 gallons. A five-gallon tank will feed a "one lunger" for 100 miles.

3. Round or oval tanks are preferred; walls without curves bulge out unless they are braced by means of surge plates, of which two are used in most tanks.

4. Each company uses a gasoline tank which will fit into the space available in view of the design, and the placing of other essentials.



Transformer for Recharging Storage Batteries

Editor THE AUTOMOBILE:

[2,295]—Will you kindly describe in your "Letters Interesting, Answered and Discussed" how to construct cheaply an efficient transformer for recharging storage batteries, say from alternating current (110 volts), as supplied for lighting purposes, and the ordinary storage battery, 6 volts, 60 amperes? G. H. J.

San Mateo, Cal.

Storage batteries cannot be charged by means of a transformer. The transformer would still deliver an alternating current, and since an alternating current delivers its impulses in alternate directions the battery would be discharged as much as it would be charged per cycle of the alternating current. A mercury rectifier will do this work. They are not easy to make in an experimental way, but one can be had at a reasonable price from some one of the big electrical companies who manufacture them.

Look Out for Secondary Moments in Speeding

Editor THE AUTOMOBILE:

[2,296]—As the rating of the horsepower of an automobile is based on piston travel of 1,000 ft. per minute, hence a 3 3-4 x 4 stroke, 4-cylinder car, must make 1,500 revolutions per minute. Is this a practical velocity of speed, and if not, what is considered a practical speed that will not abnormally injure the car? Are some cars built for higher speed than others, considering safety, and if so, what are the features to enable one car to run at a higher speed than another without injury? When is a car in such a condition that it can be called "worn out"? What condition can a car be in and not be said to be worn out? H. P. NICHOLS.

Nichols, Conn.

The speed named for a motor with a 4-inch stroke to obtain a piston travel of 1,000 feet per minute should not be unsafe. It is not possible to state offhand the safe speed of any motor; it depends upon the magnitude of the secondary moments beyond a certain speed, and the secondary moments in turn depend upon the weight of the reciprocating mass, and other unbalanced components. The design of the motor must be investigated, and calculations must be made from exact data, which can only be obtained as the result of a careful investigation.

An automobile is worn out when it is reduced to a state where it gets on the nerves of the owner.

How to Know When Tire Is Deflated

Editor THE AUTOMOBILE:

[2,297]—Do you know of any device which will let the chauffeur know when a tire becomes deflated, while running? If so, please give me the address of the manufacturer. R. M. HARBIN.

Rome, Ga.

A real, live chauffeur, were he paying attention to the automobile and the road ahead, would hear the differential gear when it is thrown into action, if one of the tires of the rear wheels flattens. When the two rear wheels are of the same diameter there is no relative motion of the sun and the planets of the differential gear. A dead chauffeur would not even know if a front tire should go down; a live one would see it. In the meantime, there are devices to be had at supply stores.

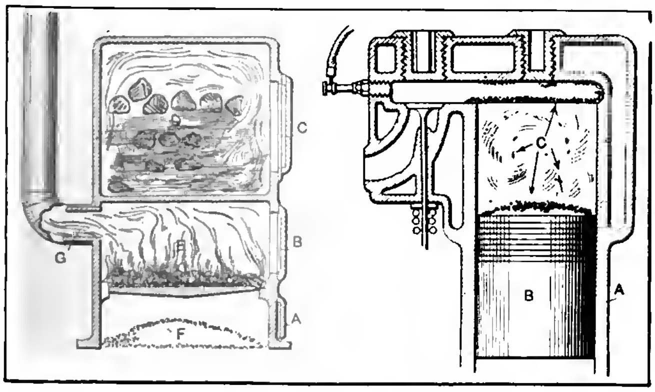


Fig. 3—Coke oven, showing its relation to the combustion chamber of a cylinder of a motor

Proper Gear Ratio for Motor Delivery Wagon

Editor THE AUTOMOBILE:

[2,298]—Kindly answer the following question through the columns of your paper. What should be the proper gear ratio for a motor delivery wagon of the following specifications: 1500 lbs. maximum load capacity; weight 2200 lbs.; motor 2-cylinder opposed, 4-cycle, water-cooled; 5-inch bore, 4-inch stroke; wheels 36 inches in diameter? F. L. S.

Toledo, Ohio.

In this connection it may be well to prefix the statement that delivery wagons are generally geared so that they travel too fast. The law of depreciation cannot be stated in such absolute figures that they may not be controverted by the wise, but in a general way the following will hold:

Speed in Miles per Hour	Life of the Car
5	100 per cent
10	25 per cent
20	6.25 per cent

The figures given are relative, so that the initial speed should be set in accordance with the characteristics of the automobile. Five miles per hour would probably be a good speed for a 4-ton car, so that in your case you might increase from five to eight miles per hour without seriously affecting the initial life. Under the circumstances, considering the difference between loaded and free speed of the motor, it would appear to be good practice to employ a gear ratio of 10:1. You probably will not care to advocate low speed, and it will be up to you to decide as to how much faster you wish to have the automobile go, thus leaving it to the purchaser to decide as to the magnitude of the repair bill.

Read "The Automobile"—See June 9 Issue

Editor THE AUTOMOBILE:

[2,299]—I have a car which is equipped with the Bosch High Tension Magneto for ignition only, and wish to equip it with an extra system so I will be able to start on the spark. Can this be done by using six dry cells, a single vibrator coil, and the timer and distributor of the magneto? Is it considered bad for an engine to be started on the spark? SUBSCRIBER.

DeLancey, N. Y.

Spark Should Not Be Retarded

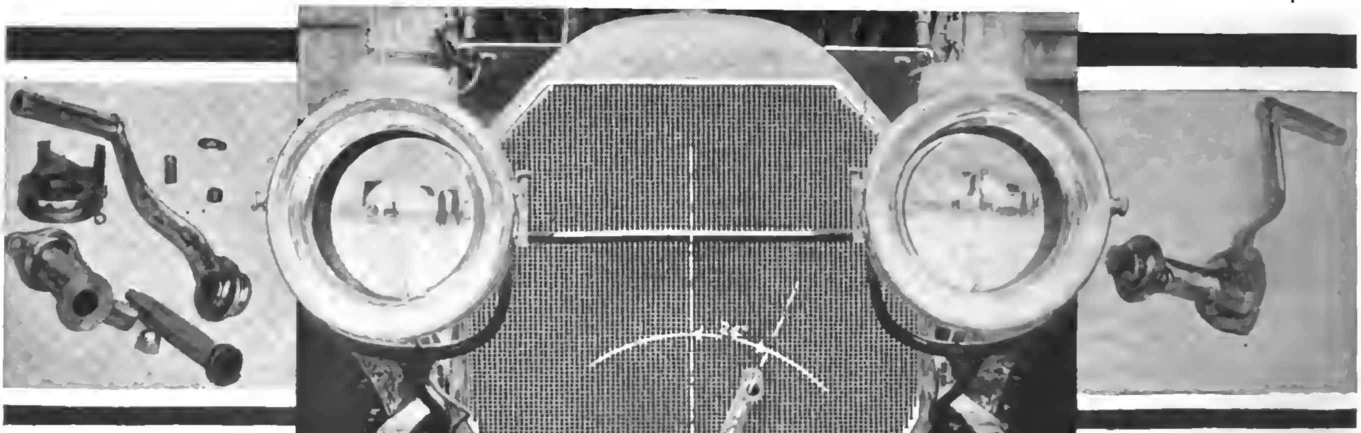
Editor THE AUTOMOBILE:

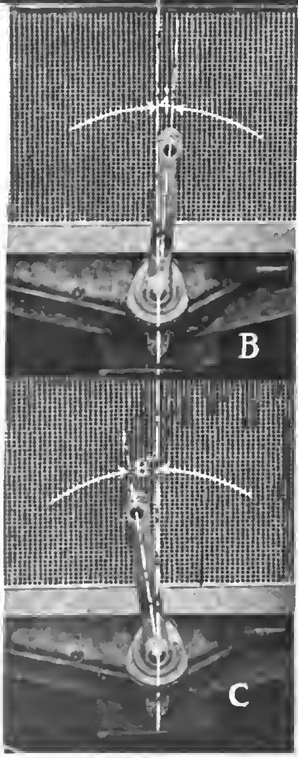
[2,300]—Will you kindly inform me if it is correct driving to have the spark advanced when going down a hill, shutting off the throttle entirely, and throwing out the clutch if the hill is not long enough to warrant cutting off the ignition entirely and coasting down? I have always understood that to leave the spark advanced is an excellent chance to cool off the motor while rolling down hill, and is also economical. Will you give me your valued opinion to settle an argument with one who always retards the spark when going down hill? E. L. G.

Flushing, N. Y.

The spark should not be retarded too much at any time whether going up or down hill or on a level. If the spark is cut off when a car is coasting, a muffler shot will be generated when the spark is thrown in again and the accumulation of mixture in the muffler and exhaust piping may be sufficient to disrupt the muffler. Running on a retarded spark causes undue heating of the automobile engine, and the exhaust valve is likely to be warped as well.

The Problems of Standardization Are Prominent



ACCESSORY makers serve all the automobile manufacturers, and in order to have the accessories on a standard basis it is necessary that each automobile maker conform to a given standard, so that the accessories will fit when they are delivered for use on the respective automobiles. There is nothing like a concrete illustration when it is desired to bring home to the makers of automobiles the reasons for conforming to a given standard, and for this occasion the Keystone safety starting handle is used as the illustration. This handle is now a regular part of Alco cars, and its value seems to be adequately demonstrated. It was used on a few of the cars during last year, and was made a regular part of the Alco equipment when the engineers of the company found that it had the two virtues which are necessary from a practical point of view. It is not enough that an equipment will perform a function, so that when the device was first applied and it was found to be capable of performing its function, there still remained the question of ruggedness in service. It took some time to find out just what part would have to be redesigned in order that the equipment as a whole would be stable, and the illustrations here shown are of the final equipment as it is used on Alco cars.

The complete safety starting handle is shown singly at the right of View A, and the component parts are given at the left of the same view. In View A the starting crank is shown rotated 24 degrees to the right of the vertical line, at which point the back kick began in the experiment which was conducted for the purpose of showing how far in the reverse direction the crank would travel before its mechanism would bring it into the release position. In View B the releasing mechanism is just letting go; the angle is 4 degrees to the right of the vertical line, so that the difference between the angle in View A and the angle in View B is the distance of angular travel which must be displaced in order to effect the release of the crank during a back kick. This angle as shown is 20 degrees. In View C the crank stands 8 degrees to the left of the vertical center, which is the position the crank took in the worst case, which 8 degrees represent the point at which the crank jaws are absolutely clear, with no chance whatever of interference between the jaws and the driving pin.

Having shown that the starting crank will release if the motor rotates in reverse, and that the angle of reverse travel is inside of 24 degrees, and that the difference between the point where the crank begins to reverse and the position of absolute clearance is inside of 32 degrees, it is unnecessary to produce any further reasoning with a view to indicating how well the hazards due to back kicks are cared for by this equipment. It is designed for this purpose, and is doing the character of work in practice which makes it wholly unnecessary to more than point out the facts. The illustrations show a starting crank of the usual design, a supporting bracket, crankshaft, a ratchet and a finger with relating small parts. The hub of the crank handle has a groove turned in it and forms a part in the ratchet-like construction. The other part of the ratchet has a drilled hole in which is a steel ball kept in place by a small spring. This form of ratchet works extremely well in practice and is entirely free from backlash. On the relating part of the ratchet is a cam or inclined wedge-shaped piece, located on the inner side, which fits over the finger on the bracket. In cranking the automobile, the handle turns freely in the right-hand direction, and the finger is then at the bottom of the inclined surface, but as soon as the backward move takes place, the cam presses against the finger and forces the handle out of engagement. The extreme movement of the handle is limited by the shoulder at the end of this cam piece.

If safety starting cranks are to be considered desirable in automobile work, it then remains to have automobiles so standardized that they can be applied without having to be especially designed for each make of car, not only for the reason that special designs are more costly, but on the further ground that mistakes are likely to creep in every time a new design is encountered, so that having arrived at a satisfactory basis for the safety starting crank, it remains to so design automobiles that it can be attached to them at will without having to redesign either.

The illustrations here afforded were placed at the disposal of The Automobile by William R. Webster, M.E., of Philadelphia, Pa., who is the inventor of the Keystone safety starting crank, and as it is here shown, it represents Alco practice.

Fuel System of Stearns Model 30-60

Some facts in relation to the gasoline storage and the method of feeding it to the carbureter, showing how it is put under pressure and controlled by a float in the auxiliary tank on the dash, so that it feeds to the carbureter by gravity. The carbureter is of the double-jet type, but one float-bowl serves for both nozzles, and the things to do if the carbureter demands attention are discussed.

DESCRIPTIONS of automobiles, while they afford a certain amount of information, general in its character, even so, the purchaser of a car must either be taught by the maker's representative how to manipulate adjustments, if the necessity arises, or technical papers, if they are to be up to a fitting standard, face the necessity of presenting specific information which may be used in the process of tuning up the automobiles. If purchasers can get from makers' instruction books data which will be sufficiently comprehensive to serve the purpose, it will be a good idea for them to do so, but an instruction book will be of no value at all, unless it is carefully read, and with a further understanding that the instructions and the automobile be compared, so that the purchaser will be sufficiently familiar with the situation to warrant him in making an adjustment on the road.

It is not prudent to undertake to adjust the ignition or the fuel system of an automobile in the absence of familiarity and at a distance from home, with the chances of disarranging the system beyond the skill of the owner to further cope with the problem. If a car will run at all, one unfamiliar with the situation will be justified in undertaking the tuning-up process in some place where he can get assistance if necessary; there is a chance that he might by tinkering with the delicate adjustments so derange the power plant that he will fail to make the motor run at all—assistance will then be necessary.

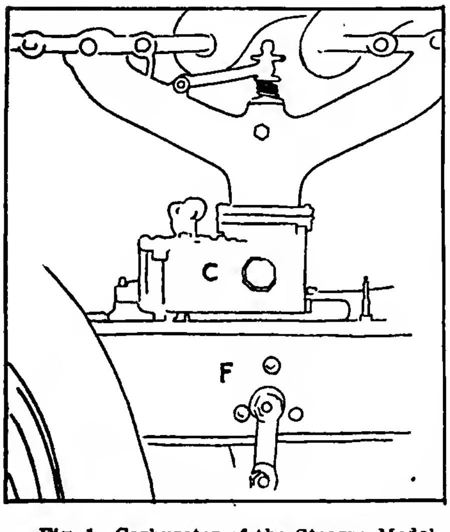


Fig. 1—Carbureter of the Stearns Model 30-60, showing how it is partly below the chassis frame

It would be an ambitious undertaking for a technical paper to present in detail the ignition and fuel system of every automobile made; there are but 52 issues of the paper per year, while of types of automobiles there are upward of 1,000. The great danger in presenting matter to readers lies in giving them too much; it is the old story of the needle in the haystack—there is too much hay. To avoid undue complication, it will be in the path of wisdom to present details of some one system at a time, and even that as briefly as possible.

For this occasion the fuel system of the Model 30-60 Stearns automobile is taken as the subject. Briefly stated, this system comprises:

(A) A gasoline tank located at rear of chassis under pressure.

(B) An auxiliary gasoline tank located on the dash to the right side of the automobile, not under pressure.

(C) A pressure regulator located on the dash under the bonnet just in front of the auxiliary gasoline tank.

(D) A hand pump located on the dash to the left side outside of the oil pump, the two pumps being alongside of each other.

(E) A double-jet carbureter located on the left side of the automobile in a mid-position on the horizontal line of the motor, partially hidden by the chassis frame F, the carbureter being indicated by C, Fig. 1.

(F) Piping which leads from the gasoline tank along the right side of the chassis frame to the auxiliary or dash-tank, which is shown in section.

(G) Piping from the combustion chambers in one of the cylinders of the motor to the pressure regulator, which receives gas under compression.

(H) Pressure pipe leading from the pressure regulator to the pressure side of the gasoline system.

Become Familiar With the Carbureter Adjustments

Referring again to Fig. 1, the carbureter C is placed so low down that it comes behind the chassis frame F for the most part; this was a necessity, due to the fact that the feed from the auxiliary gasolinc tank, which is located on the dash, is by gravity. It was stated that pressure is employed for the purpose of feeding the gasoline from the main tank at the rear of the chassis to auxiliary tank on dash. A section of auxiliary tank, shown in Fig. 2, discloses gasoline feed pipe P1, which leads from main tank to filter F, and as the arrows point, the gasoline supply leads into the auxiliary tank T, through a hole in the top, by a needle valve N; if the float is buoyed up sufficiently to press the needle onto its seat, which buoyancy is due to gasoline in the tank, the needle valve will stop off the pressure when the gasoline level is high enough to raise the float to which the needle valve is attached. The gasoline in the tank does not, therefore, have to be under pressure, and it flows by gravity through the pipe P2 out of the bottom of this tank to the carbureter, as shown in Fig. 3, entering at the top of the bowl B, through the fitting F.

The carbureter is of the float-feed type, so that a copper float, which is inside of the bowl B, stops the flow of gasoline from flowing through the fitting F into the bowl just when the level raises to that of the nozzles in the main housing of the carbureter C. This carbureter has two sets of air passageways, P1 and P2, with a nozzle in each, and air openings, shown as circles in Fig. 3. To vary the amount of air which can enter through the circular ports shown:

(A) Back off the wing nuts W1 and W2 of the smaller of the two bowls, which is marked P1, then slide the bottom casting around, noting the extent to which the holes will be covered by the sleeved portion of the lower casting. The sleeve extends up into the casting P1, and has openings in it which register with the openings in the casting P1, but by sliding the sleeve around when the wing nuts W1 and W2 are backed off, the holes will fall away from their registered position and more or less close up the air passages. When the adjustment is made, the wing nuts W1 and W2 must be screwed up tight again to hold it in place.

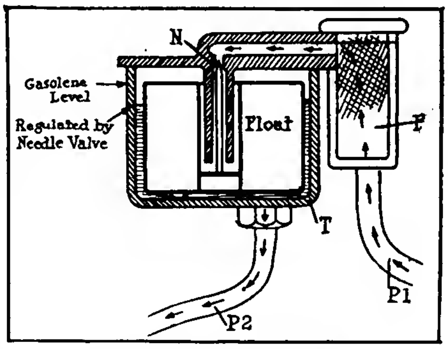


Fig. 2—Section of auxiliary gasoline tank on the dash, and means of limiting the flow of gasoline under pressure by a float.

If it is desired to adjust the air passages of the larger (inside air valve) the wing nuts W3 and W4 (the latter being shown in dotted lines) should be backed off when the passageways in the casting P2 may be throttled in the manner as described for the smaller bowl P1. The operator will have to exercise some care in making these adjustments, and the wing nuts W3 and W4 must be tightened up again when the operation is completed.

The spring S1 at the bottom of the carbureter C, Fig. 3, controls the automatic air valve on the larger of the two carbureters; this spring is very light; the pressure must be carefully regulated; the weight of the valve is almost sufficient to prevent the valve from opening, excepting at the higher speed, when more air is required in order that the mixture will be in the proper ratio of gasoline to air.

The spring S2 on the carbureter C, Fig. 3, is relatively stout and it is placed to hold the accelerator in the closed position. The lever L1 swings in the direction of the arrow when the accelerator foot pedal is pressed, there being a system of links and rods between the foot pedal of the accelerator and the lever L1 for the purpose of imparting the desired motion. The spring S2 must be adjusted to that strength which will keep the accelerator in the closed position against all the forces which are likely to be brought against it, excepting positive pressure on the foot pedal at the will of the operator.

Of the troubles which are likely to be experienced with the carbureter, the most prolific one may come from impurities in the gasoline; should water accumulate it may be run out of the bottom of the bowl B through the drain-cock D; but should the carbureter flood, the cover T over the float bowl B would have to be taken off, which may be done by backing off four screws. The needle valve seat is attached to the cover and will come away with it. The primer valve is also fitted to the cover and will come off with it. With the cover off, the float bowl will be exposed to view, and the needle valve will be found in a hole in the center of the float bowl; the bowl and the valve may be lifted out and by placing the needle valve in the valve seat member, which is attached to the cover, it will be possible to determine if the needle valve is tight by the simple expedient of pressing it against its seat and blowing through the hole in the fitting F. If the valve is not tight it will have to be ground in. It is also necessary to observe if the priming valve is tight on its seat; if it is not the carbureter will flood. The priming valve has a spring on it, and a fork lever L shaped like a bell crank is placed to lift the timing valve off of its seat against the pressure of the spring. It may be that the fork, which engages a washer on the valve stem, will prevent the valve from seating when the valve is supposed to be closed. If this is found to be true, file away enough of the fork to let the valve seat. If the valve stem is battered up so that it will not make a tight seat it must be ground in. It will be possible to note this condition if flooding continues after the needle valve, which is actuated by the float, is made tight.

Before putting the cover T back, clean out the float bowl. If water is present it will not flow through the sieve in the bottom, and it will have to be absorbed by a clean cloth to get rid of it. This is one of the strange things about fine-mesh sieves, chamois skin, and like filters. If the filter is first wetted with gasoline. water will not then flow through, but if the sieve is first wetted with water, gasoline will not flow through. This odd situation may be carried so far as to say that if part of the sieve is wetted with water and another part with gasoline, water will flow through the part which is wetted by water and gasoline will flow through the part which is wetted by gasoline.

It would be a natural assumption that the length of the needle stem, which is placed in the float bowl and is concentric therewith, will be fixed by the maker so that considering the buoyancy of the float, gasoline will raise in the bowl to the proper level to match with the height of the two nozzles in the respective air chambers. Should this not be the case, the carbureter will either flood or it will stop off the gasoline, tending to "starve" the mixture; flooding would be the most serious difficulty, but this might be overcome by placing this piece of cork on the cross bar which prevents the needle stem from passing clear through the hole in the float. The piece of cork would have the facility of raising the height of the stem so that it would press against its seat were the buoyancy of the float below the requirement. If the float leaks, it will, of course, become loggy and fail to serve its end. In this event the hole must be located and stopped up. This might be done with a soldering iron, but in the absence of one in the kit, a match may be whittled to a sharp point, and after enlarging the hole a little, the match may be screwed in tight. If the match is dry when it is screwed in, it will swell when it becomes gasoline soaked and stay in the hole long enough to let the autoist get home with his car.

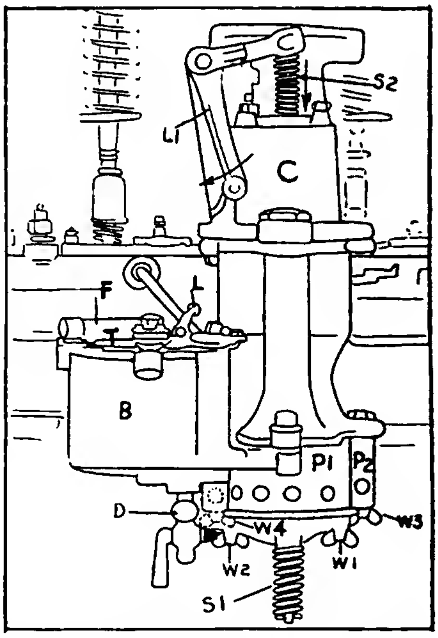


Fig. 3—Carbureter as it would look were the chassis frame removed, with letter references to aid in the discussion.

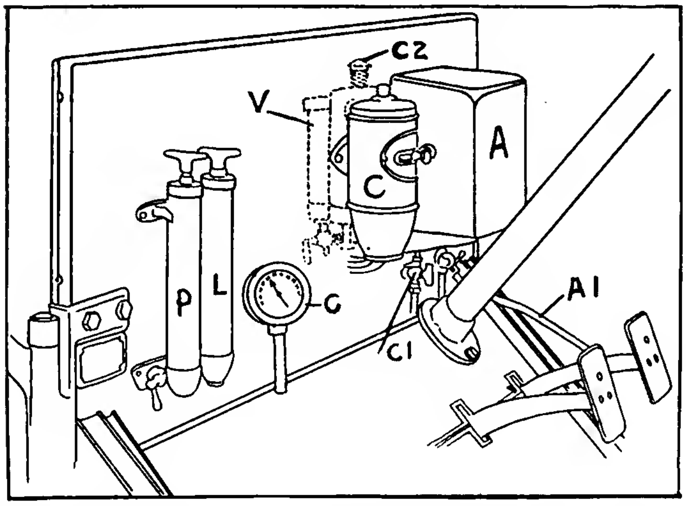


Fig. 4—Dash of the Stearns Model 30-60, showing placing of the auxiliary gasoline tank, pressure gauge, pressure pump, and dash-coil

Become Acquainted With the Dashboard Equipment

Fig. 4 shows the dashboard equipment. A is a mahogany cover over the auxiliary gasoline tank, a section of which is given in Fig. 2. C represents the dash-coil of the Bosch dual ignition system, which was described last week. P is the pump by means of which pressure may be supplied to the gasoline system, and G is the gauge which tells how much pressure is on the gasoline system. V is the automatic pressure valve, shown in dotted lines, it being on the back of the dashboard under the hood , as before stated. A1 is the accelerator foot pedal.

If the pressure on the gasoline system is not sufficient to cause the gasoline to flow into the auxiliary tank A, there will be a shortage of gasoline, but this will be discoverable by opening the cock in the bottom of the tank to see if gasoline flows out. If it does not it will then be known that the tank A is empty. If it is desired to examine the carbureter to the extent of taking off the cover of the float bowl the cock C1 may be closed to shut off the flow of gasoline to the carbureter; if this is not done gasoline will continue to flow through the system out of the

(Continued on page 1108)

Automobile Law Chart for States Which Regulate

By XENOPHON P. HUDDY, LL.D.

Gist of the automobile laws of all the States in the Union which regulate the use of automobiles through special laws. The information afforded includes the status of non-residents, the legal speed, equipment required, and penalty imposed for a conviction.

COMPLETE, accurate and up-to-date, this chart of the automobile laws of the various states contains the principal and important requirements with which automobilists should be familiar. In those states where non-residents are exempt from local registration, the exemption applies where the automobilist is duly registered in his home state and when he carries his home state number tags and other credentials. The speed rates are indicated in the chart in numbers only, it being understood that the lowest rates apply to built-up sections of cities and villages, the next rate to sections of municipalities not closely built up, and the highest rate to the open country. Automobiles should, of course, be equipped with brakes and a signaling device. As this is assumed, only the provisions concerning lights are given herein. The penalties stated in the chart are indicated in a general way. Those who contemplate traveling in a state which does not exempt non-residents should write and obtain the necessary license. More detailed information in regard to the requirements of the automobile laws may be obtained by writing to the various officials having charge of registering and licensing motor vehicles.

	Registry	Non-Resident	Speed	Equipment	Penalty
Alabama	Probate Judge, 25c.	Not exempt	8 m.	Brakes & muffler	$20 to $200, 1 to 6 mo.
California	Sec. St. $2	Exempt	10 m. 20 m.	2 white L. forward, 1 red rear	$100 to $250
Connecticut	Sec. St. $6 to $30—h.p.	Exempt 10 d.	25 m.	2 white L. forward, 1 red rear	Max. $500 or 1 yr. or both
Delaware	Sec. St. $5	Exempt	12 m. 20 m.	Brakes and horn	$25 to $100
Dist. Columbia	Auto board $2	Exempt 10 d.	12m. W'sh 20m. O.C.	2 white L. forward, 1 red rear	$5 to $250
Florida	Sec. St. $2	Exempt 30 d.	Reasonable 4m. curves, etc.	2 L.	Max. $100 & imp.
Illinois	Sec. St. $2	Exempt	10 m. 15 m. 20 m.	2 white L. forward, 1 red rear	$10 to $200
Indiana	Sec. St. $1	Exempt	8 m. 15 m. 20 m.	"Lighted lamps"	$50 to $200
Iowa	Sec. St. $5	Exempt	12 m. 15 m. 20 m.	1 white L. forward, 1 red rear	$25 to $50 & imp.
Kansas	No state law	Exempt	10 m. 20 m.	1 or more L. forward	Max. $100
Kentucky	No state law	Exempt	15 m.	1 white L. forward, 1 red rear	$10 to $100
Maine	Sec. St. $2	Exempt	8 m. 15 m.	1 L.	$50, 10 d.
Maryland	Com. M. V., $6 to $18—h.p.	Exempt 7 d. sp. permit	12 m. 18 m. 25 m.	2 white L. forward, 1 red rear	$50 to $500 90 d.
Massachusetts	Mass. High. Com., $5 to $25—h.p.	Exempt 10 d.	15 m. 20 m.	2 white L. forward, 1 red rear	$10 to $100
Michigan	Sec. St. $3	Exempt	10 m. 15 m. 25 m.	2 white L. forward, 1 red rear	$25 to $100 and imp.
Minnesota	Sec. St. $1.50	Exempt	25 m.	2 white L. forward, 1 red rear	Not in auto law. See crim. stat.
Missouri	Sec. St. $5	Exempt 20 d.	8 m. 10 m. 15 m.	2 white L. forward, 1 red rear	$25 to $500
Nebraska	Sec. St. $1	Exempt	10 m. 15 m. 20 m.	1 or more white L. forward, 1 red rear	$25 to $50 and imp.
Nevada	Sec. St.	Exempt	10 m. 15 m. 20 m.	1 or more lights forward	$25 to $50 or imp.
N. Hampshire	Sec. St. $10	Exempt 10 d.	10 m. 25 m.	Lamps	$10 to $50
New Jersey	Com. M. V. $3 to $10—h.p.	Not exempt 8 d. sp. license	12 m. 25 m.	2 white L. forward, 1 red rear	$100 to $200
New York (New law in effect Aug. 1, 1910.)	Sec. St. $5 to $25—h.p.	Exempt	30 m.	2 white L. forward, 1 red rear	$100 and other penalties
North Carolina	Sec. St. $5	Exempt	8 m. 12 m. 25 m.	2 white L. forward, 1 red rear	$50
North Dakota	No state law	Exempt	8 m. 25 m.	2 white L.	$10 to $25
Ohio	Sec. St. $5	Exempt	8 m. 15 m. 20 m.	2 white L. forward, 1 red rear	$25 to $100
Oregon	Sec. St. $3	Exempt	8 m. 25 m.	1 white L. forward, 1 red rear	$25 to $100
Pennsylvania	St. H. Dp. $5 to $15—h.p.	Exempt 10 d.	25 m.	2 white L. forward, 1 red rear	$10 to $200
Rhode Island	Bd. of P. R. $5 to $25	Exempt 10 d.	15 m. 25 m.	1 or more white L. forward, 1 red rear	$200 to $500 or imp. 60 to 90 d.
South Carolina	No state law	Exempt	15 m.	1 white L. forward, 1 red rear	$10 to $150 or imp. 30 d.
South Dakota	Sec. St. $1	Exempt	10 m. 15 m.	White L. forward, 1 red rear	$25 to $50
Tennessee	Sec. St. $2	Not exempt	20 m.	Usual L. equipment sufficient	$25 to $100
Texas	Co. Cl. 50c.	Not exempt	8 m. 18 m.	1 light	$5 to $100
Utah	Sec. St. $2	Exempt	10 m. 15 m. 20 m.	2 white L. forward, 1 red rear	Misdemean'r
Vermont	Sec. St. $1, 75c. h.p. sec. reg., 50c. h. p. 3d reg.	Exempt 10 d.	10 m. 25 m.	1 white L. forward, 1 red rear	$50 or 6 mo.
Virginia	Sec. $2	Not exempt	12 m. 15 m.	1 white L. forward, 1 red rear	$10 or 30 d.
Washington	Sec. St. $2	Not exempt	12 m. 25 m	1 or more white L. forward	Max. $100
West Virginia	Auditor	Not exempt			
Wisconsin	Sec. St.	Exempt	12 m. 25 m.	1 white L. forward	$10 to $25

Tells of Good Roads' Importance

SOUTH BEND, IND., June 13—Three hundred or more good roads enthusiasts, including highway commissioners from every township in Berrien county, prominent farmers and others, met last week in Benton Harbor, Mich., and heard good talks on good roads and the manner of constructing them. The meeting was held under the auspices of the Berrien County Good Roads Association.

Lengthen Course for Grand Prize

On account of urgency and number of requests that have been made of W. K. Vanderbilt, Jr., president of the Motor Cups Holding Company, promoter of the Grand Prize race of the Automobile Club of America, to lengthen the course for the big event, the company has decided to make the course 379.2 miles instead of 278.08, as was announced at the beginning of the season. The race will be held October 15.

Virile Atlanta Automobile Association


Exterior of Club House


Reception Room


A.G.Candler Jr


F.J.Cooledge


J Lee Barnes


J. M Nye


V.H Kreighaber


J.J Woodside


M.R Wilkinson


E Rivers


R.J. Guinn

ATLANTA, June 13—Below the shadowy line of Mason and Dixon, that arbitrary boundary which has always carried with it so much of significance and in this day so much of mystery and romance, the automobile club, as it is known in the North and East and West, is practically an unknown quantity save for such shining example as that set by the Atlanta Automobile Association and a very few other similar organizations.

The reason for the scarcity of automobile clubs in a section as rich, potent and progressive as the South, where social organizations and business associations are so notably complete and efficient, is a little obscure until one views the subject from the standpoint of the South itself. Below the Mason and Dixon line the motor car's invasion has been too recent to allow of sufficient time to form real clubs, except in a few instances like the subject of this sketch.

The conservatism of the South is expressed in its club life in speaking terms, as is evidenced by such organizations as the Pickwick and Boston Clubs of New Orleans, the Piedmont and Capitol City Clubs of Atlanta, the Watauga of Nashville and the Pendennis of Louisville, as well as such associations as the world-famed Washington Artillery of the Crescent City. But the vogue of the motor has swept over the South, and as a result here and there organizations of motordom are beginning to make their appearance. One of the pioneers in this line of activity is the Atlanta Automobile Association, which has for its object the advertising of Atlanta through the medium of the splendid speedway that has been installed near the "New York of the South."

The idea that lay at the base of the association was to place the city of Atlanta before the attention of the world. After studious consideration of all the ways and means that would be likely to accomplish this result, the men who are behind the organization decided that a speedway of the highest type would answer the purpose better than anything else, and thereupon they set about securing the land necessary for such an enterprise.

Their preliminary plans showed that 302 acres were required for the track and its buildings and not an inkling of their purpose was allowed to leak out until all the land had been rounded up and irretrievably placed under contract.

The impression was given out that a new cemetery was projected, to account for the purchase of the small farms that constituted the bulk of the desired property. The plan was to hold a race meeting during the week of the first automobile show of the South last fall, and as the movement did not really get under way until May 1, 1909, some extremely quick action was required.

Atlanta is a lively city, a metropolis of its section, but it is only number forty-three in the list of American cities as far as population is concerned. So it took a high quality of nerve to undertake such a project as that of installing a great speedway. However, the men behind the movement were intensely civic. They figured that if the race meetings made some money, so far so good; but if the balance sheets showed a loss it could be written off against an immense credit of advertising for the city. They were amply able to stand a loss in such a cause.

Securing the land commenced May 1, 1909, and was finished June 10. Bids were asked immediately, but some of the largest contractors in the country declared that the work could not be done in the short time that remained before the dates of the proposed meeting. At last one contractor said he would undertake the job if there was no rock work in the excavation. He was given a free hand and with a giant force of steam shovels, railroad trains and mule and man power he was able to complete the job within the time limit.

Atlanta was full of tourists at the time of the big show and the five-day race meeting, really the opening of the speedway, proved a vast success from every viewpoint. Numerous records were broken and several new world's marks were set. The attendance was enormous and not a life was sacrificed.

This spring the race meeting was not a success, but plans are now being laid to make the coming fall meeting the greatest thing of its kind ever seen in the South.

Stock in the association was offered to the general public, but the response was not of sufficient volume and Asa Candler, Sr., one of the most progressive citizens of the South, dug down into his own pocket to make up the deficiency. The organization contains the names of many of the most prominent men of Atlanta, who have given freely of their time and money to make this enterprise a success.

Aside from the speedway and its appurtenances, the association has a neat little clubhouse, tastefully fitted up for social features. After the recent spring meeting the prediction was made with more or less freedom that the Atlanta Automobile Association was dead. Such was not the case. An absolute loss in any business enterprise is disagreeable, but the men behind the association did not figure it a loss when they were obliged to make up the deficit. They considered such payments merely in the light of liquidating an excellent advertising bill.

But for the coming fall meeting nothing but success can be seen. Everybody is enthusiastic about its prospects and the whole association is working as a man to insure a large and representative entry list and a giant attendance during the races.

It is always refreshing to discover evidence of civic pride and progressive spirit and the motive of this association in making the Speedway project possible may be described as both. The object it sought to attain was wider than the automobile or the city of Atlanta—it was aimed to bring about the general welfare and commercial advancement of the whole of sunny Dixieland. And in passing it may be noted that it has accomplished much in that direction.

The good work done by the Atlanta Automobile Association and the stimulation to motoring given by the Good Roads and Glidden Tours through the South this spring have resulted in much activity in that line. But the honors of the pioneer must be laid at the feet of the enterprising, active and intelligent Atlanta Automobile Association.

Coming Events in the Automobiling World

June 20-July 6....Detroit, Mich., Industrial Exposition, Detroit Board of Commerce.
Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Pleasure Cars and Accessories Exclusively.
Feb. 6-Feb. 11, '11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

June 14-30.......Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, Through the Southwest.
June 16-22.......Albany Automobile Club, Albany, N. Y., Sixth Annual Tour to Atlantic City and Return.
June 18..........Ossining, N. Y., Hill Climb of Upper Westchester Automobile Club.
June 18..........Baltimore Hill-Climb of Automobile Club of Maryland.
June 18..........Philadelphia, Race Meet, Quaker City Motor Club.
June 25..........Port Jefferson, Long Island, N. Y., Hill-Climbing Contest, Automobile Club of Port Jefferson.
June 25-26.......Roadability Run, Automobile Club of Philadelphia, to Lake Hopatcong, N. Y.
June 28-30.......St. Louis, Mo., Three-day Reliability Run, St. Louis Manufacturers' and Dealers' Association.
July 1-4.........Indianapolis, Ind., Track Meet. Cobe Trophy Race—Held on Speedway Track, Chicago Automobile Club.
July 1-10........Los Angeles, Cal., Road Carnival of Licensed Dealers.
July 2-4.........Los Angeles, Cal., Speedway Meet.
July 2-4.........Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.
July 4...........Auburn, N. Y., Hill Climb of Automobile Club of Auburn.
July 4...........Cheyenne, Wyo., Track Meet of Cheyenne Motor Club.
July 4...........Dallas, Tex., Track Meet of Dallas A. C.
July 4...........St. Paul, Track Meet of Minnesota State Automobile Association.
July 9...........Plainfield, N. J., Hill Climb of Plainfield Automobile Club.
July, Middle of...Richfield Springs, N. Y., Hill Climb.
July, Middle of...Grand Rapids, Mich., Road Race of Grand Rapids Automobile Club.
July 18-23.......Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 30..........Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.
Aug. 1...........Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5.........Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 4...........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Aug. 15..........Start of Munsey Tour.
Aug. 17..........Cheyenne, Wyo., Track Meet.
Aug. 31..........Minnesota State Automobile Association's Reliability Run.
Sept. 2-5........Indianapolis, Ind., Speedway Meet.
Sept. 3-5........Wildwood, N. J., Reliability Run and Speedway Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 5..........Wildwood, N. J., Track Meet.
Sept. 5..........Cheyenne, Wyo., Track Meet.
Sept. 5..........Denver, Col., Road Race, Denver Motor Club.
Sept. 5..........Los Angeles, Cal., Speedway Meet.
Sept. 5-10.......Minneapolis, Minn., Track Meet at State Fair.
Sept. 9-10.......Providence, R. I., Track Meet.
Sept. 10.........Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10-12......Seattle Wash., Race Meet.
Sept. 17.........Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept.............Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1...........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3...........Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8.........Santa Anna, Cal., Track Meet.
Oct. 7-8.........Los Angeles, Cal., Speedway Meet.
Oct. 8...........Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15..........Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-18.......Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 20-22.......Atlanta, Ga., Speedway Meet.
Oct. 23..........San Francisco, Cal., Road Race, Portola Cup.
Oct. 27-29.......Dallas, Tex., Track Meet.
Nov. 5-6.........New Orleans, La., Track Meet.
Nov. 6-9-13......San Antonio, Tex., Track Meet.

Foreign Shows and Races.

May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
June 13-18.......Scotland, Scottish Reliability Trials.
June 20..........French Voiturette Race.
June 21..........French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27..........Speed Trials at Kiev, Russia.
Aug. 1-Sept. 15...French Industrial Vehicle Trials.
Oct 15-Nov. 2....Paris, France, Aeronautical Society Show.

)MOBILE

ursday, June 16, 1910 No. 24

JOURNAL COMPANY
WETLAND, President
TLAND, General Manager
39th Street, New York City

AL DEPARTMENT
or
A. HALL, Associate Editor
JAMES R. DOOLITTLE
LEY, Foreign Representative

SING DEPARTMENT
lg., Boston LOUIS R. SMITH, New York
higan Ave., FRANK B. BARNETT, 309 Park
icago Building, Cleveland
ınd Phila. H. H. GILL, 814 Majestic Building, Detroit

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it Britain; also in Paris at 248 Rue de Rivoli.
r, offices of "Omnia," 20 Rue Duret, Avenue
strasse 9, Berlin.

s second-class matter.
on of The Automobile (monthly) and the Motor
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profusely lubricate all the working parts; the proprietors of musicless tones, like the comets which fall upon the velvet-like envelope of earth, do more good than harm; they are crisped to dust as they ricochet from billow to billow, but the energy they possess is absorbed by the surroundings, and warmth, which is life, is taken up by the body which receives the blow.

* * *

Antiquity holds in the hollow of its withered hand the foundation of all progress. The first wheel, as it is pictured here, just as it was uncovered in a mummy-pit at Nineveh, 2000 B. C., is the rude prototype of the wheel of the very automobile which causes rare comment to-day. Would the originator of that wheel have listened to progress as it has taken on its present garb? No. The wiseacres who gathered around the throne of the Pharaoh of that day would have pointed out that ruin was concealed in every fiber of a pneumatic tire.

* * *

History justifies antiquity, but the antique has no place in active life—it belongs in a museum.

* * *

Shall we quake with fear because the automobile industry has accumulated force which is worth $500,000,000 per annum? Is progress an asset or a liability? If an asset, is it possible to have too much? If a liability, how comes it that the world has extended such liberal credit?

* * *

Considering the fact that the demand for steel as used in automobile work is 133,000 tons per year at the present time, and that this steel comes from the same hole in the ground as that which goes to make steel rails, knives, baby carriages, and bridges—allowing that mine labor is paid for its hire in either event—what kind of logic is it that says there is danger in mining the raw material for this particular 133,000 tons of steel?

* * *

Remembering that $160,000,000 worth of machine tools are now being utilized in the automobile business; that they would not have been in demand without it; that it took 43,000,000 man-days to build these machine tools; and that money was paid to all this labor—was it imprudent to employ the labor?

Allowing that 40,000 freight cars will be but enough to accommodate a year's output of automobiles during transportation, is it a risk for the railroad companies to furnish them?

* * *

In the plants where freight cars are made labor is employed, and the question is, Were the men in general work, or doing automobile work when the 40,000 freight cars were being made? Just think of it—4,800,000 pneumatic tires are made and used in a single year, all because of the automobile. This small effort requires the expenditure of $100,000,000 or more per year; is it imprudent to pay the cotton growers for their product? Will the negroes in South American wildernesses be hurt physically or morally by the opportunity to earn sustenance? Are the American artisans who make an honest living building tires damaged beyond repair by the money they thus receive?

But the story is not half told; as a small part of the situation, 1,000,000,000 gallons of automobile gasoline are consumed in a year; a small matter of $14,000,000. The question is ripe for the asking: Is Standard Oil money a menace to the community?

* * *

We build roads; what for? In order that automobiles may be used to advantage, and to realize the greatest measure of economy, remembering that the automobile and the road on which it travels constitute the complete conveyance—not the automobile alone. Are the roads, since they are in all truth but a part of the automobiles, wrong to have?

* * *

Is the farmer who uses the road justified in demanding that it be suppressed merely because it is a part of the automobile.

* * *

The building of automobiles, and their use in commercial pursuits, will deprive the farmers of the horse market they have enjoyed ever since women were released from the task of drawing coal out of the mines of Wales and the plow in the fields. Will this be an economic wrong? If so, why was it not wrong to substitute horses for women? We still have quite a few women with us; why allow them to rest in idleness?

* * *

Will the farmers be damaged if farm labor is commandeered?

* * *

Is the farmer so dull that he will not be able to employ the same farm labor indirectly and to better advantage? Is he not clever enough to see that he will get more out of the labor in this indirect way than would be possible directly?

* * *

Is it not true that a laborer can grow more wheat running a lathe in a shop than he can pushing a plow (in the old way) in the field?

* * *

If the laborer proves to be a better man at growing wheat on a lathe—in a shop, so to speak—than he could in the old way, will he not be in a position to purchase more of that wheat for his own use?

* * *

In a word, is money absorbed from other industries by the automobile industry, as the learned are wont to proclaim, when, as a canvass of the situation shows, the building of automobiles adds to the sum total of energy in the world? Energy is made valuable to man in his environment when it is lifted up by activity from the sea-level of inactivity, and placed alongside of other kindred forms of energy.

* * *

Were the automobile a plaything all the energy put into it would be put into play; would there then be too much play? Who can tell? We earn the right to play when we work.

But the automobile is not a plaything; it is the next step on the great stairway of human progress. Let us climb down the stairs of progress right now, and learn, perchance, wherein the error, if one there is, lies.

6000 to 4000 B. C.—Medians, Persians, Assyrians and Egyptians managed to drag burdens placed across the forked branches of a felled tree.

5000 to 3000 B. C.—The same peoples built sledges and rolled them on logs. Tiles show funerals with white oxen drawing the corpse on these conveyances.

4000 to 2000 B. C.—The Egyptian **plaustrum** is a cart on two solid wheels, drawn by horses.

2000 to 1000 B. C.—The Scythians, being nomadic, placed their huts on wheeled platforms and toured through Asia Minor.

Homer describes Juno's carriage by its "whirlwind wheels on iron axles, each with eight brass spokes."

1000 B. C. to our era.—Plinius reports that the chariot on four wheels came from the Phrygians before Rome was founded.

The oldest Roman vehicle, the **arcera**, mentioned in the Twelve Tables, was an ambulance.

Solon, the founder of Grecian law, ordered that no good woman should leave her house at night, unless in a carriage lighted by torches.

Cæsar went from Rome to Gaul in one week by relay coaches, but he issued an edict ordering moderation in the luxurious equipment of the litters employed by ladies.

The Etruscans are credited with the introduction of hoods for chariots.

0 to 300 A. D.—At the beginning of the Roman Empire the four wheeled carrucca, with seats for two only, was the gala vehicle. The driver sat in front and lower. This word is the origin of "carriage." The **pilentum** was an open city carriage for matrons. It had a canopy on four slim posts worked in gilt bronze, ivory or rare woods. Young girls sat in highly ornamented litters covered with drapes. Only women of bad reputation were prohibited by law from using conveyances of any sort. The **carpentum** looked like a richly carved baker's delivery wagon, and was drawn by two horses tandem when used by women, by four horses when used by men. It had either two or four wheels. The Roman **cisium** was a cabriolet hung by leather straps.

Middle Ages.—In the ignorance and poverty of the Middle Ages the use of vehicles languished. The use of leather straps for suspension was forgotten. Only the **thensa** survived. It was a two-wheeler used by the Romans for transporting the images of the gods, and was built in imitation of temple style, with columns, pilasters, etc. It was used for wheeling the images of the saints. Later all sorts of rough carts reappeared.

1294 A. D.—Philip of France made a sumptuary law prohibiting plain citizens from using carriages. Pope Gregory possessed a **caretta**, looking much like a prairie schooner. It was drawn by two horses tandem. Richard II. of England and some of his friends had **whirlicotes**.

1554 A. D.—Queen Mary went to coronation in a canopied chariot. The English sedan chair of 1581 was on wheels and much like a push chair for invalids. This century saw the introduction of leather braces again, the innovation coming from Hungary. Ladislaus of Hungary sent such a carriage as a present to Charles VII. of France.

1650 A. D.—Glass windows were introduced in French carriages.

1670 A. D.—**Steel springs were introduced at about the same time** in France and England. Charles II. formed the first Coachmakers' Company in 1677. A pamphlet was published in France extolling the virtues of carriages as against those of sedan chairs. **Cabriolets** came in 1672 from Florence, Italy. **Postchaises**, looking like sedan chairs on wheels, came at the end of this century.

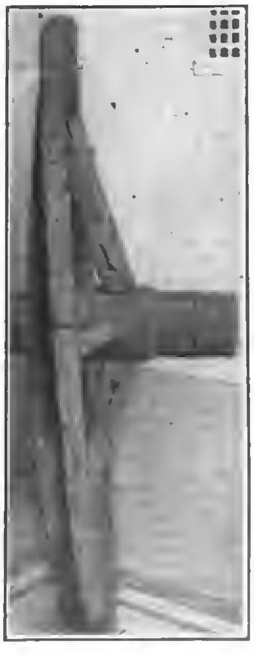
1670 to 1700 A. D.—On the Continent the **Berlin** was the favorite type. It was a coupé sitting on the middle of long poles or springs reaching from front to rear wheels. The high driver's perch came in use through the **chariot à l'Anglaise**, at the same time as the landau, which looked like a modern coupé, but could be opened.

18th Century.—The high perch **phaeton** was used by young bloods of the George III. period. The **brlska** was on C springs with leather straps and remained in fashion into the early Victorian Era.

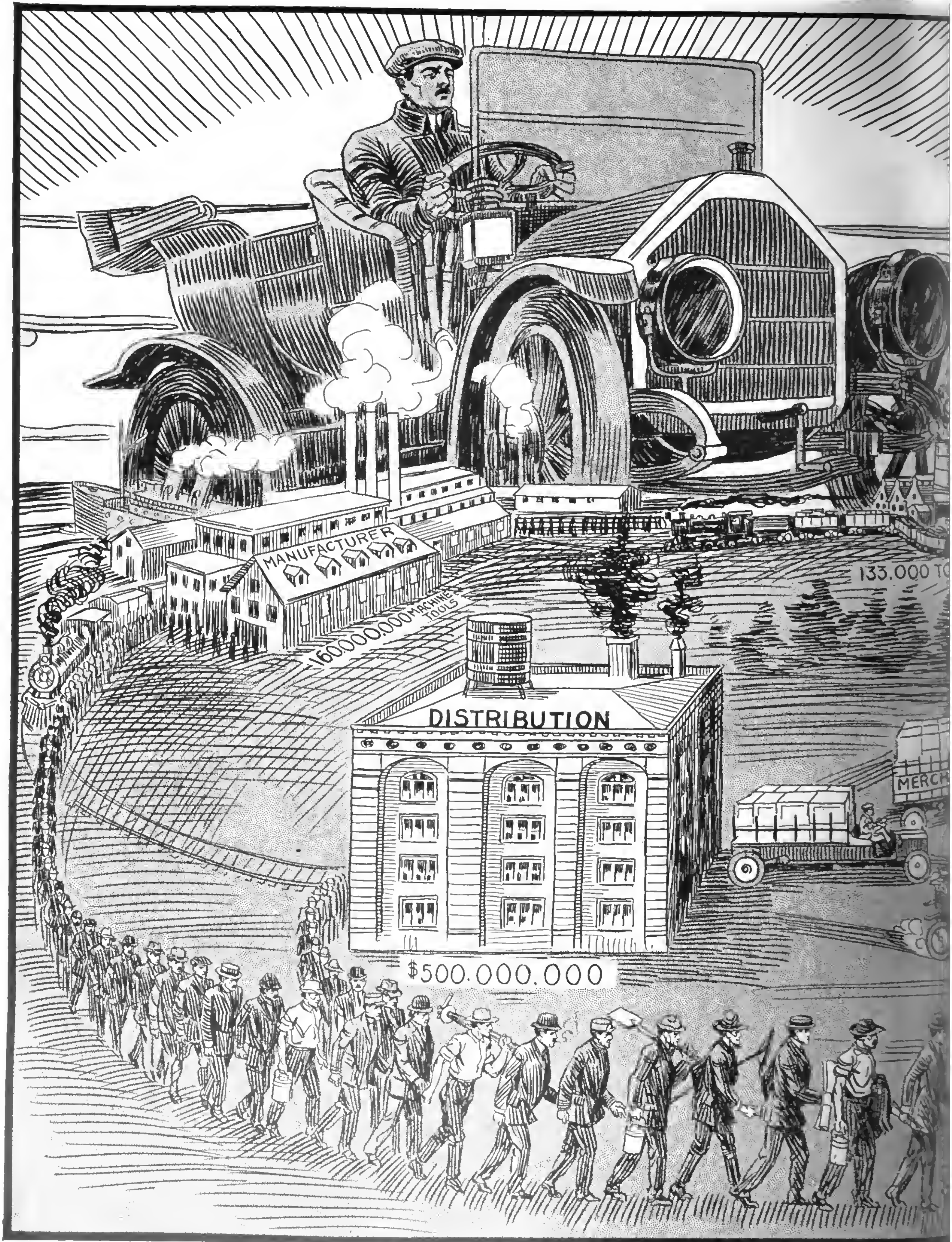
1804 A.D.—Obadiah Elliot patented elliptical springs. Napoleon's campaign carriage had bedroom and library and was a real military touring car drawn by two or four horses, sometimes by six.

1834 A. D.—The **hansom** was patented by Hansom of England.

With these dates available, which are offered to facilitate matters, it is hoped that the wise will point to the particular epoch back to which we are to go in quest of safe and sane finances, counting as the cash-box relates to methods which eliminate burdens that weigh down the part of the human race which is least able to resist. But why should idle cash be the gauge by which active men are to regulate effort; is the right to produce limited by the belief that money may spread out too thin in satisfying demand?

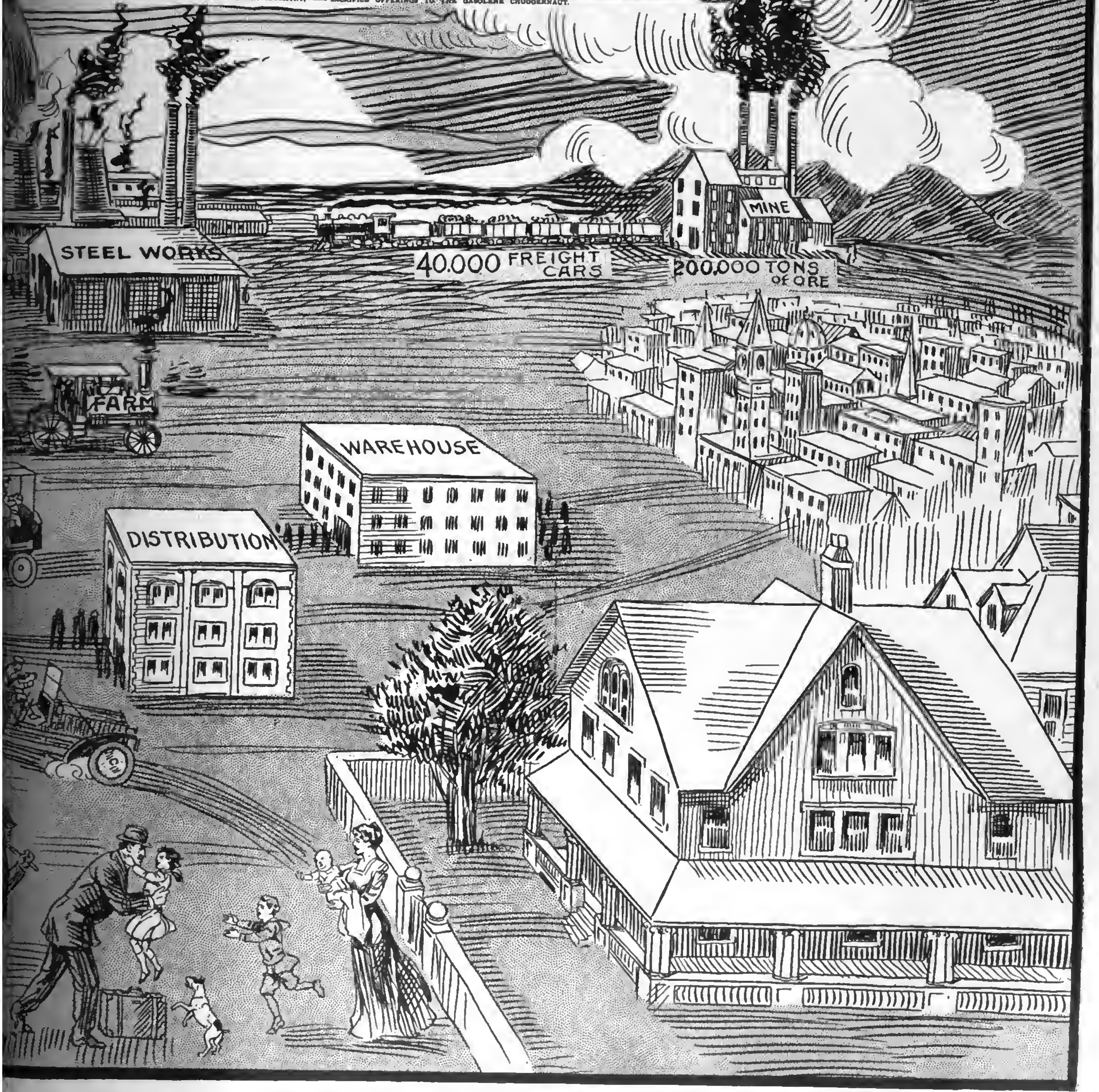


From an Egyptian Mummy Pit, 2000 B. C.



THE HOME, WHICH IS THE UNIT, IS MAINTAINED IN COMFORT AND SECURITY THROUG

THE GOD OF THEIR IDOLATRY. —— SACRIFICE OFFERINGS TO THE GASOLENE CHUGGERNAUT.



LIGENT EFFORT, OF WHICH THE AUTOMOBILE IS ONE OF THE BEST CREATIONS

Two Hundred Cars Participate in Premier Roadability Run

PHILADELPHIA, June 13—Two hundred cars participated in the second annual roadability run of the local Premier representatives to Cape May on Saturday afternoon last. Of these, fully two-score came from New York, the itinerary of the latter contingent including a return trip as escort to the contestants in the Atlanta-New York Good Roads Run, who arrived here from Gettysburg yesterday. On the trip to Cape May, additional Premier cars joined the procession at Vineland, Bridgeton, Cape May Court House, and other points, and when the big line swung into Cape May there was much enthusiasm along the route to the big Hotel Cape May, the official headquarters.

Allen Shelden, president of The Motor Company, local Premier agents, was the host of the occasion. The mayors of this city and of Camden were among the guests.

The New York contingent left the metropolis on Friday morning, and had a veritable mud plug across Jersey to this city. The Gotham section was under the direction of R. M. Owen & Co.

There was a grand parade of all the cars in Cape May on Saturday night, and much red fire was set off to celebrate the occasion. A grand ball wound up the festivities, after which the prizes were distributed to the winning drivers. The Boards

Official Car of the New York Premier Contingent

of Trade of several of the larger towns along the route hung up cups for the car whose time most nearly approached the secret official figures established for the run to their respective cities—these in addition to the main trophies. Those who won these various cups and trophies were:

L. W. Mulford, of Narberth, Pa., the Vineland trophy. Official time, 99 minutes; actual time, 99 minutes, 10 seconds.

W. J. Hendren, of Manayunk, the Bridgeton trophy. Official time, 175 minutes, 44 seconds; actual time, 175 minutes, 24 seconds.

Benjamin J. Carroll, of Philadelphia, the Port Elizabeth trophy. Official time, 232 minutes, 36 seconds; actual time, 232 minutes, 40 seconds.

George Thompson, of Philadelphia, the Bellevue Hotel of Court House prize. Official time, 313 minutes, 34 seconds; actual time, 313 minutes.

C. H. Clinton, of Philadelphia, and L. N. Shakespeare, of Haverford, tied for the Cape May Hotel prize, the main trophy, each negotiating the route in the same time—365 minutes, 31 1-2 seconds; the official time was 365 minutes, 30 seconds.

John C. Cave, of Philadelphia, the Board of Trade prize. His time was 365 minutes.

This morning the New York Premier brigade followed the Atlanta-New York tour to the metropolis.

One peculiar feature of the run was that the weather, which in other not distant sections of the country caused the abandonment of several important events, was most delightful. When the

Line-up on 59th Street, New York, Before Start

tourists arrived at Cape May the sun was in evidence and had been for the greater part of the day.

Allen Shelden, the director of the run, who was largely instrumental in inaugurating the annual outing, was complimented for the thorough preparations he had made for the en-

New York Premierites Checking Out at Jersey City

tertainment of the more than 750 guests who composed the party. Fully two-score newspaper men were included in the number, no less than 10 cars being detailed to carry the writers.

News Notes from the Kentucky Metropolis

LOUISVILLE, KY., June 13—The first run of the season was held here on June 2 under the auspices of the Louisville Automobile Club, when Louisville motorists toured to Frankfort to witness the dedication of the new State capitol. The start was made at 7 o'clock in the morning near the entrance to Cherokee Park, where the cars had assembled. Roads between the two cities were in splendid condition.

Reo Plant to Be Greatly Enlarged

LANSING, MICH., June 13—Another expansion of the Reo Motor Car Company, both in the variety of the output and in the size of the factory, is in prospect. Portions of the old Bement plant, recently purchased from the Detroit Trust Company by R. E. Olds, are to be used as an auxiliary plant for the production of automobile trucks. Two styles of trucks will be turned out this year, one a light delivery wagon for laundries

iiant's Despair Hill Climb

Fifty thousand people cheered when Ralph DePalma, driving his big 200-horsepower Fiat, established a new record for the hill in the free-for-all. The new mark that he set is 1:28 2-5 for the 5,700-foot course, which has grades which at places are as great as 22 per cent. and sharp and dangerous curves at the Devil's Elbow, the Mountain House and the S turn beyond. He was the choice of the people for the record-breaking, owing to the power of his machine, and the crowd showed its appreciation when it learned that he had lowered the record 3 1-5 seconds.

The largest crowd that ever witnessed a climb up the hill lined the course. Automobilists came from all sections of eastern Pennsylvania, lower New York State and northern New Jersey and thousands of machines were parked on the mountainside.

The free-for-all was the event of the day and twelve cars entered it. The Fiat, conceded to be the winner, proved that the judgment of throng was right, while the Chadwick, driven by Len Zengle made great time up the hill and took second place in 1:37, the "Knox Giantess," with Disbrow at the wheel, was a little more than eight seconds slower and won third place. These two cars also maintained their respective positions in the invitation event, a sort of consolation for the drivers who did not win in the free-for-all, and from which the champion Fiat was barred. Zengle took first place in the invitation by daring driving around the sharp curves and by getting great speed out of his car in the straightaway, making the climb in 1:37 3-5, practically the same time as he made in the free-for-all, while Disbrow, with the "Knox Giantess," got to the top in second place in 1:44 3-5. A Matheson Six car won third place.

The famous Hollenback $1,000 trophy was won by Fred Belcher, who drove a Knox runabout, and who went up the hill like a demon, striking the curves with great speed and bounding over the steep finishing stretch to the top in 1:53 2-5. A Knox car also won the event last year, and if a Knox wins it again it will become permanent owner of the trophy. The Knox people took a large space of the prizes for the day too, getting three firsts out of nine events, two seconds and a third. In the Hollenback the Matheson Six car, which Wilkes-Barreans so earnestly hoped would win as it is manufactured here, took second place in 2:00 4-5, while Kincaid's National "40" was third.

No. Car	H.P.	Driver	Time
STOCK CHASSIS, 161 TO 230 CUBIC INCHES			
1—Oakland	40	H. A. [illegible]	2:17 2-5
2—Reo	30	Frank Martz	2:21 1-5
3—Maxwell "T"	30	T. M. Costello	2:55
STOCK CHASSIS, 231 TO 300 CUBIC INCHES			
1—Marmon "32"	32	Ray Harroun	1:50 1-5
2—Pope-Hartford	40	Robt. Johnson	2:05
3—Pullman	28	H. P. Hardesty	2:05 2-5
STOCK CHASSIS, 301 TO 450 CUBIC INCHES			
1—Knox	40	Fred Belcher	1:52
2—Marmon	32	Ray Harroun	1:54
3—National	40	John D. Aitkin	1:54 2-5
STOCK CHASSIS, 451 TO 600 CUBIC INCHES			
1—Knox Giantess	48	L. A. Disbrow	1:47 2-5
2—National	40	John D. Aitkin	1:55
3—National	40	R. Wilcox	1:58 2-5
STOCK CARS, $2,000 TO $3,000, FULLY EQUIPPED, FOR HOLLENBACK TROPHY.			
1—Knox Runabout	40	Fred Belcher	1:53 2-5
2—Matheson Six	50	Guy Renolds	2:00 4-5
3—National	40	Thos. Kincaid	2:01 2-5
GASOLINE CARS, FREE-FOR-ALL			
1—Fiat	200	Ralph De Palma	1:28 2-5
2—Chadwick	60	Len Zengle	1:37
3—Knox Giantess	48	L. A. Disbrow	1:45 4-5
GASOLINE CONSOLATION RACE			
—Chadwick	60	Len Zengle	1:37 3-5
—Knox Giantess	48	L. A. Disbrow	1.44 3-5
—Matheson Six	50	John Turner	1:48
ARS UNDER $2,000, WILKES-BARRE CLUB MEMBERS ONLY			
—Marion	40	Edward Habblett	2:19 2-5
—Maxwell "Q"	22	M. S. Donnelly	2:46
—Maxwell "T"	30	W. C. Moore	3:05 2-5
ARS OVER $2,000, WILKES-BARRE CLUB MEMBERS ONLY			
—Matheson Six	50	John Turner	1:46 2-5
—Knox	38	Fred Belcher	1:51 1-5
—National	40	John D. Aitken	1:52

Hamilton Beat Express Train to Philadelphia

Traveled 175 Miles Through the Air

Hamilton flew from Governor's Island, New York, to Philadelphia—Returned the same day—Weight was 74 pounds more than Curtiss was encumbered with in his flight from Albany to New York City—Hamilton had some ignition trouble in his return trip—He descended at South Amboy, N. J., on way back and splintered the propeller—New York Times and Philadelphia Public Ledger put up the prize—Public speculating as to the future of the aeroplane.

TRAVELING 175 miles through air, Charles K. Hamilton sailed from Governor's Island, in New York harbor, to Philadelphia and return in safety Monday. He used a Curtiss biplane of the same general character as that in which Glenn Hammond Curtiss recently flew from Albany to New York, but which, it was announced, weighed 74 pounds more than the machine used by Curtiss.

Hamilton's trip was accomplished without an untoward incident until he had nearly completed it, when ignition troubles in two of his cylinders caused him to descend in a swamp-meadow near South Amboy, N. J., where in making a landing he splintered one of the blades of his propeller and was obliged to make extensive repairs before continuing his voyage to the starting point.

This, however, was done after considerable delay and the aviator scudded across the Jersey lowlands and out over the broad reaches of New York harbor in the gathering gloom, reaching Governor's Island just before the lowering clouds and the darkness of night closed in upon him.

The trip was a record-breaker in some respects. It was the first round-trip ever undertaken with an aeroplane between two big centers of population. It involved passing over heavily populated areas, covered with large buildings which produce air-currents and eddies likely to disconcert the aviator. It all seemed ridiculously easy and simple until the very moment when vast crowds assembled about bulletin boards all over the country were ready to cheer the announcement of the successful completion of the flight. Then came a delay that lengthened into minutes and for nearly two hours no word of a definite character was received from the air sailor.

Even those who promoted the flight did not know what had become of Hamilton and his machine and all sorts of rumors were afloat as to their fate. Then came the news of the descent in the Jersey swamp and something like a groan of sympathy arose all over the land.

The start was scheduled to take place at 7 o'clock in the morning from the "made-ground" on the south side of the island and in spite of hazy weather conditions that promised rain and, perhaps, wind later in the day, Hamilton completed all his arrangements, and a few seconds after 7 o'clock gave the signal to let go. With a rush the machine started, but in tilting to leave the earth, the wooden propeller caught upon a stake and one of the blades was splintered beyond repair.

Fig. 1—Starting from Governor's Island on the long flight to Philadelphia

Glenn H. Curtiss volunteered to lend Hamilton the propeller that he had used in his Albany-New York flight, and in half an hour the aeroplane was ready for the trip, equipped with the Curtiss propeller. At 7:36 the actual start was made and the biplane rose gracefully and sailed toward the Statue of Liberty on Bedloe's Island. Then the aviator swerved to the right and crossed the bay in the direction of South Elizabeth.

Vast throngs lined every available point of vantage to get a glimpse of the aeroplane, the route being black with humanity practically all the way to Philadelphia. At an elevation of from 400 to 1000 feet or more, the out-bound trip was made with surprising steadiness. Rahway, Metuchen, New Brunswick, Monmouth Junction, Princeton Junction, Trenton, Bristol and Holmesburg Junction were passed in order and at 9:26 o'clock Hamilton swooped down upon the spot selected for his landing

Fig. 2—After the involuntary descent near South Amboy; carrying the plane out to a road

within the precincts of Philadelphia. Before he came to the ground, the aviator gave an extra exhibition of his facility in handling the machine, circling the field and dipping and rising at will amid the stunning applause of 100,000 persons.

The landing was made without accident, the flying time for the trip of 86.1 miles being 1 hour and 50 minutes.

The aviator delivered a message of greeting from Governor Hughes to Governor Stuart, of Pennsylvania, who was among the first to congratulate the young air sailor on the success of his daring trip. In return he was charged to deliver a message from the Pennsylvania and Philadelphia authorities to Mayor Gaynor, of New York, and the New York State officials.

Hamilton announced that he would start on the return trip within an hour and tore himself away from his host of admirers long enough to provide himself with a cup of coffee and some light refreshments.

In speaking of the first part of the trip he said that it had been without incident practically all the way, but that when he was approaching Philadelphia he noticed that one of his cylinders was missing fire. The motor was pretty well warmed up and gasoline and lubrication supplies were low. Hamilton complained that the quality of his oil was not exactly right and subsequent events showed that the trouble he experienced with foul sparkplugs might be chargeable to that fault.

It was a little over two hours before the aviator was ready to commence the homeward bound flight, and with his machine in apparently perfect condition Hamilton took his seat and gave the signal to start at 11:33 o'clock.

A mighty cheer greeted man and machine as the powerful engine gathered headway and rose above the heads of the crowd, turning to the right to pick up the Pennsylvania Railroad tracks.

The man-bird rose higher than on the first stage of the trip and settling into a fast pace shot northeastward toward the metropolis. Passing Bristol Hamilton threw out a number of peace-bombs, paper projectiles intended to demonstrate the efficiency of the aeroplane in times of war. These little packets rattled down about the heads of the spectators and gave significant promise of what might be the result of that variety of warfare in the next great campaign.

If the crowds were dense on the out-bound trip, those that stood and waited for a sight of Hamilton and his machine on his return voyage were of vastly greater proportions. It is safe to say that there has not been so much excitement in Trenton, the capital of New Jersey, since that Christmas Day about 135 years ago when Washington crossed the Delaware river and surprised the Hessians in their beds. Over the spots where the Hessian mercenaries had their camps and batteries Hamilton strewed another installment of peace-bombs, showing how much easier it would be for him to destroy a hostile army, single-handed, than it was for Washington to accomplish the same result by the military achievement that stands in history as one of the most astonishing feats of any war.

Fig. 3—Near a wood, ascending to clear the trees and to make time

Shooting past Princeton Junction, within sight of the historic university, the aviator took to the meadows south of the railroad tracks and with a sparkling burst of speed moved straight and steadily as far as Metuchen. It was a few miles back that Hamilton first noticed that a cylinder of his engine was missing again, and as he passed over the city he discovered that even with full throttle he could not get an explosion from that cylinder. In a moment another cylinder began to act badly and the aviator curved away from the railroad and was lost to sight over the Jersey lowlands and tidal flats. He found that it was doubtful if he could retrace his course on six cylinders and started to make an airline shoot toward Governor's Island before his power failed.

The sooting of his sparkplugs proved to be too serious, however, and the aeroplane sank lower and lower under the slackened power until the aviator was forced to make a landing. Some distance ahead of him, and in a territory with which he was not familiar, Hamilton discovered what seemed to be a grassy meadow, flat as a board and without obstruction of any kind. With a last effort he applied all the power his dirty motor could generate and, setting his gliding planes, shut off power and came down. The landing was made in a grass-covered swamp that looked like a meadow from above but which in reality was knee-deep in water and mud. The tough swamp grass searched the machinery, and when the aviator tried to disentangle it he found the propeller jammed so hard at its bearings that it became disabled. In a short time assistance came for man and machine and soon the aeroplane was lifted and carried to dry ground.

Messages were sent to Hamilton's family and the officials at Governor's Island and with all despatch another propeller was started toward the scene of the mishap. This arrived after several hours of unavoidable delay and was installed by a force of volunteer mechanics. With his sparkplugs clean once more he managed to make the final ascent of the trip, clearing the trees and crowds and rising only high enough to avoid the obstacles. The rest of his trip was without special incident.

The distance traveled on the return trip was 88.9 miles. The full distance of the round-trip was 175 miles. He started at 7:36 o'clock in the morning and returned at 6:40 o'clock in the evening. His flying time was 3:34, or an average of a little over 49 miles an hour for the entire flying time. On the outward trip he averaged 46.92 miles and on the return 51.36 miles an hour.

The flight was the result of an offer of a big prize by the New York *Times* and Philadelphia *Public Ledger* for a flight between the cities.

Technical Angle of the Hamilton Flight

Mr. Hamilton's flight from New York to Philadelphia and return was made possible by favorable weather and it was interrupted, it is said, through the sooting up of a sparkplug. Are any inferences to be drawn from either the substantial success of the trip or from the little incident which marred it toward its close? According to the best information, the fracture of a propeller blade, which also delayed the returning aviator, was due to unskilful handling of the machine by outsiders after it had landed. The distance of the flight and the time the machine was in the air have no bearing on design or construction, if it is assumed that the weather was uniformly propitious, but they do relate to motor construction or motor operation, owing to the thermic factors which enter at this point. It is usually conceded that sparkplugs very rarely give out under the best motor conditions. Poor lubricating oil would affect all the sparkplugs alike, unless the thermic conditions in one cylinder differed from those in the other cylinders. The inference would be that the motor was operated too close to the thermic limits, and that one cylinder, for some minute reason ultimately due to this general cause, developed so much heat as to "crack" the lubricating oil, preventing its complete combustion. A contributory cause to this effect would be the extra weight carried, in the form of a large gasoline supply. This compelled the aviator to use a high tilt, and the desire to make speed with high tilt compelled the operation of the motor at a high development of power, at which any imperfections in its thermic action and the efficiency of the cooling provisions would be accentuated.

Fig. 4—Greetings between Hamilton and his mother, with sympathetic onlookers

Owing to the persistent rain, the Oldsmobile owners' reunion at Empire City race track Saturday was smaller than its indications promised when all the plans had been completed. About 200 cars paraded from Olds headquarters at Fifty-first street and Broadway to the track where the exercises were to have been held. A. C. Stem proved the winner of the automobile offered free to the holder of the ticket drawn last from a secret receptacle. Aside from luncheon and the running of a foot race, the original program was not followed. The six races carded for the afternoon's sport were called off and the prizes, consisting of silver cups and blue ribbons, were awarded by lot

Society of Automobile Engineers Adds Members

Coker F. Clarkson, General Manager of the Society of Automobile Engineers, this week announced the election of the following new members of the Society: David Dwight Rowlands, Rider-Lewis Motor Car Co.; Clarence W. Spicer, Spicer Manufacturing Company; Christian Girl, Perfection Spring Co.; Arthur Holmes, H. H. Franklin Manufacturing Co.; Marcus Thompson Lathrop, Halcomb Steel Co.; Henry C. Wilson, Sub-Target Gun Co.; C. E. Reddig, Columbia Motor Car Co.; Joseph P. Lavigne, Lavigne Mfg. Co.; Edward R. Hewitt, Hewitt Motor Co.; Tracy Vere Buckwalter, Pennsylvania Railroad; H. P. Dodge, Ohio Electric Car Co.; H. C. Colburn, Colburn Automobile Co.; Irving W. Adams, High Frequency Ignition Coil Co.; John A. Mathews, Halcomb Steel Co.; W. H. Cameron, Willys-Overland Automobile Co.; Charles Archibald Ward, Pittsburg Motor Car Co.; Lars G. Nilson, Nilson-Miller Co.; Hugo C. Gibson, Requa-Gibson Co.; William Fleming Abel, Halcomb Steel Co.

Boston Show Dates; New Car Plant

Boston, June 13—Boston's next motor show will be held during the week of March 4-11, 1911. This was one of the things decided at the meeting of the Boston Automobile Dealers' Association. The election of officers resulted as follows: J. M. MacAlman, president; J. S. Hathaway, vice-president; F. A. Hinchcliffe, treasurer; Chester I. Campbell, secretary; directors, J. W. Maguire, E. A. Gilmore, F. E. Wing, C. F. Whitney, Charles E. Fay, A. P. Underhill and the officers named above. Mr. Campbell was chosen manager of the show.

Plans for the Orson plant, at Springfield, are rapidly crystallizing. It is stated that some $75,000 worth of machinery is on the way in addition to the big shipment already received. It is said that the first car will be finished sometime in July. From what has been given out, it is claimed that the Orson will have no less than 45 ball bearings; have mechanically oiled-valve stems; one-piece housing for the steering gear and some other features that will be entirely new. The horsepower is not stated. Nor has it been intimated what its makers may do relative to the Selden license.

H. B. Layman, formerly with the Packard, Winton, Alco and Ruttenburg plants, is president and general manager, with J. E. Davey, formerly with the Locomobile Company, as factory superintendent. Among the men interested in the car as stockholders, it is said, are W. K. Vanderbilt, Jr., Henry O. Havemeyer, Jr., James Stillman, Percy Rockefeller, Richard Sutro, Charles Gates and other well-known New York bankers. E. C. Kilbourne, of Springfield, a brother of Vice-Pres. H. M. Kilbourne, of the City Bank in New York has been named treasurer of the new concern.

Central Ohio News Features

Columbus, O., June 13—An elaborate system of parks and boulevards is projected by the residents of East Columbus; consequently plans by which to meet the expense of the improvement are now being made. Property owners along Alum creek have been asked to donate enough ground for the desired drives. The matter of improvement has been discussed for some time without obtaining results. Finally, an Improvement Association was formed, with O. A. Miller as president, Dennis Kelly, George Hardy, C. E. Richards and others as officers. It is proposed to raise $25,000.

At a special meeting of the Athens Automobile Club, held recently, the working committees for the coming year were appointed as follows: Laws and Ordinances, C. D. Hopkins; Grievance, H. D. Henry; Streets, Roads and Signs, A. A. Wolfe; Runs and Tours, F. B. Phillips; Membership, W. F. Mercer; Auditing, F. L. Alderman. Six new members were received into the club. Arrangements will be made for a number of club tours.

The Al-Ton Motor Accessory Company, Akron, O., was incorporated with a capital stock of $50,000 to make and deal in motors and motor parts. The incorporators are Clyde S. Pelton, H. T. Maranville, Edward W. Brouse, C. H. Maranville and Harry William.

The Perfect Tire Company, of Cleveland, was incorporated with a capital stock of $50,000 to make automobile tires and motors, and to deal in automobile parts. The incorporators are M. J. Kirby, William Eynon, Walter C. Eynon, W. A. Mayer, Frank L. Smith and Jacob Boeple.

The Charles Schiaer Motor Car Company, of Columbus, O., has taken the Central Ohio agency for the Everett. The territory includes about fifty counties in Central and Southern Ohio.

If plans which are under way are carried out Akron will have another large concern for the manufacture of automobile tires as well as rubber goods of every description. The Portage Rubber Company, of Akron, incorporated some time ago with a preliminary capital of $10,000 is the nucleus for the concern. Steps were taken recently to increase the capital stock to $1,000,000 and a board of directors was elected consisting of William Christy, John Kerch, John W. Miller, Judge Dayton, A. Doyle, A. S. Mottinger, James Christy, M. S. Long and H. A. Kendall, the latter of Cleveland.

A number of sites for the erection of the plant are under consideration and a deal will likely be closed in the near future. It is the intention to start the erection of the plant as soon as possible. At the start 300 men will be employed.

The annual outing given by the Diamond Rubber Company, at Akron, to its thousands of employees took place Saturday, June 11, at Silver Lake Park. Between 10,000 and 12,000 attended the affair.

News Mems. from the Missouri Metropolis

ST. LOUIS, June 13—The route for the three-day run of the St. Louis Manufacturers' and Dealers' Association on June 28-30 has been selected, and details for the contest are fast being completed. The run will be from St. Louis to Hannibal for the first night's control, from Hannibal to Mexico, Mo., for the second night's control, and from Mexico to St. Louis the third day. The distance is approximately 400 miles. The tour covers one of the best parts of Missouri. Originally it was planned to cross the river from Hannibal into Illinois, but the Buick pathfinding car demonstrated that the contemplated route was too long for a three-day run. The honor of being the first entrant and obtaining position No. 1 fell to the Lindsay Motor Car Company, which entered an Interstate car. There will, it is expected, be from 60 to 70 cars in the run. The numbers will be assigned according to the priority of the entry. The small numbers have the advantage, of course, of being the first to start in their order from each control. The Contest Committee, consisting of F. R. Tate, John H. Phillips and Charles E. Michel, has formally announced the appointment of J. D. Perry Lewis, of the Halsey Automobile Co., as referee. Checkers at controls will be Samuel Breadon, of the Western Automobile Company; Charles E. Michel, of the Union Electric Company; and Harry W. Blodgett, the association's attorney. The Technical Committee, as decided upon, is: George P. Dorris, of the Dorris Motor Car Company; A. R. Walton, of the Standard Six factory, and Stewart McDonald, of the Moon Motor Car Company. Two trophies are offered, the principal one being the St. Louis *Star* cup for touring cars, and the other a handsome cup for roadsters, donated by the association. The entry fee is $25, but $20 will be returned to those whose cars reach the first control. The Buick "Old Red Wing," the pathfinder, will act as pilot.

The Board of Police Commissioners has purchased a Ford touring car for Chief of Police Young. The Chief and Hobart Brinsmade, purchasing agent for the board, tried the car out before it was accepted, and found it satisfactory. The car is in extreme contrast to the runabout the St. Louis chief formerly was provided with. Chief Young makes a tour of every district in the city two or three times a week, and a good, substantial car was found necessary.

The Auto Transit Company of St. Louis has been formed, with J. J. Quinn the moving spirit. The company will incorporate for $25,000, the papers having already been prepared. Mr. Quinn announces that he will start a 5-cent fare automobile line from the city limits to Bailas Road, a distance of 2 1-2 miles. The new line is designed to carry passengers to the new suburban residence division of Winchester Park, and will be the first of its kind established in Missouri. The new district was isolated, as it is 2 1-2 miles from the nearest car line from the city. The automobile line, it is declared, will be a great aid to the real estate business in that section. The line will be conductorless, the Van Note tabulators and registers being substituted. Passengers will enter at the rear of the cars and alight from the front. The Van Note tabulators act in the manner of turnstiles, and are much in use on suburban car lines in many parts of the country.

The incorporators of the company are to be: J. J. Quinn, H. L. Van Note, W. D. Helman, and William A. Estep. Mr. Quinn announces that two light cars, each to carry five passengers, will be installed at once, and that subsequently other cars will be added as the demand grows.

Many local motorists attended the housewarming given by the Overland Motor Car Company of St. Louis, which has just incorporated and moved into its new quarters at 3907-9-11 Olive street. The incorporators of the St. Louis Overland Company are Jerome Harrington, T. B. Funk, Howard Harrington, W. M. Armour and C. S. Dines.

The University Automobile Company of St. Louis has been installed in its new garage at 5800-2-4 Delmar boulevard. The building is new and affords room for the garaging of 100 cars. The company will handle the Henry car in St. Louis territory.

The agency for the Van Dyke light delivery automobile has been placed with Kardell Brothers for St. Louis and St. Louis territory. Kardell Brothers handle also the Reo and the Fal.

The Lindell Motor Car Company of St. Louis has moved its salesrooms into new quarters at 4829 Delmar boulevard.

Hoosier Happenings from a Motor Viewpoint

SOUTH BEND, IND., June 13—Work has commenced on the erection of a one-story building on East Washington street, Goshen, Ind., which when completed will be used as a garage by J. E. Smith, agent for the Ford. The new building will be of brick and cement block and well equipped.

Representatives of fourteen northern Indiana counties met in the Federal building and organized an association which will take steps to have State and national legislation in behalf of good roads in this section of the State. Only recently have a large number of the tradesmen, manufacturers and laboring classes realized that good roads in this section will be of as much benefit to them as to the farmers, and the organization is the result of the interest taken by the public in general in the good roads convention recently held in this city at the Oliver Hotel. It was decided to take the matter of good roads legislation up with the nominees to be elected to the Legislature this fall and appoint a committee to draft a measure to be presented at the next session. Articles of incorporation were adopted by the association, which will be known as the Northern Indiana Good Roads Association. The association is expected to accept the offer of Carl G. Fisher, president of the Indianapolis Speedway, who, in a recent visit to the city, expressed his willingness to furnish $10,000 worth of crushed stone for the improvement of the highway between South Bend and Plymouth, Ind.

Marking Route for Kansas City Star Tour

LA JUNTA, COL., June 12—The pathfinding party of the Kansas City *Star* trophies tour arrived at La Junta at six o'clock to-night in the big six Stevens-Duryea, driven by M. C. Nolan, the Kansas City distributor. The route layers traveled over 221 miles at a 26-mile clip to-day, starting at 9:30 at Dodge City, Kan., stopping an hour and a half at noon for luncheon at Syracuse, Kan., a half hour in Lamar, Col., to allow a long funeral procession to pass and many times through the morning and afternoon for photographs.

The route, which is following the historic old Santa Fé trail from its origin in Kansas City to the Western terminus at Santa Fé, N. M., was accurately marked along the highway of '49 most of the time to-day. Besides the granite trail markers erected by the States of Kansas and Colorado and State historical societies, the pathfinding party came across grassy mounds that mark the ruts of the wheels of prairie schooners and the tread of the oxen. At one place the trail expanded to a width of 200 feet in which there were knee-deep tracks of the old freighters.

The party has had an almost unbroken relay of pilots since leaving Kansas City June 9, and many times has been escorted by dozens of cars. The projected route of the tour in all is 2,200 miles, which, so far, has been laid through Emporia, Hutchinson, Great Bend, Dodge City, Garden City, Kan.; Lamar, Las Animas and La Junta, Col.

One Clean Score in Carolina Endurance Run

RICHMOND, VA., June 13—The Carolina Endurance Run, promoted by the *Times-Despatch*, was one of the most splendid successes that the sport has known in this portion of the South. Ten cars, out of fourteen starters, finished the 409-mile trip in good shape, despite the fact that the last day's run was made through a rainstorm that not only drenched the drivers to the skin, but made the roads, in some places practically impassable. Although there were twenty-five cars entered in the run, only fourteen reported for the start on Tuesday morning, the remainder having been withdrawn for various good reasons, principal among which was that the garages, some of which had one or more cars entered, were forced to scratch their entries through the fact that every car in stock had been sold out.

One of the big features of the four-day trip was the hospitality shown the entrants by the people of Virginia and North Carolina at every checking point. It was a gay whirl of receptions, feasts, barbecues and every other sort of the best of good times, at every stop along the entire route, with the last point always making a strong bid to outdo the preceding one.

To one thing was the attention of the party particularly drawn—the superiority of the North Carolina roads over those of Virginia. With a few exceptions—a few miles out of South Hill and Lawrenceville—the Virginia roads were found to be indescribably bad. In many places mudholes two feet deep were encountered, through which it was necessary for the drivers to work their machines with rare care and judgment, to prevent serious accident, while in others huge boulders, that had been lying in the same identical spot since the first Indian trespassed upon the property of the pre-historic race, were encountered, and around which it would have puzzled a snake to have found its way. However, inconceivable as it may seem, the cars wended their way safely over these stretches, though it is puzzling even yet to the drivers just how they did it.

North Carolina is far more progressive in her roadbuilding than is Virginia, for Virginia has no roads that can compare with those in Franklin and Durham counties, North Carolina. The people down in Carolina believe in good roads with all their souls and both State and county make annual appropriations for their betterment and upkeep, an example which Virginia may well follow.

The White Special, owned by B. A. Blenner, which went over an embankment near Littleton on Tuesday afternoon, was dug out of the railroad cut into which it was precipitated and hoisted onto a freight car, arriving in Richmond Friday evening. Here, to the surprise of all who saw the feat, the car was cranked up and ran to the garage on her own power, without a hitch.

Following is the summary:

No. Car	Entrant	Score
	DIVISION 1	
15—Maxwell	Dr. Saml. McAnnally	123
23—Hupmobile	Richmond Motor Co.	243
	DIVISION 3	
10—Chalmers "30"	E. C. Pelouze	35
12—Chalmers "30"	J. T. Palmatory	196
5—Regal	S. Stagg	Disqualified
16—Maxwell	....	Disqualified
	DIVISION 4	
9—Buick 17	Foster Motor Car Co.	0
6—Rambler 53	E. J. Allen	43
13—Buick 17	R. Williams	98
18—Buick 17	J. R. Williams	224
4—Buick 17	T. E. Williams	No final exam.
3—White	B. A. Blenner	Disqualified
	DIVISION 5	
24—Speedwell	Jno. B. Alsop	20

Fuel System of Stearns Model 30-60

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main supply tank as long as pressure is indicated on the gauge.

If the pressure on the gauge G is not sufficient to raise gasoline out of the main tank, and fill the auxiliary tank A, it is a sign that the automatic valve V is out of adjustment; it should be so adjusted that it will admit gas from the cylinder of the motor until the gauge G shows sufficient pressure to afford a satisfactory supply of gasoline to run on. In adjusting the automatic valve V the proper way to go about it is to turn the adjusting screw on the top of the valve marked C2 one way or the other until the gauge registers the desired pressure; if the motor is shut down manipulate the pump P and note when the valve V shuts off the supply of air to the fuel system. It will make a slight hissing noise at the instant of closing.

It will be understood that the float chamber of the auxiliary gasoline tank must be open to the atmosphere or else gasoline will not freely flow under the force of gravity down to the carbureter.

There is one more extremely important point reserved to the last in this discussion, because it is the first thing to look for when trouble is encountered. By taking the mahogany cover off the auxiliary tank A, the knurled cap on the tank will intercept the eye. If this is screwed out a gauze filter will come with it. If the filter is scummed over it should be cleaned, but in screwing the filter back, unless it is fetched up tight, it will leak air. This leak must be stopped or the pressure on the gauge will die, and the gasoline will not be raised up to the auxiliary tank, so that there will be no supply available to the carbureter, and the motor will shut down for want of fuel. There may be a leak at some other point, as at any one of the joints in the piping system, considering any part of the piping between the auxiliary tank A and the main supply tank. The remaining and most likely place to find a leak will be at the filler cap of the main supply tank. The tool kit holds a special wrench which must be used in tightening up this filler cap; it will have to be perfectly air-tight or it will be impossible to go anywhere with the automobile. Pressure on the gasoline system is one of the conditions which cannot be disregarded if the automobile is to run with any degree of satisfaction, but if the leaks cannot be stopped it will then be necessary to work the pump P hard enough to maintain pressure, despite leaks, and in this way, it will be possible to run the automobile long enough to get home, or to a place of repair, where a bad leak may be stopped up. Finally, it is well not to become superstitious if trouble seems mysterious in character:

Aero Show Planned at St. Louis

Under the auspices of the Aero Club of St. Louis, the St. Louis National Aero Show has been organized, and will be held in the Coliseum Building, October 8 to 13, during the period when outdoor aeroplane and balloon events of international importance will take place in St. Louis.

Boston Children Given Outing

BOSTON, June 13—In a column, consisting of 218 automobiles, over 1,000 blind, crippled or orphaned children were given a fine outing on June 8 at Lake Massapoag. The affair was conducted by the Boston Automobile Dealers' Association and proved to be a success from every viewpoint.

Wheels of Progress Hum Busily in Detroit

DETROIT, MICH., June 13—Of the four or five new corporations identified with motoring here, one, the Detroit Monoplane Company, has capital stock of $20,000 paid in. with Fred Weinburg, 118 Alfred street, as the prime mover in the enterprise. Associated with him are his brother, Curt Weinburg, Ray Wilcox, William Anderson, and Alfred Brown. Several well-known members of the Aero Club of Michigan are said to have placed orders with the firm for planes.

The others are: the Shock Absorber Company, to manufacture a patented shock absorber; capital, $5,000; the Detroit Airless Tire & Rubber Company, the reorganized Dayton Airless Tire Company, which is moving to Detroit, has filed notice of its incorporation; capital, $1,500,000. Another event of the week in this line was the increase by the Demot Car Company, the present stockholders subscribing to an additional issue of $25,000 for factory alterations.

The Hale Motor & Machine Company, paid in capital, $125,000, has been incorporated by Charles Ritter, J. C. Hudson, L. J. Brennan, J. E. Dubois, and R. J. Brennan as trustees, all of Detroit, and S. E. Hale, of Cleveland.

Several other new companies are forming, but the details of these are not yet available. Among these are the Bailey Motor Car Company, to build delivery wagons and light trucks; the Johnson Roller Bearing Company, to make a new and different type of roller bearing; the Reynolds Motor Company, to build a new engine with rotary valves and other features; the Hastings Motor Car Company, to build a six-cylinder pleasure car with rotary valves; a new automobile bank; and several agency and selling companies.

It was announced that the W. A. Paterson Automobile Company, of Flint, Mich., an old established carriage firm which has just entered the automobile business and is building the Paterson "30," would establish in Windsor, Ont.

The past week also saw the tripling of the capitalization of three of the General Motors component companies in this State, these being the Marquette Motor Company, Saginaw, from $300,000 to $800,000; the Oakland Motor Car Company, Pontiac, from $200,000 to $800,000; and the Cartercar Company, Pontiac, from $350,000 to $650,000. The original total was $850,000 and the changes raise this to $2,250,000.

Great interest is being displayed here just now in the motor truck end of the industry, and a number of companies are forming to take up this work. The Oliver Motor Car Company is occupying for the present a building at the corner of Grand River and Harrison avenues, with about 5,000 square feet of floor space. This will only be used for the construction of the first few model or demonstrating wagons. Plans are being worked upon for a very large factory building, 300 feet long by 60 feet wide, four stories high for a depth of 90 feet, the balance being but two stories high. The whole will afford a total of 47,000 feet of floor space.

The first Oliver commercials will be of the light delivery type, although a one-ton truck is promised later. This first product will have a carrying capacity of 1,000 lbs., will be powered with a two-cylinder horizontal opposed engine of 4 1-2 in. bore and 4 1-2 in. stroke, a two-speed planetary transmission, made a unit with the engine, the whole forming a unit power plant which will be removable as a whole without removing anything else. The engine will be set down on a sub-frame, but will not be so low but that a bonnet will be used in front. Semi-elliptic springs will be used both front and rear, while the frame will be of pressed steel of channel section, smooth side out. The wheelbase will be 102 in., while the tread is standard. Wheels are large, and equipped with solid tires, 38 by 2 1-2 in. both front and rear. Final drive is by shaft. The very large honeycomb radiator is set in front under the bonnet.

For the coming year, a total output of between 300 and 500 is planned. The price of the wagons is doubtful as yet, but will be in the neighborhood of $1,400, fully equipped. Express bodies will be standard, but any form will be furnished on call.

The officers of the concern are: Lewis Schinnel, president; Paul Wagner, vice-president; Robert S. Hartenseine, treasurer; Frank A. Gies, secretary; and Charles F. Case, general manager.

When the buildings at present projected for the Reliance Motor Truck Company, of Owosso, Mich., have been completed, they will comprise the largest motor truck plant in the world. Announcement was made recently that the General Motors Company will at once commence work upon a number of additions to the present plant. These additions include a large assembly building, a body shop, a large paint shop, and a power plant, the whole of which will occupy 20 acres of ground. Machinery to the value of $150,000 has already been ordered. The plant has easy access to three large trunk railroads, giving unsurpassed shipping facilities.

Michigan Aero Club Plans Many Flights

DETROIT, June 13—Although the officers of the Michigan Aero Club, whose headquarters are in Detroit, have denied that they are planning to offer a prize for a Detroit-Toledo flight, several balloon flights are planned for the summer, and much other general activity in an aeronautical line.

Mexican Trip's First Stage Finished

DETROIT, June 15—Covered with Canadian mud, the Flanders "20" which is making a trip from Quebec to Mexico City ran into this city yesterday afternoon. The car was escorted around town by one day's factory output of Flanders cars, about 40 in all, and twice as many more privately owned Flanders cars. This morning it started for Toledo, Indianapolis and St. Louis. The car left Quebec June 6 and has been on the road nine days.

Speedwell Protest Checks Award

RICHMOND, VA., June 14—Because of the protest of John B. Alsop and Howard Wagner, of the Speedwell Motor Car Company, the award of the prizes in the *Times Dispatch* North Carolina Endurance Run will be postponed until the decision of the referee or the Contest Board is announced. The committee penalized the Speedwell one point each for two motor stops and eighteen points for being eighteen minutes late at Lawrenceville.

Fast Time at Kansas City Meet

KANSAS CITY, June 11—After several postponements the track meet at Elm Ridge was run this afternoon. Fifty thousand people saw Oldfield fail to beat the world's circular track record. The Knox won a five-mile free-for-all in which a Jackson and a Warren Detroit were placed. Time, 6:02 1-5. In the fifty-mile free-for-all the Knox won in 56:07, with a Cutting second in 59:04. Another Cutting was third in 60:04. The five-mile free-for-all handicap was won by Therman in an Auburn with a handicap of 70 seconds. Clark in a Cutting was second and Miller in a Warren-Detroit third. Winner's time was 5:48 2-5.

Maryland to Make Auto Treaties

BALTIMORE, June 13—Governor Crothers is preparing to establish reciprocal relations with Delaware and Pennsylvania by July 1. This will be the initial move to bring about such relations with every State in the Union.

Big Meeting for S.A.E. at Detroit in July

Divers Subjects Proposed for Discussion

HOWARD E. COFFIN, president of the Society of Automobile Engineers, has announced that the meetings of the society to be held at its convention in Detroit, July 28, 29, and 30, will be the largest ever attended by automobile engineers. There will be several professional sessions and that matters of the greatest interest will be presented and discussed by authorities is shown by the following list of proposed subjects, the most important of which will be taken up as fully as time will permit:

It will be a convention of designers and Detroit will have an opportunity to entertain all the chief engineers of the principal makers of automobiles in America, with a good contingent from abroad. The subjects to be discussed are: Gears; Commercial Cars; Electric Vehicles; Gasoline Motors; Materials and Treatment of Materials; Wheels, Rims, and Tires; Ignition; Ball, Roller, and Plain Bearings; Right and Left Hand Driving; Final Drive; Factory Systems; Contests; Miscellaneous Subjects.

The Society of Automobile Engineers. Its future intentions, and the benefits to be derived by its members.
Lines along which the work of the S. A. E. may be made of the greatest benefit to its members individually and to the motor car industry.
Specification and treatment of automobile materials generally.
Standard gauge, sizes, and chemical composition of sheet metals.
Standard sizes of seamless steel tubing.
Standard dies.
Standardization of square holes and keyways used in automobile construction.
Standardization of control mechanism—position of speed notches and actuation of planetary gear pedals.
Standardization of wheels and tires for commerical vehicles.
Nomenclature of motor car parts.
Responsibility of the motor car engineer as to safety of the car designed. Mechanical efficiency of spur and bevel gears. Form of tooth for quiet gears, both spur and bevel. Grinding methods for making quiet gears. Stub tooth and hot-rolled gears. Form of gear teeth for rear-axle bevel gears.
Design of pinions.

Types of Commercial Vehicles and Design Features

Mixed (gasoline-electric) systems.
Comparative merits of having a motor truck engine under a hood or under the seat (both vertical engines).
Proper power and speed of motors and trucks.
Does a transmission on a motor truck need to be heavier than on a touring car, using a motor of the same power?
Chain final drive for trucks and the importance of housing same.
How can the spark and throttle of commercial vehicles best be made fool-proof?
Is a chain-driven commercial vehicle as efficient with the differential separated from the transmission, and should there be more than one universal joint between, where the shaft does not exceed 36 inches in length?
Sliding gear transmissions for trucks.

The Electric Vehicle and Battery Problems

The Edison battery from actual tests; life from practical experience.
Low voltage motors for electric vehicle propulsion.
Recent improvements in electric storage batteries for both power and lighting.
Ampere-hour meters for electrics.
Relation of tire, battery and general repair maintenance cost.

About Gasoline Motors and Auxiliaries

Reports of motor tests.
Motor noises,
Cam shapes and valve operating mechanism.
Die-cast versus sand-cast bearings.
Carbureters.
What is the most quiet carbureter?
Helical timing gears.
Slide, piston and rotary versus poppet valves for gas engines.
Single—versus dual—versus en-bloc cylinder construction and advantages of each.
Three—versus five—versus two-bearing crankshaft construction.
Effect of T-head motor construction on fuel consumption.
Is the valve-in-the-head motor a more difficult one for the novice to operate?
Valve seat angles.
Cast-iron valves.
Power required to drive a motor car on various road surfaces at various speeds.
Foreign matter in commercial gasoline.
Ill-smelling and unsightly exhausts.
Two-cycle motors.
Determination of proper proportioning of cooling systems.
Air cooling.
Valve settings for racing cars.
Motor lubrication; constant level versus mechanical oiler with separate leads.
Chemical decarbonizers, are they safe and effective?
Clearance and limits for pistons, wrist-pins and valve lifters.
Advantages of a six-cylinder over a four-cylinder motor of equal rating.
Thermal and mechanical efficiency of motors for constant horsepower and variable number of cylinders, with special reference to gasoline economy of a six-cylinder motor and single cylinder motors for given kilogrammetric performance.

Automobile Materials and Treatment Demanded

The adoption of uniform symbols for the designation of heat and other treatments in connection with the specification of raw materials.
Hardening carbon steel and alloy steel gears.
Brake materials.
Best steel for ball races.
Casehardening camshafts and like pieces.
Proper materials for transmission gears and shafts for commercial vehicles.
The pyrometer: Its development and use.
The use of the Scleroscope for determining the hardness of metals.

Characteristics of Wheels, Rims, Tires, Etc.

Data on efficiency of pneumatic tires.
Clincher versus quick detachable tires.
Demountable rims.
Advisability or inadvisability of tire lugs.
Power consumption of tires versus their life.
Methods and appliances for carrying spare tires, rims and tools.
Wheel alignment, camber and foregather.

Magnetos, Spark Coils and Ignition Problems

Fixed ignition timing.
Dual versus double ignition systems.

High-tension versus low-tension magneto ignition systems.
Magneto efficiency.
Does the usual magneto arrangement give enough range of spark advance?
Direct or indirect causes of ignition knocks or chirping in large motors.

Ball Roller and Plain Bearings

Ball bearings versus roller bearings.
Live rear-axle bearings—on pinion, on differential, on axle; thrust bearings, from fiber and steel to annular and annular and thrust.
Advisability of providing universal joints with hall bearings.
The variation of current practice in anti-friction bearings. (Paper by D. F. Graham.)

Driver's Seat on Left Hand or Right Hand

Left-hand versus right-hand steering—operating levers in center.
Should the driver be on the left in those countries where the rule of the road is to keep to the right?
Chain versus shaft drive.
Worm drive.
Modern factory construction and its mechanical equipment.
Labor-saving schemes and devices in motor car production.
Shop progress.
Cork insert pulleys.
The engineer and the motor car contest. The lessons of the motor car contest.
Charts for racing drivers to fill in in making reports.
Automobile racing on a more scientific basis.
Leaf springs, their method of mounting and their proper treatment at the factory and in the hands of the customer.
Gradient of curves on roads.
Test data on frame sections.
Most suitable form of coupling between motor and motor-testing apparatus.
Transmission and rear axle noises.
Metal stampings.
Proper gear ratios in three- and four-speed transmissions.
Sheet metals.
Lubrication and lubricating devices (aside from motor) insuring proper lubrication.
Torpedo bodies.
Electric lighting.
Universal joints.
Best method of fastening universal joint sleeves.

Warner Turns His Attention to Aeroplanes

Beloit, Wis., June 13—Announcement was made to-day by colleagues of A. P. Warner, the aeroplane enthusiast, that the latter is planning in secret a unique new style of aeroplane different from any ever built before.

Mr. Warner has just disposed of his Herring-Curtiss aeroplane, in which he made numerous daring trips over Beloit, to Joseph Seymour, the racing driver. It is said Mr. Warner has hit upon numerous ideas of tremendous importance to aerial navigation, and these, with such points of advantage as were presented by his flights in the Herring-Curtiss machine, will be embodied in the new aeroplane. Among one of the aeroplane hobbies of Mr. Warner is one of knowing the exact speed of the machine at all times during flights and his invention of the aero-meter supplied that want, the aero-meter now being used on the aeroplane which Glenn Curtiss himself drives.

The shape of the new aeroplane which Mr. Warner is to build it is said is entirely different from any of those now being used and according to those who are close to the aerial navigator many other vital points which lend stability to the air craft are to be taken care of in a manner more efficient than in other aerial flyers.

Upon several occasions last Fall, Mr. Warner startled Beloit and surrounding country by daring flights in his Herring-Curtiss aeroplane, and the news that he is building in secret a new aerial craft on wonderfully unique plans of his own created a stir in this city.

Aiding Mr. Warner in his aeroplane building are experts who are employed in his factories in all phases of delicate mechanical work. With their assistance and with the efforts lent by men of science of Mr. Warner's acquaintance it is expected that the flights of the new model will surprise even those in closest touch with the world's new sport of aeronautics.

New Hampshire's Brilliant Good Roads Outlook

Concord, N. H., June 13—Judge W. B. Fellows, state auditor, announced to-day that so well had James E. French, chairman of the committee of appropriations, handled the finances this year, that it will be possible to complete the three big trunk highways without issuing the $200,000 worth of bonds that remained unissued to finance that project. These highways reach out from the mountains to the State borders, touching Massachusetts, Maine and the ocean, covering several hundred miles.

Jottings From Across Big Muddy

Omaha, Neb., June 13—The Maxwell-Briscoe branch in Omaha has moved into its new garage and salesroom at 2115 Farnam street. The new structure is probably the largest and one of the finest automobile buildings thus far completed in the city. It is two stories high, with 50 foot frontage on Farnam street, and is 128 feet deep.

The salesroom is 50 by 40 feet, with large show windows. The finishing is of maple throughout. Back of this is a room for demonstrators, a car of each model being kept there for that purpose. Also on the first floor is a stockroom for accessories and repair parts, 20 by 70 feet. On the second floor is a repair shop and stockroom. The washroom and storage-room are in the basement.

The *World-Herald* endurance run, which was the big auto event of last year in this part of the country, will be a feature of this season again, the *World-Herald* having offered another cup this year.

The South Omaha Automobile Company has opened a new garage at 436-40 North 25th street, South Omaha. Henry Petersen and his son, N. H. Petersen, are the proprietors. They will handle the Cartercar, Deal and Imperial cars.

The work of wrecking the building at 12th and Farnam streets, Omaha, to prepare for the big new garage of the Freeland Brothers-Ashley Company, is under way. The building will be four stories in height, and the Freeland Brothers-Ashley Company and the Apperson Sales agency will occupy practically all the space.

Omaha autoists are pushing a movement in favor of an auto show at the Nebraska state fair this year, and hope to have a building set apart for the exhibition of motor cars. It is believed that the idea will meet with favor owing to the growing popularity of the automobile among the farmers and rural residents.

Taxicab Company Is Common Carrier

Lansing, Mich., June 13—In a decision recently handed down by Attorney-General Bird a taxicab is held to be a common carrier, and as such all taxicab companies will have to make application to the State Railroad Commission for permission to increase or decrease their capitalization. This decision was the result of an application by the Detroit Taxicab Company to increase its capital stock from $5,000 to $100,000.

What's Doing Along Detroit's Automobile Row

DETROIT'S "Automobile Row"—as the selling agencies of cities are usually called—may be said to be in two parts, extending in two decidedly different directions. Thus, there is the Woodward avenue portion, extending northward from the center of the city, this being the principal thoroughfare of the city. Then, there is Jefferson avenue, which also extends outward from the center of the city, but in an easterly direction. This, too, is one of the principal streets. For the present, the buildings, agencies, and men along the former will be described, leaving the latter to some later date, the same applying to such agencies and salesrooms as are located on side streets.

Going out Woodward avenue, the first agency is that of the Buick Company, which is located way down town, standing virtually alone just below Campus Martius. This is a retail salesroom, handling the factory output in all branches, and working directly from the factory at Flint, forty-five miles away. Despite the location, far away from the other selling firms, this agency finds business brisk just now, with a decidedly greater call for the baby of the Buick line, Model 10. Much attention is now being paid to the new delivery wagon, this downtown location permitting access to merchants and retailers.

Above this, there is a break in the "Row" for a distance of nearly a mile, which brings one up nearly to the new site of the United States Motor Company, corner of Charlotte and Woodward avenues. This is a very large lot, with an old-fashioned brick building, which is now being torn down to make room for the more modern office building and garage. The present plans include a ground floor salesroom, garage, and agency for the Maxwell-Briscoe-McLeod Company, handling the Maxwell and Columbia cars. Part of the second or higher floors will also be at the service of this firm. The balance of the building will be devoted to the offices of the officers of the Detroit division of the company, just created.

Two blocks below this, on the corner of Sproat street, the Oldsmobile holds forth in a natty little one-story building, with a wide front and a great depth on Sproat street, the back part being the garage portion. The interior of the building, at least in the office part, is finished in weathered oak, which is very attractive. Following out its former lines, the Olds machines, originally Detroit-built, have a strong hold on the town, very many of the big model with the 40-in. wheels being seen on the streets, this being known as the Oldsmobile Limited.

Midway between the two, at the corner of Bagg street, there is a small group of agencies, with another building just going up. From Bagg street, going down, J. P. Schneider has the corner, by far the largest of the buildings. Next below this is the Detroit Motor Sales Company. Following that, the Remy Electric Company, and finally the Montgomery Motor Sales Company, and the Cartercar Company. The new building just below this has not been completed, nor has this place been definitely contracted for by an automobile firm, but it was built to rent as such.

Agencies: Hupmobile, Winton, Chalmers, Buick and Regal

Schneider is one of Detroit's oldest salesmen, being on Jefferson avenue, just east of Woodward, for a number of years, where he handled many of the most prominent American and foreign cars. By a peculiar irony of fate, the building he occupied then is now used by a horse outfitting firm, selling blankets, harness, saddles, etc. Schneider is now handling the Pierce-Arrow, Stevens-Duryea, and Baker Electric, a line of high-grade cars, this being peculiarly appropriate in this neighborhood, for years the home of Detroit's aristocracy. In passing, it might be mentioned that this city seems to have a peculiar leaning for the electric car, their number here being very great, and probably not equaled by any other city. Whether this is due to the fact that a number of electrics are built here or not is hard to determine, but the fact remains that there are many of this type of car upon the streets here.

The Detroit Motor Sales Company handles the Paige-Detroit and the Warren-Detroit, both made in the city, as the names would indicate. The former is a two-cycle car, selling at a low figure, while the latter is of the more usual four-cycle type, but also sells at a moderate price. The Electric Company, of course, sells the well-known Remy magneto, as well as the other ignition specialties of this Indiana firm. Quite an extensive line is handled by the Montgomery Sales Company, including as it does the American and Speedwell, with the cartercar sharing the salesroom. The latter is a friction-driven car, selling at a moderate price, while the other two cars are listed at higher prices,

Goodyear Tires Are Prominent on the Row. They Are Kept Here

the American, in particular, being an expensive car. In this line, the greatest demand seems to be for the Traveler, of which model it seems impossible to keep one in the salesroom floor. The Cartercar, too, is very popular in this city, being built so close by as to be practically a Detroit-made car.

Above this group, the selling houses skip another long distance to Parsons street, at least a half mile. Below this street, on the East side are the Postal-Doherty Auto Company, and the Michigan Motor Sales Company, sharing a large building, of 60 feet frontage and nearly triple that depth. The former is the selling agent for the White, while the latter is the State sales agent for the Oakland and Welch. Each firm has its own showroom, the front of the building being divided squarely in half by the driveway to the garage.

Diagonally across the street, but above Parsons street, are the city salesroom, charging station and garage of the Anderson Electric Company, makers of the Detroit Electric. This building has the same characteristic Detroit automobile sales building shape with two showrooms, one on either side of the wide drive. the remainder of the building being devoted to the working part of the establishment. The building is larger than those just described, being some 75 ft. front and correspondingly deep. The strong hold which the electric car has upon this city, as just spoken of, keeps this place busy at all times, although from a sales point of view, the floor is bare at all times, the cars selling faster than the factory can furnish them.

Above the next street, very properly named Selden, is a large group, consisting of Brush and the Apple Electric Company on the west side, and the agents for the Hupmobile, Stewart speedometer, Stromberg carbureter, Marmon cars, Winton, Chalmers, and Buick, quite a large and representative group, which might be said to be augmented by the Regal agency in the block above, but practically across the street from the last of the row, Buick, because there is no intervening building.

Everitt "30" Dwells in a Well-Equipped Building, as Shown

The Brush agency is, of course, a factory branch, and has in connection a large garage, this being located at the rear, and entered from the side street, Selden, to which it runs, the building being L-shaped. Next above this the Apple Electric Company has a small place, selling the storage batteries, magnetos, and other ignition apparatus, as well as the Aplco electric lighting system.

The Keeler-Hupp Company is the agent for the Hupmobile and shares a Detroit-style building with a sales agency for accessories, which latter has the Stromberg carbureter as well as the Stewart speedometer, both Chicago products. Collins & Co., having just taken on the Marmon state agency, have space in here also. The Winton Motor Carriage Company place is a factory branch and, of course, sells only the one car, the Winton. Although not a branch, the same is true of the Grant Bros. Automobile Company, dealing exclusively in the Chalmers product. Both of these, as well as Buick on the corner, have the typical floor layout referred to as the Detroit style of building.

This, with Regal, previously spoken of, concludes this group and the next is another short jump away, being some three blocks farther north at Garfield street. Below this is a group of one-story buildings, with the Standard Auto Company, selling the Packard, on the corner; C. F. Gilmour, selling the Mitchell, next, and below the latter, the Neal-Kitchel Motor Sales Company. The last named sells the Paterson 30, the Parry, K-R-I-T, and De Tamble, a long line, varying in price from $850 for the last to $1,400 for the first, but all medium-priced cars. The latter and the Empire Tire Company have the ground floor of a two-story building, the upper floor of which is also devoted to automobile products, Empire tires having part of it, and the Detroit Leather Works, making the Knight leather tires and tire protectors, the other parts. This is in one of the finest parts of the city, being just across the street from the Detroit Athletic Club.

Detroit "Electric" Lives in an Up-to-Date Garage

Across Garfield street is one of the newer buildings, built last year, but now fully occupied. This is a two-story building with the whole ground and second floors devoted to accessories, with but one exception, the agents for the Great Western, also selling as a side line the Everitt "30." The corner is occupied by the B. F. Goodrich Company, selling Goodrich tires and mechanical rubber goods, with a large repair department at the back, on Garfield street. The next store houses C. F. Splitdorf. Here are sold the Splitdorf ignition specialties, coils, magnetos, batteries, etc. Going on up, next is a general sales company, selling Sterling tires and Warner autometers. The rest of the ground floor is given over to the interests of Prest-O-Lite tanks, Emil Grossman with his wind shields and other specialties, and Wheeler & Schebler, while on the second floor are located the following, all well-known in the trade: R. E. Dietz & Rushmore Lamp Company; Lazarnick, the photographer; Auto-Automatic Windshield Company; Hubbard Engineering Company, representing Thermoid Rubber Company, Heinze Electric Company and Lumen Bearing Company; Sibley Motor Car Company; Bosch Magneto Company; and the Rubber Company of America, World tires. Just two doors above, close enough to be a part of the same group, is the Pennsylvania Rubber Company, in its recently opened office. The building, called the Edwin S. George Building, is so nearly composed of glass windows with corners and a roof, that it might be called a glass house. The result is very light showrooms, and a pleasant place to work.

Speaking of glass brings to mind at once the next in order going up the row, the new home, not yet completed, of the Everitt "30." It is the farthest down town of this group, which extends downward from Warren street. The corner, extending back on Warren for 250 feet, has not yet been rented, although several automobile firms are looking at it. The same applies to the second store, while the third has been taken by the Harper-Aldrich Auto Company, selling agents for the Demot car. This brings us to the Everitt building, the sales agents being the Security Auto Company. This building will be one of the future models for agents' buildings. The whole two-story height has been made one story clear, with enormous panels of glass from the sidewalk upward at least 16 feet. Above this are several rows of smaller panes of glass, so that the whole front is of glass. To this alone the building does not owe its distinction, the salesroom being notable in other ways. The whole front, as deep as wide, and this is 60 feet, is made one room, panelled in oak, with a dull finish, as high up as 12 ft. The entrance for cars, to the showroom and to the garage in the rear is by the covered drive between the Security and the Harper-Aldridge companies. For the garage this leads straight back, being of unusual width.

Just above Warren, practically across that street from the building just described, is going up another, but very large, automobile building. This measures some 90 feet in width and about 250 in depth. At present but the side walls and center dividing wall are up, but it is said that this has been rented to a firm farther down the street. Grant Bros. are rumored to be the lucky ones.

Again there is a large gap in the row, this one being about a third of a mile to the next-to-last group, which includes not only the older structures, but two new buildings, not yet finished, as well. One of these is the new Detroit home of the Rapid trucks, while the other is as yet untaken. The Rapid place is finished in a California Mission style, with red tile roof, hanging low over the front of the building, which is of dark green brick. The interior will be equally attractive, with its spacious rooms, plenty of light, and handsome mission furniture.

After the new building, going north, one comes first to the home of Vesta Accumulators, a small store, but devoted exclusively to this ignition firm's specialty. Next above that is where the Eclipse gas tanks and Federal tires are sold. This firm does a general tank business, taking orders to fill or refill any kind, make or type of gas tank. The two-story building beyond this is the "hang out" of Reo and Thomas pleasure cars and Grabowsky commercials on one side, and Stearns pleasure cars on the other, the former being sold by the Century Motor Sales Company and the latter by the Palmer Auto Company. Both report a flourishing business, while the garage in the rear is also doing well.

The building next above is another double purpose structure, the Annett Auto Garage being the nominal proprietors, while the two salesrooms in the front, one each side of the entrance to the garage, are occupied respectively by a firm handling the Auburn and Bernhard Helfern & Company, selling the Herreshoff. Up over the Annett garage, Spooner & Wells, photographers, have the whole front of the building.

On the same side of the street, the west, one block farther north, is the factory of the Beyster-Detroit Motor Car Company, manufacturers of the Beyster-Detroit delivery wagon. Although hardly classified among the sales agents, the front of the deep building is given over to local sales, no other agent being employed. This firm builds a light delivery wagon, of which a number have been sold in the city.

Diagonally across the street is the last of the agencies conducted by a private individual for profit, the only other selling agency on the street being the Cadillac in the block above, but this latter is a factory branch. By this, reference is had to W. F. V. Neumann & Company, handling the Rausch & Lang Electric and the Stoddard-Dayton. This building has a very large frontage on Woodward avenue, some 120 feet, and is, in fact, one of the best arranged garages in the city, the front of the building only being devoted to the use of the sales force. The building is but one story in height, but the width, taken with the great depth, gives the whole a very large amount of floor space. Business is reported brisk both in the electrics and the line of Ohio cars.

Last of the buildings on the street devoted to the sales end is the Cadillac branch, previously mentioned. This is on Woodward avenue, just at the railroad crossing, and a little above Amsterdam street. One block back of this, occupying the same position on the street, is the immense Cadillac factory, while just across the railroad to the north is the factory of the Briscoe Manufacturing Company. The Cadillac building is in two parts, the one containing the salesrooms proper, and the other without the glass front and other indispensable parts of a city salesroom being devoted to the garage and car storage, the factory often making use of this in time of car shortage, that is freight cars. This closes the list of Woodward avenue selling houses.

Rain Checks New Jersey Run

The endurance contest of the New Jersey Automobile and Motor Club, which was scheduled to be run off Saturday, June 11, has been postponed until June 18. The start will be from the clubhouse in Park avenue, Newark, at 5 o'clock in the morning.

Winton Officers Hold Conference

CLEVELAND, O., June 13—Winton branch managers, salesmen and other prominent employees of the Winton company from Boston to Seattle spent the week of June 6 in Cleveland. The first two days were devoted to business affairs, including a thorough inspection of the Winton Six, details of which will be made public on July 1. When business had been disposed of the visitors attended ball games, theater parties, various luncheons and dinners, and indulged in athletic sports. Mr. and Mrs. Winton entertained the entire party on Wednesday with a lake ride on Mr. Winton's big steam yacht, "La Belle," at dinner at Roseneath, the Winton home, and with an evening at the theater.

Among those present at the convention were President Alexander Winton, Vice-President Thomas Henderson, Secretary and Treasurer George H. Brown, George W. Miller and A. G. Schaefer, of Seattle; H. L. Owsney, of San Francisco; W. D. Howard, of Los Angeles; F. A. Hinchcliffe, of Boston; Charles M. Brown, of New York; A. E. Maltby and F. W. Stockbridge, of Philadelphia; W. L. Duck, of Baltimore; Earl H. Kiser and S. R. Iams, of Pittsburg; C. M. Brockway, George Arbuckle, F. H. Walley, F. N. Sealand and Frank Robishaw, of Cleveland; Thomas W. Henderson, of Detroit; J. F. Davis, W. A. Stoker and A. J. Roe, of Chicago; Charles S. Calvert, of Indianapolis; J. S. Johnson, of Minneapolis; J. J. Jack, of Denver, and the following from the main office: Sales Manager Churchill, Advertising Manager Mears, Superintendent Waidig, Purchasing Agent Ranney, Parts Manager Smith, Traffic Manager Baughman, Engineer Anderson, James Winton, W. E. Miner, of the accounting department, and W. J. Ward, of the advertising department.

Mr. Winton contemplates building aeroplanes in which he will incorporate ideas of his own. While in Paris, recently, he spent a great deal of time visiting the twenty plants where aeroplanes are made, and was much impressed. He has ordered a Gregorie monoplane. As soon as the machine arrives he will begin the work of familiarizing himself

Winton Sales Force at Mr. Winton's Residence "Roseneath"

with the art of flying. The machine was shipped on May 30. Frank Lahm, father of Lieutenant Lahm was in charge of the construction.

"I have always been interested in aeroplanes," said Mr. Winton recently, "but I never before had time to look into them. I am going now to see what there is in them. I want to keep abreast of the times. I think it would not be right for anyone in this country to build aeroplanes without making some kind of terms with the Wright brothers. If I ever make a long flight it will be in a machine of my own and one that I have built myself." It is expected that Mr. Winton will make rapid headway in this new undertaking of his and much interest is being taken.

Ground Broken for New Lozier Plant

Work on the new million-dollar plant of the Lozier Motor Company at Detroit commenced May 18 and already the concrete foundations upon which the buildings will stand have been put in. The steel construction work will begin in the near future and the whole fabric is expected to be pushed.

Albert Kahn, the originator of the Kahn system of construction, which is now in general use in building the highest class of automobile plants, is in charge. A. Bentley Sons & Company of Toledo are the contractors. J. G. Perrin, superintendent of the Lozier plant, has general supervision of the work.

The buildings, according to preliminary announcements, will be as complete and perfect in every way as the present advanced stage of the structural art will permit. Mr. Kahn is authority for the statement that they will represent the highest type of accomplishment in that line ever undertaken by him. Particular stress is laid upon the sanitary advancement and material comfort of operatives and employes in the plans presented to the company. Plenty of light and air and the best type of machine room construction will be the chief features of the new plant.

From Left to Right: Albert Kahn, Mr. Bentley and J. G. Perrin

The photograph for the accompanying illustration was taken the day ground was broken for the massive foundations of the main building.

Nine Enter for Munsey Tour

WASHINGTON, D. C. June 13—The entry list for the Munsey historic tour was opened this week and the close of the week found nine nominations, as follows: Premier, Premier Motor Manufacturing Company, Indianapolis; Columbia, Columbia Motor Car Company, Hartford, Conn.; Selden; Maxwell, T. A. Lambert, Baltimore, Md.; two Washingtons, Carter Motor Car Corporation, Washington, D. C.; Reading, Middleby Automobile Company, Reading, Pa.; Ford, Charles E. Miller, Washington, D. C.; Elmore, Frank Hardart, Philadelphia, Pa.

The work of pathfinding the route will begin Wednesday, when an E-M-F touring car, with Tom Skeggs at the wheel, will start from Philadelphia. The members of the pathfinding party are Harry Ward and F. J. Byrne, staff correspondents of the Munsey newspapers, and Nathan Lazarnick, photographer.

Hartford Notes on the Automobile

HARTFORD, June 13—An orphans' day run is planned by the Automobile Club of Hartford for the latter part of June. The children of the Blind Institution are to be included in the outing this year. The committee in charge is hustling to make the affair bigger and better than ever before.

Hartford will have its first sight of a real aeroplane July 4, when Charles K. Hamilton plans to fly from New Britain to Hartford and circle the State Capitol.

Virginia Auto Law in Effect

RICHMOND, VA., June 13—The new law governing automobiles, passed by the last Legislature, goes into effect Wednesday. Most of the autoists of the State have secured their new cards, but there are still a number who have not conformed to the law.

Formerly there was only a charge of $2 to obtain a number, which was good during the life of the machine. The speed limit in the country was fifteen miles per hour. Now twenty miles an hour may be traveled, while the following is a schedule of the new fees: Twenty horsepower and less, $5; over twenty and under forty-five horsepower, $10; forty-five horsepower and over, $20; motorcycle, $2; chauffeur, $2.50; dealers' demonstration license, $50. All old numbers stand annulled after Wednesday.

The new law provides that the operator of a machine shall not drive in the corporate limits of any city or town at a rate of speed greater than twelve miles an hour, unless the local ordinance of such city or town shall provide otherwise. Outside the limits of any city or town, a speed of twenty miles an hour is permissible, except going around curves, down sharp declines, or at the intersection of any crossroads, or over the crest of hills, or in passing other vehicles or riders on roadways, when a rate of speed not exceeding eight miles per hour must be observed.

The law provides that when horses are frightened, upon a signal or request from the driver or rider, the chauffeur shall immediately bring his machine and its engine to a full stop and allow ample time for the rider or driver to pass.

Following the usual annual custom, the Richmond Automobile Club proffered its cars for Orphans' Day, and the children were taken for a spin to the country.

Nearly 400 children gathered at Capital Square Park at 3 o'clock. The route was to Lakeside Park, where the youngsters were turned loose for a romp.

A public subscription fund to be used on improvements to the Midlothian highway from Richmond to Falling Creek, a distance of about twelve miles, has been raised by Supervisor Thomas E. Woodfin, amounting to $5,000.

News Notes from Nashville

NASHVILLE, TENN., June 13—Capital stock to the extent of $400,000 has been subscribed and paid in to establish in Nashville the Southern Motor Works, and the plant of the company now located at Jackson, Tenn., with a small capacity, will be moved here, the new factory to have a capacity of 750 to 1,000 cars per year from the beginning, with provision made for expansion. Several of the wealthiest citizens of Nashville are interested in the enterprise. A charter has just been secured, incorporating the company for $400,000. The incorporators are are follows: A. H. Robinson, Exile Burkett, John L. Wisdom, Geo. W. Killebrew, Johnson Bransford, Arthur B. Ransom, G. M. Neely, J. H. Ambrose, John W. Love and John H. Howe.

The company has already secured a building, having purchased the factory of the Phoenix Cotton Mills, and it is now being cleaned and rearranged. Exile Burkett is president of the company, A. H. Robinson is vice-president, J. H. Fisher, secretary and treasurer, and W. H. Collier, superintendent. The company manufactures the Marathon, a car that sells for $1,500.

The Nashville Motor Car Company now has on display in its show rooms a full line of 1910 Buicks, and also a Dorris car and a Dorris chasis. The chassis has been displayed at a number of shows and was loaned the Nashville auto firm. Duncan R. Dorris, the manager, is a brother of the designer.

An automobile highway is to be built between Morristown and Rogersville, Tenn., a distance of 22 miles, arrangements having been completed at a public meeting held for the purpose.

The Hoard-Cregor Company, which recently moved into a new garage on Broadway, held a public reception for several days, lately. The house was attractively decorated for the occasion and models of the various cars represented by the company were on exhibition.

Fig. 1—Start of the all around Long Island-"Montauk Light or Bust" run

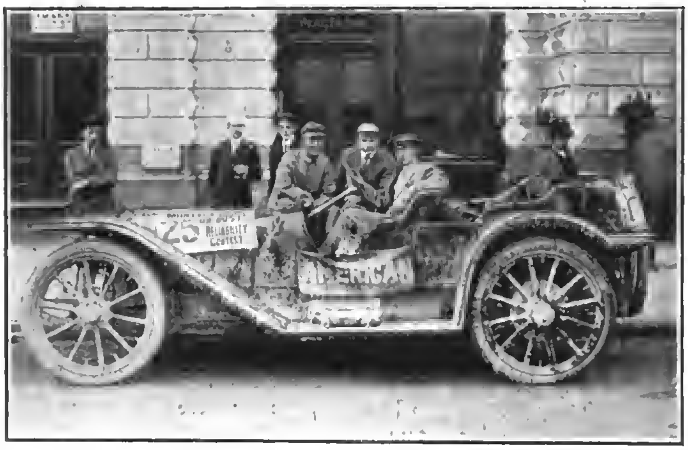


Fig. 2—American car at the start of the run

Fig. 3—Regal in the shape it expects to return

Fig. 4—The Franklin one-ton delivery wagon which is for supplies

Montauk Light or Bust

Under superb weather conditions and with everything favorable for good sport and a pleasant tour, the "Montauk Light or Bust" run of the Motor Contest Association started from Madison Square Tuesday morning. The cars were classified in seven divisions under Class A rules according to list prices.

The first day's schedule called for a long run down the south shore of Long Island, approximately 211 miles, over 50 miles of which is through the celebrated Montauk badlands. Over the barren lands and close to tide water, the course lay for miles, the ocean dashing against the beach at their feet, and the seabreezes blowing into the faces of the tourists. The return trip was by a more northerly route. A Thomas Flyer, in charge of Raymond Beck, laid the confetti trail.

The other official cars included a Knox, carrying Referee Allen C. Alderman, president of the Long Island Automobile Club; a Mitchell "6", pacemaker, with Oakley Delamater, and a Franklin, Welch-Detroit, Palmer-Singer, Chalmers, Packard, Velie, Babcock and American carried press representatives and working officials.

"Senator" William J. Morgan, president of the Motor Contest Association, authorized the statement that this run would prove the last that he would promote. Senator Morgan has had much success in this line of endeavor and in speaking of his determination said that he figured that he had done enough. The list of entrants is as follows:

Car	Entrant	Driver
Division 1A—$800 and under—		
Hupmobile	F. L. C. Martin Auto Co.	Elmer D. Cutting
Hupmobile	F. L. C. Martin Auto Co.	R. E. Gillam
Division 2A—$801 to $1,200—		
Ford	Ford Motor Co.	W. A. Starbuck
Mitchell	Mitchell Motor Co. Brooklyn Branch	D. M. Hasbrouck
Buick	Buick Motor Co.	E. E. Easter
Ford	Ford Motor Co.	W. B. Young
Division 3A—$1,201 to $1,600—		
Regal	Regal Detroit Auto Co.	
Mitchell	William Simonson	William Simonson
Chalmers	Continental Caoutchouc Co.	E. Miles Welch
E-M-F.	Studebaker Bros. Co.	E. A. Taylor
Division 4A—$1,601 to $2,000—		
Pierce Racine	S. W. Fromm	Lewis Strang
Velie	Garland Auto Co.	
Auburn	LaDue-Carmer Motor Co.	Herbert F. Earl
Mitchell	Mitchell Motor Co. of N. Y.	O. R. Delamater
Elmore	John L. Gwyer	John L. Gwyer
Westcott	Dunlop-Taylor Motor Co.	Thomas Wilson
Buick	Dr. William H. Nafis	Dr. William F. Nafis
Buick	Buick Motor Co.	W. Davenport
Buick	Buick Motor Co.	Philip Hines
Buick	Buick Motor Co.	Frank Remsen
Division 5A—$2,001 to $3,000—		
Haynes	Walter E. Shuttleworth	Walter E. Shuttleworth
Mercer	Mercer Auto Co.	
Franklin	Franklin Auto Co.	C. J. Hickman
Selden	Cloud-Marts Auto Co.	George E. Mack
Division 6A—$3,001 to $4,000—		
Franklin	Franklin Auto Co.	Paul Harvey
Knox	Knox Auto Co.	H. K. Sutherland
Welch Detroit	Welch Detroit	Ward Smith
C. G. V.	C. G. V. Import Co.	Arthur Coombs
Division 7A—$4,000 and over—		
Zust	American Zust Motor Co.	V. P. Pisani
Amplex	S. J. Wise & Co.	Walter Jones
Fiat	Hugo Ricca	Peter Smith
American	American Auto Co.	Earle A. Cryne
Stearns	Edgar Gibbs Murphy.	Edgar Gibbs Murphy

Delawareans and Philadelphians in Accord

WILMINGTON, DEL., June 13—As a result of the persistent and aggressive work of the Delaware Automobile Association, Delaware has been eliminated from the fight between the city of Philadelphia and New Jersey automobilists, which had reached a point where it had become very annoying to Delawareans, particularly residents of this city, who often motor to Philadelphia, chiefly for the purpose of enjoying a ride through Fairmount Park. While the association members are reaping the benefit, so are all other Delaware automobilists, and naturally the association and its officers, who were instrumental in accomplishing this result, are receiving a great deal of praise.

In order to insure enforcement of the Pennsylvania automobile law within the city limits, and incidentally to keep out New Jersey autoists who sought to come in without Pennsylvania licenses, the Department of Public Safety of Philadelphia about two months ago issued an order requiring all cars entering the city without Pennsylvania license tags to be driven to the City Hall, where a permit must be obtained before the machine could proceed further. In the case of Delaware this permit did not cost any money, though it resulted in a great waste of time and also in much annoyance. Delaware and Pennsylvania have reciprocal relations, so far as motor cars are concerned, which enable those bearing the tags of either State to enter the other with a home tag. The reciprocal period in each State is 10 days. As a result, there is the best of feeling between Delaware and Pennsylvania, but just the contrary is the case between Pennsylvania and New Jersey, the latter not being willing to have reciprocal relations, and the result is that a Jersey machine is not allowed to enter Pennsylvania without a Pennsylvania license, if it can be prevented.

This is why the city of Philadelphia issued the order requiring a permit for all non-resident machines, and for the same reason the Fairmount Park Commission, a few weeks ago, made an order requiring all machines entering the park to carry special Fairmount Park license tags, which were obtainable at the City Hall, and at certain times from some of the guard houses in the park. This also caused a great deal of annoyance and confusion to Delawareans who went to the park, for if they depended upon obtaining a license tag there and happened to strike the wrong gate they would be required to leave the park and go around it until they came to a place where the tags could be obtained. As was the case with the city authorities, there was no fight against Delaware, but Delaware had to put up with the annoyance just the same, until the Delaware Automobile Association was able to revolutionize the whole situation.

The trouble came to a climax the early part of last week, when the Department of Public Safety of Philadelphia directed the police to rigidly enforce the order requiring permits, which had not been enforced prior to that time, though it was issued some time ago.

The city and park matters were both taken up by the Delaware Automobile Association, through its executive committee. The association has an attorney in Philadelphia, who was also of assistance. He pointed out to the city authorities that the Pennsylvania automobile law prohibits cities or towns requiring permits in addition to State licenses, and as a result on Friday of last week the order requiring permits in the city was rescinded by the Department of Public Safety, and on the same day the Fairmount Park Commission rescinded its order requiring special tags for the park.

Now all that is necessary for Delaware automobilists visiting Fairmount Park or any place in the city of Philadelphia is to have a Delaware license tag in plain view on the machine, and have the accompanying registration card, to be shown if called for, though the tag is usually accepted without question.

Philadelphia Club Activities

PHILADELPHIA, June 13—The fourth annual summer track meet of the Quaker City Motor Club, at Point Breeze, will be held Saturday, June 18. A feature of the entry blank which is something of a novelty is the announcement of the Contest Committee that if, in their opinion, the number of cars entered in any event is insufficient to guarantee a contest, they reserve the right to return the entrance fees and declare the event off.

The contest fever has attacked even the ultra-conservative Automobile Club, of Philadelphia, and the Tours and Runs Committee of that organization has planned a two-day tour, June 25-26, with a secret-time schedule for each day, to Lake Hopatcong, N. J., and return. Allen Shelden, chairman of the committee, who, by the way, is president of The Motor Company, which handles the Premier car here, and who was the originator of the annual Premier runs, will endeavor to induce officials of large towns on the route to offer prizes for the driver who covers the distance from each day's start to the town mentioned closest to the official secret time. This scheme worked out very well in last Saturday's Premier run. Members only are eligible to compete.

The "sociability" run of the North Wildwood Automobile Club from this city to Wildwood on July 2 next, the preliminary to the club's races on the Speedway there on the 4th, promises to be well patronized. The route will be laid out via Salem and Bridgeton, the automobile club of the first-named city having asked the privilege of furnishing lunch to the contestants. Besides providing much sport, without the hard work inseparable from an endurance run, the cities, towns and villages along the route have been flooded with booklets pointing out the beneficial effects of such contests upon the good roads movement.

Automobile Club in Sage Brush

GOODING, IDAHO, June 13—Motor clubs and alfalfa alike flourish in the sage brush country, and both are seemingly prolific in their growth. The Gooding Motor Club, just organized, has its headquarters where two years ago there was nothing but a lonely ranch house, a railroad siding and an occasional sheep herder to relieve the monotony. To-day Gooding is a city of 2,500 inhabitants, with electric lights, telephones, fifteen miles of cement sidewalk and all the conveniences to be found in cities of ten thousand population in the Eastern States. Motor cars are plentiful in the town, and many of the ranchers use this vehicle instead of horses and wagons.

The Gooding Motor Club starts with a charter membership of twelve, and the motor ranchmen of Lincoln county are sending in their applications, so that the club promises to reach fifty or more before the summer closes. The club has adopted "Good Roads" as its slogan, and it will at once begin a vigorous campaign for the improvement of the roads of Lincoln county. The officers of the club are: President, Judge J. D. Furcht; vice-president, Dr. W. H. Johnson; secretary, Robert W. Spangler.

Delaware Club Run June 18

WILMINGTON, DEL., June 13—The annual run of the Delaware Automobile Association this year will be to Oxford, Pa., and will cover about 82 miles, starting and ending at the Court House in this city and going through London Grove, Pa., on the trip out and through West Grove and West Chester, Pa., on the return trip. June 18 was selected as the date for the run. A sealed time run was decided upon.

In the Realm of the Makers

Paul Gaeth, president of the Gaeth Auto Company, left Cleveland Tuesday, June 7, for a two months' trip in Europe.

The Car-Makers' Selling Company, George L. Derr, president, has been incorporated to do business in New York. The company is located at 1780 Broadway.

The New York Auto Top and Supply Company has opened a branch establishment for the manufacture of automobile tops at Paterson, N. J.; the main branch is at 267 Halsey street, Newark.

The Vickers Auto Car Company, of Coshocton, O., has completed its first car, which will be called the Vickers. The machine is a runabout with a four-cylinder, 2-cycle, air-cooled motor. Carl Vickers, proprietor of the Vickers Repair shop, backed by E. H. McMasters, of Bellaire, O., is at the head of the enterprise.

The New Departure Manufacturing Company, of Bristol, Conn., manufacturers of New Departure ball bearings, is installing a Snow twin-tandem gas engine of 500 horsepower, thereby increasing the power plant to five engines of this type. The new engine will furnish power for three new buildings now in course of erection.

The Sands Specialty Company has been recently organized in Cleveland for the purpose of marketing an improved form of the Sackman starting device. The inventors, W. H. and C. M. Sackman, are both enthusiastic about their product and claim it is the simplest and surest method of eliminating cranking dangers. A factory for the manufacturing of these appliance on an extensive scale is now being arranged for.

The Joseph Dixon Crucible Company at its annual meeting re-elected the old board, consisting of Geo. T. Smith, William Murray, William H. Corbin, Edward L. Young, Geo. E. Long, William H. Bumsted and Harry Dailey. The board of directors re-elected the former officers, namely, Geo. T. Smith, president; William H. Corbin, vice-president; Geo. E. Long, treasurer; Harry Dailey, secretary; J. H. Schermerhorn, assistant treasurer and assistant secretary. William H. Corbin was also re-elected as counsel.

The Canadian New-Way Motor Company, Ltd., a branch of the New-Way Motor Company of Lansing, Mich., has been formed and a plant is to be built at Welland, Ont., a Canadian town a few miles from Buffalo, N. Y. The new company is capitalized at $50,000 and the directors are William E. Newbrough, C. D. Woodbury, E. H. Goodnow, L. M. Gleason and H. E. Thomas of Lansing. Air-cooled gas and gasoline engines will be manufactured and the export trade of the company will be transferred to the Canadian concern, from which exportation can be made to advantage owing to the preferential tariff Canada has with Great Britain and her possessions.

Seventy-five new members have been added to the Portland (Ore.) Automobile Club since the new officers started to work. The slogan is "1000 in 1910," and a recruiting committee is working to raise the membership to the century.

Wisconsin registration June 1 reached 12,740 and applications are coming at the rate of 40 to 60 a day. This is the best motor car year Wisconsin has ever experienced.

Fig. 1—Earl J. Moon in a Moon "30" trying out the beauties of car and road in St. Louis

A new motor car built by the McKeen Motor Company at Omaha, Neb., has just been placed on the LeRoy, N. Y.-Rochester route of the Buffalo, Rochester & Pittsburg Railroad Company. The car is 72 feet long, 10 feet wide and weighs 68,000 pounds.

"Tim" Lynch, well known to Adirondack tourists, has opened a garage at the Leland House, Schroon Lake, N. Y. Mr. Lynch was formerly foreman for Miller Bros., at Glens Falls.

A paper chase has been planned by the Motor Racing Association for its members and guests, June 15. The route has been selected through a remarkably isolated country, but its details will not be given out until the day of the affair. It will be run in the vicinity of New York.

The Minneapolis Automobile Club is constructing a lagoon at its clubhouse at Bloomington, so that members may reach the clubhouse from the city via the Minnesota and Mississippi rivers in launches. The distance by river is 25 miles. Power boat races in the river will be a feature of the late summer, and the club may go in extensively for this branch of sport.

Fig. 2—K-R-I-T car with Baron Von der Noot de Moorsel, who is making a trip around the world. Mayor Breitmeyer, of Detroit, is saying good-by to the Baron

Agency and Garage News

Frank F. Weston has been appointed general sales manager of the Mercer Automobile Company, with headquarters at Trenton, N. J.

W. A. Gilbreath has taken on the management of the Motor Car Sales Company at Indianapolis. The concern handles the Peerless and Everitt "30."

Frank Donnell, for many years connected with the Ford Motor Company, has been appointed assistant manager of the Atlanta branch of the Ford company.

C. H. Bigelow, who at present is making a transcontinental tour in a Mercer car, has experienced some bad weather and heavy roads. He is approaching his destination, Los Angeles, over the old Santa Fé trail.

The Hollenbeck Automobile Company, of Portland, Ore., have secured the agency for the Croxton-Keeton car in that city.

C. A. Eaton has taken the agency for the Westcott car in Boston. He formerly handled the Lambert and is well known in the trade.

The O'Neil Tire & Protector Company has opened a sales depot at 126 Massachusetts avenue, Boston, Mass. F. W. McGahan, formerly of Ennis Tire Company, is manager.

The Haynes Automobile Company has closed a contract with F. H. Grasswick, Calgary, Alberta, Canada, to take the Haynes agency for the territory of Alberta and Western British Columbia.

The Meyer Carriage and Auto Company, 322-324 Ellicott street, Buffalo, is the distributor of the Pullman motor car in Buffalo and vicinity.

Joseph Nelson, of Montpelier, Idaho, and M. Crumrine, of Greenville, Ohio, will handle Great Western cars exclusively, having been recently appointed agents by the makers of these machines.

The Cincinnati branch of the Goodyear Tire & Rubber Company, for some years located at 317 East Fifth Street, will move on or about July 1, to new offices at 127 East Seventh street, the "Automobile Row" of Cincinnati.

The Chisholm Sales Corporation, which was recently incorporated in Buffalo, has opened headquarters at No. 730 Main street in that city. The concern will have the Buffalo agency for the National, Locomobile and Speedwell motor cars.

The Studebaker Automobile Company is seeking a location for its Pittsburgh shop work. Plans for a four-story building are being prepared and a site will be announced shortly. This branch covers the western half of Pennsylvania and parts of West Virginia and Ohio.

The J. Ludwig Co., Inc., of 20 Camfield street, Newark, N. J., is building a three-story fireproof structure at 275-279 Halsey street, that city, which will be ready for occupancy about July 1. The company has the State agency for the Randolph Commercial Wagon and will add a pleasure vehicle to its line in the fall.

The Garage Owners' Association of New York will hold its first annual dinner at Reisenweber's, June 23. A large attendance is expected and a list of notable speakers will take part in the program. The association now includes two-thirds of the garages of Manhattan and the Bronx. At the last meeting five new members were elected and several applications for membership from Brooklyn and out-of-town were received.

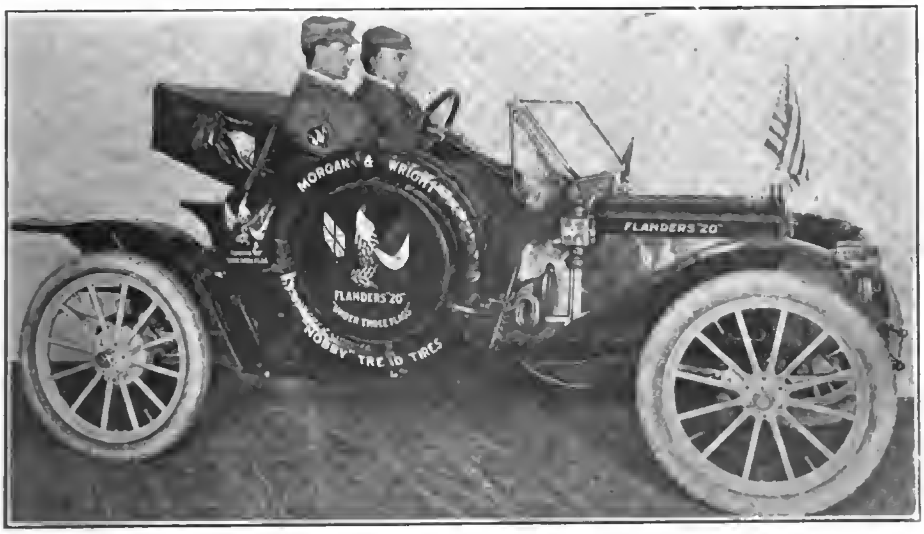


Fig. 3—Flanders 20 "Under Three Flags" ready to start its trip, extending from Quebec to Mexico City

J. P. Dick was recently appointed State agent of the American cars at Atlanta. He has offices at 105 North Pryor street.

A. G. Spalding & Brothers have removed from 200 Halsey street, Newark, N. J., to their new branch at 845 Broad street, that city.

Edward T. Smith, formerly in the sales department of the Iroquois Rubber Company, of Buffalo, has been appointed manager of the company. John S. Watterson is the assistant manager.

The A. R. Mosler Company announces that it has secured the services of H. A. Wattenscheidt, formerly with James L. Gibney & Bro. Mr. Wattenscheidt will cover the New England territory.

C. C. Early, recently manager of the used motor car department of the Franklin Automobile Company, is now connected with the sales department of the Euclid Automobile Company, of Cleveland.

A. W. Woodruff, formerly connected with the Western Reserve Motor Car Company of Cleveland as selling agent for Apperson cars, has joined the Cleveland sales force of the Stearns Company.

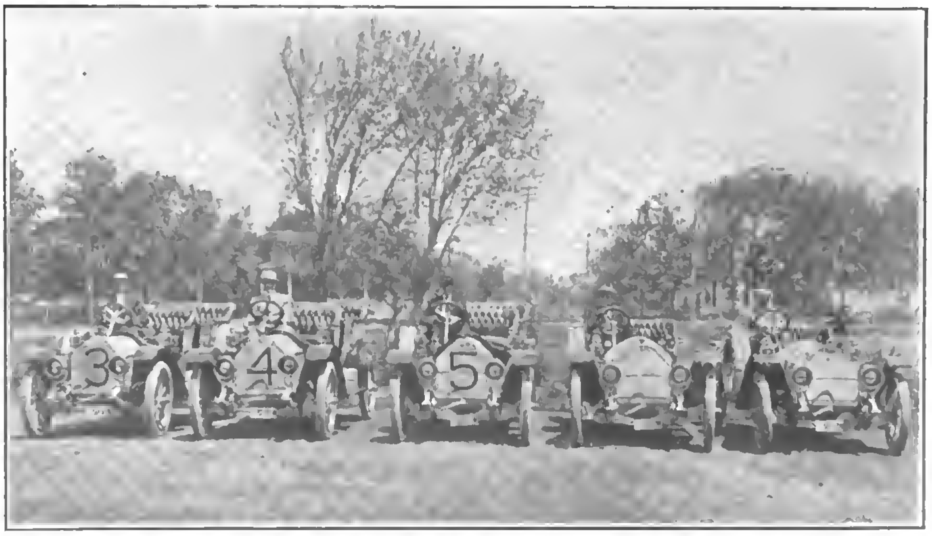


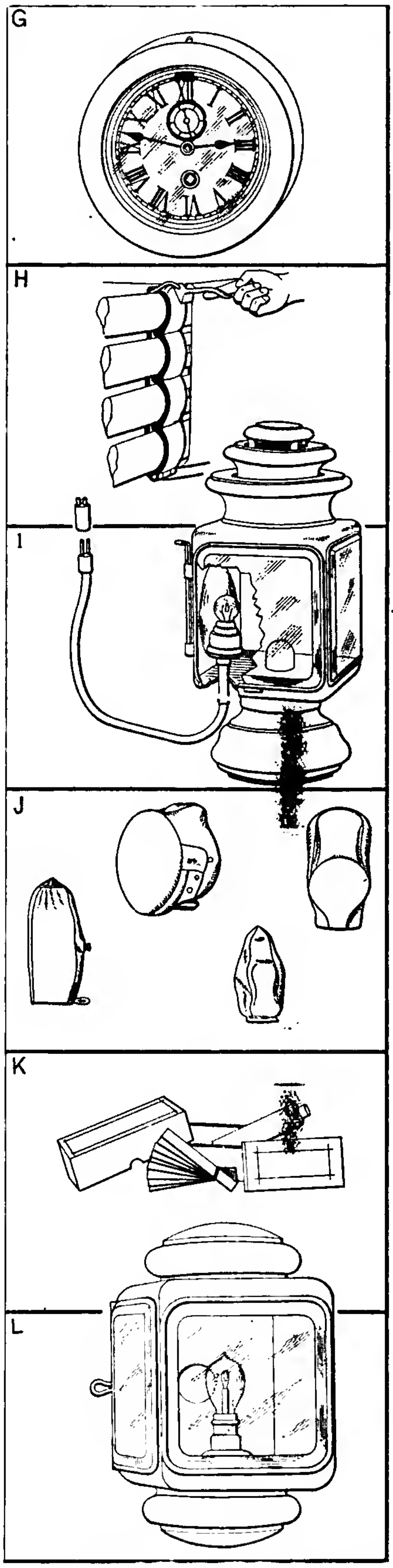
Fig. 4—Battery of Chalmers cars as they will be found in line battling for supremacy in the Glidden Contest

Seen in the Show Window

THE CORRECT "time o' day" is an important element to the automobilist. Watches frequently succumb to the jarrings and moisture inseparable from a long cross-country tour, and a reliable chronometer is therefore a joy forever, even if not a thing of beauty. But the most recent effort of the Chelsea Clock Company, of 16 State street, Boston, Mass., combines utility with attractiveness of appearance. The Chelsea Auto Clock (G) is of the eight-day type, built with a view to stand the jolts and jars of the roughest roads without wavering. It comes in four styles —"Round," "Offset," "Special" and "Limousine," all of which are furnished in 2¾-inch dial diameter, and the first three named in the 3½-inch size. The Chelsea Auto Clock is fitted with the same movement which the company supplies for hard use on locomotives, steam fire engines, etc.

LONG automobile tours without a top to the car are fraught with discomfort and an excess of moisture in many cases, especially if ladies form a portion of the party. But under certain conditions of rough going a top becomes an unmitigated nuisance, what with rattling, broken bows, buckling and numerous other shortcomings. To minimize these troubles the Auto Specialties Mfg. Company, 812 Unity Building, Chicago, has patented the Bair Auto Top Holders (H), a device which will obviate jarring, chafing, jolting, rattling, broken bows and all the minor ills to which the average automobile top is prone, besides doing away with all straps and buckles.

AUXILIARY ignition work, if it is to be relied upon, demands that the battery which is to furnish the electrical energy be of the kind that will remain inactive for even months at a time, and when the critical moment comes it must be ready for instant use. If a storage battery is selected several matters of importance must be considered, among which the question of sulphation is not the least. If a battery is not properly designed and constructed it will self-discharge, and in the process a condition of persistent sulphation will set up, which not only defeats the proper working of the battery at the right time, but it so affects the structure that it will scarcely be worth recharging with a view to future work. In this and many other particulars it was the idea of the Witherbee Igniter Company, Springfield, Mass., to so manufacture its ignition batteries that they will do the very work for which they are intended. A "Witherbee" is here offered as Fig. I; it is a portable six-volt battery of convenient form, which, when it is taken away to be charged, is easy to handle.



G—Chelsea Auto Clock; H—Bair Auto Top Holder; I—Witherbee Igniter; J—Hopewell Lamp Covers; K—Carborundum Compound; L—Castle Electric Lamp.

AUTOMOBILE lamps are a sufficiently expensive accessory to warrant the best of protection for their polished surfaces against the attacks of the weather and the mud and silt of the streets and roads. Careful owners and the manufacturers of access-ries have met on common ground in this particular, with the result that many clumsily fitted lamp covers have been evolved which, while they perform their task of protection in a satisfactory manner, are so crude in appearance that they strike a discordant note in the outfitting of many an otherwise perfectly equipped car. To remedy this defect the Hopewell Brothers, of Newton, Mass., have devised and are marketing a line of Perfect-Fitting Lamp Covers (J) of various sizes, made of the best quality of fleece-lined rubber cloth. The Kinder Tire Covers, in enameled duck are also a product of this firm. They are fastened at the end, and with but five buttons.

IN GRINDING down a worn valve an element of primary importance is the possession of a reliable and ready-at-hand grinding compound—one which will cut very fast and very clean and insure a positively true contact seat. The machinist who relies upon his own skill in producing such a mixture often fails to attain the maximum of efficiency, either too much grease or an excess of carborundum powder marring the accuracy of his work. The Carborundum Valve-Grinding Compound (K), made by the Carborundum Company, of Niagara Falls, relieves the machinist of all worry over the preparation of an efficient grinding material. That company puts up its compound in two collapsible tubes, one containing coarse mixture for rough grinding, the other fine mixture for finishing. A package of carborundum cloth strips for cleaning carbonized matter from contact or vibrator points goes with each outfit.

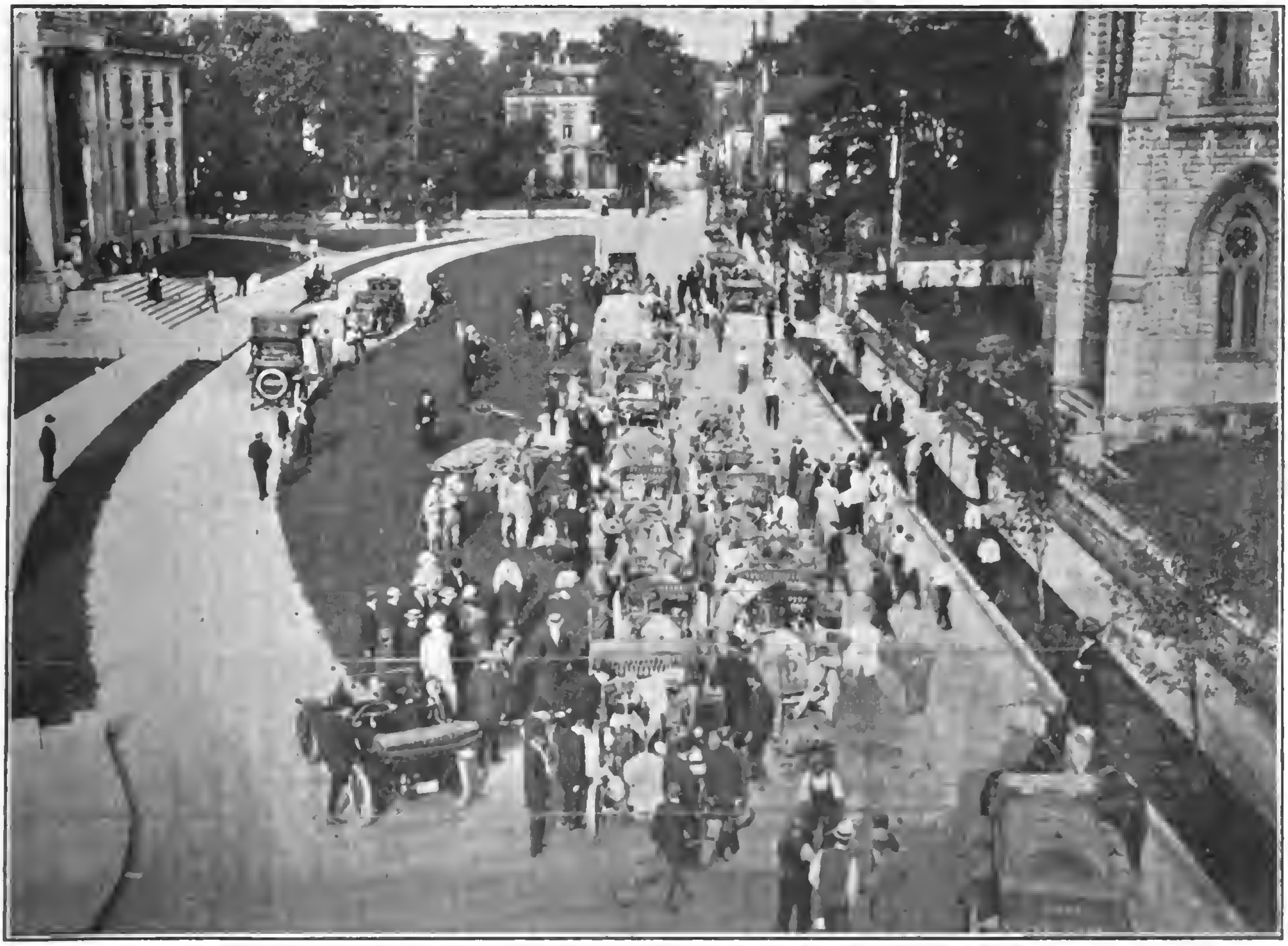
THERE IS something about an electric automobile lamp which appeals to the motorist who desires up-to-the-minute equipment on his high-priced car. There is a market for such a lamp if the danger of short-circuiting be eliminated and the bulb wires so placed as to be easily get-at-able in the event of breakage or needed repairs. Such a lamp has been devised by the Castle Lamp Company, of Amesbury, Mass. It is called the Model 100-E Electric Side Lamp (L), and possesses all the most recent improvements which make for ease and quickness of renewal and repair. The style shown is made of extra-heavy gauge brass, has new-style, extra triple-plated 4¾ x 4¾-inch reflectors of French plate thickness, with a large, red jewel in the rear.

THE AUTOMOBILE

Nine Days of Glidden Besmirched Records

SHEFFIELD, ALA., June 16—To-day's run of 119.7 miles was the shortest in the tour. In crossing the numerous fords several contestants swung rubber aprons over the radiators to prevent water splashing inside, but there was no use for such precautions. This act on the part of many provoked considerable discussion as to whether such was permissible or not and the referee waived all penalties as might have been imposed for such work. In spite of the shortness of the day's run and the comparative ease of the roads, penalties were imposed as follows: Chicago trophy class—No. 100 Moline, 9 points for oiling spring shackles in the noon control. No. 105 Parry, 12 points for fastening up a muffler. No. 108 Cartercar, 2 points for a temporary repair of the clutch pedal, and No. 111 Westcott, 2 points for working on a loose seat.

MEMPHIS, TENN., June 17—Never before in a Glidden tour has there been so strenuous a trip as to-day's 162 miles from Sheffield to Memphis. The route to Corinth, the noon control, 62 miles, offered the worst possible roads imaginable—the merest trails along the sides of hills covered with underbrush or across bog holes in the swamps. Over such an impossible course the cars traveled on 18- and 20-mile-an-hour schedules. As a result eleven contesting cars were late at Corinth, leaving only four that checked in there on time, these four being No. 1 Premier, No. 5 Chalmers, No. 9 Parry and No. 7 Maxwell. The others were late from one hour to over two hours. For over 50 miles the roads were horrible and literally took the heart



HOW THE CONTESTING AUTOMOBILES WERE NESTED AT THE CONTROL AT LOUISVILLE and patience out of the well-nigh exhausted car crews.

Among the Glidden contestants No. 2 Premier received 121 points for late arrival at control and 4 points for adjusting the igniters in its make-and-break system of ignition. No. 3 Chalmers received all told 162 technical penalties for such work as tightening terminals, putting on a new water line gasket, work on the steering gear, using a new spark plug and other minor difficulties. No. 4 Chalmers, driven by Joe Matson, received 89 points for losing his muffler and trying to replace it, and other car work. No. 6 Cole lost 3 points in adjusting brakes. No. 10 Glide had 29 points for lateness. No. 11 Ohio lost 11 points on technical matters and 54 on time. No. 14 Pennsylvania 6 was withdrawn during the day and received its total of 1,000 points for this withdrawal, but previous thereto had been charged with 338 points on technical matters, including as they did work on the muffler, straightening a steering arm, adding a new muffler pipe and performing other minor work. No. 15 Cino was 54 minutes late at the noon control, exclusive of the 3-minute time allowance.

In the Chicago trophy division every car contesting received a penalty for being late and three of them received technical penalties. No. 100 Moline was given 3 points for lateness, but had a clean technical score. No. 101 Moline received 6 points for filling the radiator outside of controls and 44 points for being late. No. 102 Moline was clean technically, but was taxed 39 points for lateness. No. 103 Lexington was given 2 points for tightening a steering arm and 222 for lateness. No. 105 Cole was withdrawn for having burned out a crankshaft bearing caused by the oil pipe breaking when crossing the bottom lands. No. 106 Falcar was clean, but driver Van Sicklen lost 83 points on time. No. 111 Westcott was also clean technically, but received 142 bad marks for lateness.

The Lexington 110 was withdrawn during the day because of breaking a steering arm and not having the necessary spare parts on hand. No. 108 Cartercar was levied against to the extent of 143 points for repairing a clutch pedal, working on distance roads, and repairing the radiator support parts. Its time penalties are not known to date.

Little Rock, Ark., June 18—Although the cars checked out of Memphis this morning at 7 o'clock, it was midnight before many reached the Marion House here to-night, making in all seventeen hours on the road. This was due to two ferries that had to be crossed by all of the tourists, the first being at Helena over the Mississippi, and the second at Clarendon over the White river. In order to get the cars across the river the Helena motorists secured a large lumber barge on which all of the cars were loaded at one time and were then towed across the stream to Helena. In midstream a meeting was called on deck, Chairman Butler issuing final instructions on the *modus operandi* of the checking system at the ferry; but a long delay followed before the cars reached *terra firma* and started on.

The 63 miles from Memphis to Helena were novel in that the route lies for miles along the base of the levee used for preventing the Mississippi overflowing its banks. The going was lumpy, and as a result some of the cars suffered more or less penalization.

A—Cartercar, No. 108, between Louisville and Bowling Green
B—Chalmers-Detroit Car Stuck in the Mud
C—The Cole, No. 104, Checking Out in the Morning
D—Premier, No. 2, Crossing a Ford En Route
E—The Cino Car Making Good Time on the Road

The second stage of to-day's run, from the Mississippi to Clarendon, on the White river, was over a monotonous, flat country used largely in the cultivation of cotton and corn. The road was one of the easiest of the tour so far and the schedule was easily maintained.

At Clarendon the ferry facilities comprised two barges lashed side by side. Instead of simply carrying the cars across the river a ten-mile trip down stream was made and the cars landed in the midst of a forest through which they were run for ten miles to the village of Roe, where they were checked out at 6 o'clock for the 90-mile run to Little Rock.

The roads were straight, with wire fences on either side. The rice fields around Stuttgart were flooded with water that appeared to be some 6 inches deep, and above the surface of the water the heads of the rice plants were seen. Leaving Stuttgart the same flat country was encountered until within twenty-five miles of Little Rock, when rolling territory was invaded. This run was made after sundown by all of the tourists, the acetylene headlights and oil side lamps being seen flickering all over the country as the night slowly moved along. This was the first occasion in a Glidden tour in which a night run has been indulged in, but no difficulty was experienced in following the route.

F—Moline, No. 101, Between Bardstone and Bowling Green
G—Nashville Control—Putting the Cars Under Cover
H—Maxwell, No. 10, Between Louisville and Bowling Green
I—The Falcar, a Prominent Chicago Trophy Contender

Despite the easy going No. 2 Premier, driven by Ballinger, had to solder its gasoline tank, which cost 76 points. Besides this it was 21 minutes late at Clarendon control and lost 3 points for taking on extra gasoline at Helena, giving the total for the day at 118 points.

No. 9 Parry had its muffler almost torn off, and 4 minutes were needed to complete the repair; a fan belt was replaced and 6 more points added for tightening front wheel and tie rod bolts. The total penalty against the Parry was 20 points.

No. 11 had 114 points levied against it, caused by taking off and repairing the radiator, and after doing this once having to do it a second time. Hand in hand with the radiator difficulties was that of taking on water and oil.

In the Chicago trophy field Moline No. 101 lost 14 points for putting water in the radiator three times outside of control, adding oil once and tightening a spark plug.

No. 108 Cartercar received all told 405 points, made up as follows: 393 for replacing a broken spring and the remainder for taking on gasoline, oil and water outside of control. The small Cartercar and Cole No. 6 were withdrawn to-day.

Hot Springs, Ark., June 19—To-day's run of 53 miles from Little Rock here was unique in that it is the first time in which a Sunday was used for a run. The 191-mile trip to Texarkana over rough roads was too severe a one-day test in view of the grueling the cars have already received and it was decided to take the 53-mile run here to-day and at the same time give all hands a chance to use the hot baths.

When the final reckoning was made this afternoon it was found that several cars had received penalties, one of the most serious being No. 103 Lexington, which struck a very soft spot in the road and broke the right side member of the frame just back of the front axle. Driver Moore at once withdrew from the contest, but later to-day reconsidered his course.

The Glidden ranks suffered a couple of penalties to-day, one being No. 15 Cino, which received 16 points for tightening the hub flange bolts in the left rear wheel. No. 8 Cartercar suffered 28 points on work tightening spring clips and 13 more for late arrival. No. 11 Ohio suffered 18 points for taking on water due to a leaky radiator and also 18 points for lateness.

No. 108 Cartercar fell out with a broken rear axle when a little over 10 miles out of Little Rock and the other Cartercar No. 8 in the Glidden was late, due to helping the disabled car out of its dilemma.

Texarkana, Ark., June 20—To-day's run of 138 miles from Hot Springs to here has resulted in eliminating two of the three remaining perfect scores, and to-night there is but one car running with a perfect road score to date and that car is No. 5 Chalmers, driven by W. Bolger. The other perfect scores to pass out of existence to-day were: No. 1 Premier, driven by Ray MacNamara, and No. 7 Maxwell, driven by H. E. Walls. Others penalized were No. 2 Premier, No. 4 Chalmers, No. 8 Cartercar, No. 9 Parry, No. 11 Ohio, No. 15 Cino in the Glidden, and No. 106 Falcar, No. 101 Moline and No. 103 Lexington.

DALLAS, Tex., June 21—To-day's record run of 217 miles found No. 3 Chalmers, No. 4 Chalmers, No. 7 Maxwell, No. 15 Cino, No. 102 Moline, No. 107 Maxwell, No. 106 Falcar among the sufferers. In 1909 five had clean road scores at the finish; this looks like a no-clean-score run.

TECHNICAL STANDING OF CARS IN GLIDDEN TROPHY

No. Car.	1st	2d	3d	4th	5th	6th	7th	8th
1—Premier	0	0	0	0	0	7	0	0
2—Premier	0	0	0	4	97	0	10	0
3—Chalmera	0	20	0	162	0	0	0	18
4—Chalmera	2	6	0	89	0	0	9	6
5—Chalmers	0	0	0	0	0	0	0	0
6—Cole	75	0	3	withdrawn				
7—Maxwell	0	0	0	0	0	0	6	4
8—Cartercar	0	0	0	135	0	28	595	0
9—Parry	3	3	0	0	20	0	8	0
10—G'ide	0	0	0	0	0	0	0	0
11—Ohio	75	0	0	0	0	withdrawn		
12—Ohio	100	0	48	withdrawn				
14—Pennaylvania....	1042	0	withdrawn					
15—Cino.............	0	0	0	0	0	32	45	0

TECHNICAL STANDING OF CHICAGO TROPHY CARS

No. Car.	1st	2d	3d	4th	5th	6th	7th	8th
100—Moline	0	0	9	0	0	0	0	0
101—Moline	0	0	0	6	14	0	192	0
102—Moline	0	0	0	0	0	0	3	6
103—Lexington	0	0	0	2	0	20	842	0
104—Cole	0	0	0	0	withdrawn			
105—Parry	0	4	withdrawn					
106—Falcar	0	0	0	0	0	0	0	0
107—Maxwell	0	0	0	0	0	0	11	12
108—Cartercar	0	0	2	143	405	not reported		
109—Cartercar	46	0	104	withdrawn				
110—Lexington	4	0	0	withdrawn				
111—Westcott	0	2	0	0	0	withdrawn		

Distant Verdure Always Looks Greenest

BY MISS CORA A. MOORE

The Automobile Blue Book was utilized during an interesting path-finding trip around New York City in an attempt to show that it is not necessary to go on long tours in order to enjoy the automobile and all that it offers. The Riverdale Avenue route on the road to Yonkers leads to the autoist's best view of the Palisades. Local history (Baedeker feature of the Automobile Blue Book) was studied to good advantage.

THE majority of motorists know their long runs thoroughly enough, but they would be distinctly at a loss were they called upon to designate a round tour from New York which could be accomplished in a day's time at a comparatively easy pace, and yet afford an entrancing diversity of scenery, good accommodations and fair roads.

But there are such journeys, and the autoist may, very near home, with a little stretch of the imagination, fancy himself an intruder amid the glories of the Berkshire or Shinnecock Hills, or even of the matchless Killarney Lakes.

One of these trips whose outline may be useful or inspiring to that one-day-long auto wanderer lies out through Yonkers, either through Broadway or Riverdale avenue to Brewster. Of course, exact roads and turnings, mileages and all that information is given in the Blue Book, and the way is plentifully supplied with direction signs. At an easy rate, with a none too early start, it may be completed with two hours of daylight to spare.

While Yonkers admits that it is not so large as New York, it insists that in point of age the larger city has "nothing on" the smaller. It started its existence during the days of New Amsterdam as the manor of Colendock, the property of Patroon Van der Donck. Yonkers got its name in a strange way. Van der Donck, coming here in 1642, lived in so much fashion that his property came to be called "de jonkheer's landt"—the gentleman's land—from which the translation to Yonkers is easy.

The pride of the town is the very wonderful Colonial relic and heirloom, the Phillipse Manor House, where lived Washington's first love, Mary Phillipse. During the Revolution she was accused of treason and the house confiscated by the Government. Phillipse Manor House is still in good condition and is used by the municipal government of Yonkers as a city hall. It is credited with having been erected in 1682.

The tablet on the monument near Dobbs Ferry tells how the old house still standing there was once the headquarters of General Washington, and a little farther on is the André Monument, that marks the spot of the capture of

An Island Approach to Lake Mahopac

the unfortunate and misled British major with the evidence of treachery concealed in his boot. This strip of country was the theater of much Revolutionary history. War swirled through Westchester in those days and it was in the Livingston mansion that Washington met Rochambeau in 1781 and planned the campaign of Yorktown. In May, 1783, under this same roof, the papers were signed by which England renounced all claims to America.

Between Dobbs Ferry and Tarrytown are some of the most magnificent private estates in the country.

A Spot for Fishing Near Lake Mahopac

Tarrytown is mightily changed in less than a hundred years, but there is that charm in the atmosphere that causes us to wonder not that the good wives gave it its name because their husbands were wont to linger there on market days.

Up the hill from the town and one may look back to the left for a fine view of the Hudson, with the manufacturing plant of the Maxwell-Briscoe Motor Company looming up prominently; then on to Scarboro and Briarcliff Manor. Here the road turns along past Echo Lake, and half a dozen miles farther on the first of the chain of beautiful Crotona lakes which assuage the thirst of New York comes into view. Passing the first bridge

The Dam at the West Branch Reservoir

the road runs alongside the lake with many a turn, each of which has some charming view to offer. Through Yorktown Heights and into Amawalk the road extends, and follows for

Just Before the Good Roads Were Reached

the entire length of the Muscoot reservoir, bearing northward until the beautiful Lake Mahopac is reached.

Over the bridge at the head of the West Branch reservoir the road leads on toward Carmel, then follow Brewster and Sodom, after which Peach Lake awaits in refreshing beauty, and by its side the State road. Then comes North Salem, with its rather lugubriously named resort, "The Port of Missing Men."

From this point the way is straight south to Bedford, through New Castle Corners to Armonk. In a few minutes more and the path is running along the east side of Kensico reservoir and then, suddenly, we are away from all country things and in the midst of the very citylike bustle of White Plains.

All that remains is the spin in through Yonkers to New York. In all less than 135 miles have been covered, and there is still time to dress for dinner.

Chadwick Gathers Laurels in Baltimore Climb

BALTIMORE, MD., June 20—The big event in the Baltimore hill climb, the free-for-all on Saturday last, was carried off with flying colors by the big 90-horsepower Chadwick car, entered by the Chadwick Engineering Works and driven by Len Zengle. The ascent was made in the remarkable time of 36 seconds flat for the six-tenths of a mile, breaking last year's record of 43 1-5 seconds. It is the opinion of motorists that this performance will stand unequaled for some time to come. For taking the honors in the feature event the Chadwick car gets the handsomest of the silver cups offered by the Automobile Club of Maryland, under whose auspices the climb was held.

There were two prizes offered in this event, the other one being for the four-cylinder car that made the best showing in the contest. This prize was captured by the 60-horsepower Stearns entered by Joel G. Nassauer, chairman of the committee which had the contest in hand, and driven by Clarence L. Hahn. This car negotiated the distance in 49 1-5 seconds. It must be understood that this car did not finish second, but it received the prize under the conditions of the race, which were made so as to give the amateur performers a chance to shine as well as the big fellows. The second car in the event was a 50-horsepower Matheson, entered by the Matheson Motor Car Campany, and driven by J. A. Turner. The time was 44 seconds. The third car was another Chadwick of 60 horsepower, which completed the ascent in 46 seconds. This entry was that of W. W. Lanahan and was driven by Wilfrid Smith.

The races began promptly on scheduled time, at 2 o'clock. They were held on the Belvedere Hill, from Falls avenue to Roland avenue, the grade of which is 15 per cent. With the exception of a rough starting place, the hill was in excellent condition. The mud on Belvedere avenue, just west of the Falls road, was very heavy because of the continued rainy weather and it was necessary to lay a large quantity of cinders.

There were nine other classes besides the free-for-all race and the motorcycle event. The time made by the winning cars in these events was considered very creditable. In addition to capturing the amateur prize in the free-for-all contest, the Stearns 60-horsepower car, entered by Joel G. Nassauer, also won two other events—the Class G for cars selling for $4,001 and over and Class K for amateur drivers only in cars selling for $3,001 and over. In the former event the car was driven by Clarence L. Hahn in 50 3-5 seconds, while in the amateur event Mr. Nassauer drove his car up the hill in 51 4-5 seconds.

Matheson cars were also conspicuous as winners, carrying off three of the events scheduled. In Class E and Class H the 50-horsepower Matheson car, entered by Edgar F. Dobson and driven by himself, was the winner. The former event was for cars selling for $2,001 to $3,000, while the Class H event was for amateur drivers only in cars selling for $3,000 and under. Mr. Dobson's time in the Class E event was 49 1-5 seconds, while in the amateur contest his time was 48 3-5 seconds. The other Matheson car to carry off the honors was in Class F for cars selling for $3,001 to $4,000. This car was driven by Guy Reynolds and entered by the Matheson Motor Car Company. The time was 47 seconds.

The 30- and 40-horsepower Buick cars entered by the Auto Outing Company won the Class C and Class D events. The former was for cars selling for $1,201 to $1,600 and the latter for cars selling for $1,601 to $2,000. In the Class C event the Buick. driven by G. B. Hall, made the climb in 57 1-5 seconds, while in Class D the Buick's time was 56 seconds flat. Charles Jenkins drove the car in this event.

Howard Bauer, in a 30-horsepower Oakland, entered by the Oakland Motor Car Company, was the winner in Class B for cars selling from $801 to $1,200. The time was 1.01. The opening event was taken by the Hupmobile entered by Little Joe's Auto Exchange and driven by T. Wilson Simpson. The little car made the distance in 1.21 1-2. The undertaking was conducted with the greatest care and praise was meted out freely by the contestants and the patrons of the event, who gathered in force at points of vantage.

Those in charge of the meeting were: Hill climb committee, J. G. Nassauer (chairman), H. M. Luzius and F. H. Hack, Jr.; referee and representative of A. A. A., Dr. H. M. Rowe; judges, C. Howard Milliken, Osborne I. Yellott and James Stone Reese; timers, Dixon C. Walker, Harry Weiler, F. S. Bliven and J. M. Zamoiski; technical committee, E. W. Orr, J. M. White and Lee Trembley; clerk of course, Thomas G. Young; starter, Howard A. French; assistant starter, Frank Olmstead; scorer, Thomas E. Brian; announcer, Harry E. Mayer. The summaries:

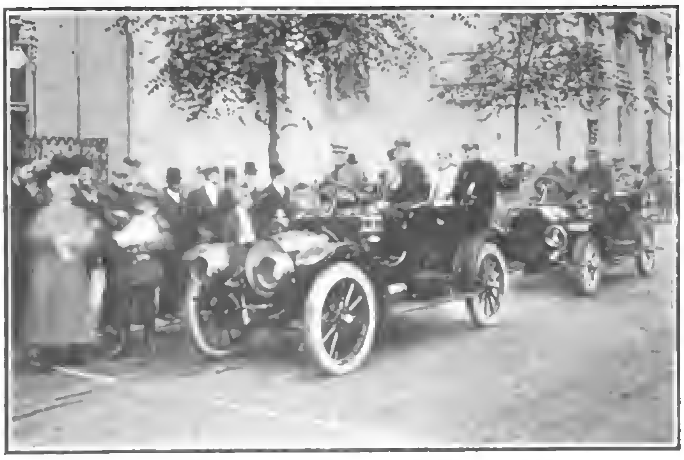
No.	Car.	H. P.	Driver.	Time.
Class A—$800 and under—				
1.	Hupmobile	20	T. W. Simpson	1.21 1-2
2.	Hupmobile	20	Nat Tuttle	1.43 1-2
Class B—$801 to $1,200—				
1.	Oakland	30	Howard Bauer	1.01
2.	Warren-Detroit	30	Harry Reis	1.06 1-2
3.	Ford	20	A. M. Eastwick	1.08 3-4
Class C—$1,201 to $1,600—				
1.	Buick	30	G. B. Hall	0.57 1-5
2.	E-M-F	30	M. C. Jones	1.05 1-2
3.	Crawford	28	A. A. Miller	1.07
Class D—$1,601 to $2,000—				
1.	Buick	40	Chas. Jenkins	0.56
2.	Oakland	30	Howard Bauer	0.56 1-2
3.	Buick	30	Geo. Jenkins	1.02
Class E—$2,001 to $3,000—				
1.	Matheson	50	E. F. Dobson	0.49 1-5
2.	Chalmers-Detroit	40	Jos. F. Janin	0.58 2-5
3.	Oldsmobile Special	40	C. R. Meisner	1.13 2-5
Class F—$3,001 to $4,000—				
1.	Matheson	50	Guy Reynolds	0.47
2.	Knox	40	John Goodwin	0.58 1-5
Class G—$4,001 and over—				
1.	Stearns	60	C. L. Hahn	0.50 3-5
2.	Chadwick	60	J. R. Dungan	0.52
Class H—Amateurs, $3,000 and under—				
1.	Matheson	50	E. F. Dobson	0.48 3-5
2.	Chalmers-Detroit	40	Harry Reis	0.56 1-5
3.	Crawford	28	Wm. Delon	1.03 2-5
Class K—Amateurs, $3,001 and over—				
1.	Stearns	60	J. G. Nassauer	0.51 4-5
2.	Chadwick	60	W. W. Lanahan	0.52
3.	Stearns	60	S. A. Nattans	1.28
Class L—Free-for-all—				
1.	Chadwick	90	Len Zengle	0.36
2.	Matheson	50	J. A. Turner	0.44
3.	Chadwick	60	Wilfrid Smith	0.46

Eleven Perfect-Score Cars in New Jersey Run

NEWARK, N. J., June 20—Under extraordinary conditions of road and weather, nineteen out of the total list of thirty-four starters in the annual endurance run of the New Jersey Automobile and Motor Club finished the full course Saturday. The distance was 290.6 miles—twice around a measured course of 145.3 miles. In perfect weather the run would prove difficult enough on account of its unusual length and stiff hills, but after a long series of rainstorms, which rendered the crowned roads perilous in places and the hills well-nigh unnegotiable, a cloudburst, tornado and a pelting hailstorm added just the touch necessary to make the trip answer to Sherman's definition of "War."

The blow fell during the first half of the second round, when most of the cars were in the vicinity of Green Pond Mountain, as difficult a bit of hill climbing as there is in this part of the country. Suddenly the black clouds emptied themselves and thousands of tons of icy pellets, propelled on the wings of a 60-mile wind, whistled about the heads of the contestants like the projectiles from a battery of machine guns.

Some of the cars had succumbed during the first round, but it was the hail that caused the vast bulk of the trouble. It put out a whole platoon of automobiles and left them standing at various points in the hills while their crews sought shelter in the mud and water under the cars.



Carlough's Perfect-Score Franklin at the Start

Eleven cars completed the run under these conditions with perfect scores and checked in on the minute in the presence of a vast crowd that lined the last mile of the course and surrounded the clubhouse in Newark. There would have been one more clean score if a series of street cars had not blocked Buick, No. 17,

Baby Maxwell on Road Between Dover and Bloomfield

about 200 yards from the finishing line, as the car was but 1 minute 52 seconds late.

The higher class runabouts made the best showing with four perfect scores and only two absentees at the finish.

There was a large amount of tire trouble all along the route and the tremendous grades and the mud brought on considerable carbureter difficulty and heating of the motors.

The course was from the Newark headquarters of the club, north to Newfoundland, west to Hackettstown, south to Flemington and east to Newark. The start was at 5 o'clock in the morning, and the finish at 8 o'clock at night.

The event was conducted under the direction of the contest committee, of which H. A. Bonnell, assistant general manager of the A. L. A. M., was chairman. Associated with Mr. Bonnell were A. B. Le Massena, secretary of the club,, F. C. J. Wiss, De Witt C. Reynolds and B. F. Hurd. The referee was Jacob Haussling. There was no technical examination of the cars after the finish, as under the conditions of the race the awards were made upon the showing of the cars on the road. The observers were drawn largely from the ranks of college students, but as the penalized cars did not finish in considerable numbers, their work was not heavy. The New Jersey laws prohibiting the use of

Humphreville's Hudson near Morristown

chains on some of the roads, while allowing them on other parts of the course, puzzled some of the drivers and injected an element of uncertainty in attempts to pass some of the cars on steep grades. The Simplex tore down a section of fence on the first round, but neither car nor crew suffered injury. Aside from that accidents were rare.

The course did not pass by directly the new country headquarters of the club near Butler. Work is being pushed on the additions to the splendid buildings and by next Saturday it is believed that the place will be ready for occupancy.

The tabular score of the run is as follows:

No.	Car.	H. P.	Entrant.	Score.
Class A—Touring cars listed at under $1,600				
34	Cadillac	30	I. M. Uppercu	Perfect
20	E-M-F	30	G. F. Eveland	Did not finish
26	Mitchell	30	F. L. C. Martin	Did not finish
32	Regal	30	E. S. Hilton	Stripped gear, did not fin.
Class B—Touring cars listed at $1,600 and over—				
15	Franklin	28	E. D. Carlough	Perfect
19	Buick	30	J. C. Bell	Perfect
28	Buick	30	James W. Ward	Perfect
17	Buick	30	J. C. Bell	2-points; late at finish.
9	Am. Simplex	50	H. F. Seibert	3-points; stalled motor
36	Packard	30	A. Hollendar	Disqualified; early at fin.
8	Auburn	32	J. J. Meyer	Withdrew after 1st round
11	Haynes	30	E. H. Paddock	Did not finish
18	Buick	30	J. C. Bell	Did not finish
21	Fiat	25	Philip Hilton	Did not finish
25	Selden	35	P. L. Munford	Did not finish
38	Johnson	30	Carl F. Johnson	Did not finish
Class C—Roadsters listed at under $1,200—				
24	Hudson	25	A. H. Humphreville	Perfect
27	Hupmobile	20	F. L. C. Martin	Perfect
29	Ford	20	L. J. Wycoff	Perfect
4	Maxwell	22	J. W. Mason	7-points; motor stops
5	Maxwell	14	J. W. Mason	15-points; motor stops
30	Hupmobile	20	F. L. C. Martin	Broke wheel at start
31	Overland	25	W. F. Ackor	Did not finish
33	Hupmobile	20	F. L. C. Martin	Did not finish
Class D—Roadsters listed at $1,200 and over—				
6	Maxwell	30	J. W. Mason	Perfect
10	Haynes	40	W. E. Shuttleworth	Perfect
22	Jackson	50	F. L. Kramer	Perfect
23	Columbia	29	W. J. Tynan	Perfect
14	Franklin	42	E. D. Carlough	1-point; stalled motor
35	Cadillac	30	I. M. Uppercu	3-points; motor stops
7	Overland	40	George L. Riess	70-points; lateness
3	Mercer	30	R. A. Greene	Finished after limit
37	Chalmers	30	Frank J. Radel	Did not finish
39	Haynes	30	James D. Rourke	Did not finish

Quaker City Summer Meet Marred by Storm

PHILADELPHIA, June 20—Rain put a stop to the fourth annual Summer race meet of the Quaker City Motor Club, at Point Breeze track, Saturday afternoon. E. R. Bergdoll in a Benz and Ralph De Palma in a Fiat were having a battle royal for the honors in the fifty-mile race, with the latter about 10 seconds in the lead, and the field strung along for miles behind, when the storm, which had been threatening for half an hour, came down upon the track. It wasn't an ordinary rainstorm; it was a cloudburst, with hail on the side, and in a minute the red flag was wig-wagging the contestants to shelter. Thirty miles had been covered when the race was stopped, and as De Palma had a fifty-yard advantage over Bergdoll when the race was called off, the officials awarded him first money.

When the storm loomed up in the west there were still two events to run off—the twenty-five mile and the fifty-mile. It was decided to start the latter, as the field was rather large, it was the big race of the day, and it was thought that there would be sufficient time to finish it. Two Klines, a Buick, a Chalmers-Detroit and a Jackson were the other starters. The twenty-five mile event was not run.

Bergdoll was the star of the meet. The local millionaire brewer had his Benz going fine, and he easily annexed the five and ten-mile events for amateurs, besides finishing second in the fifty-mile free-for-all. Scoot Miller won one of the five-mile events for smaller cars in his Warren-Detroit, the other going to the Otto, driven by G. Jones. The times were slow throughout, the only record broken being the track figures for five miles, De Palma clipping 1 3-5 seconds off the previous best of 5.14 3-5. One event which proved amusing, even if not exciting, was the mile "nearest to three minutes" race. There were thirty entries, and the contest resembled a funeral procession, and an exceedingly slow one at that. Gordon Dyer, in his Selden, was the best guesser of the bunch, landing his car under the wire in 3.00 2-5.

A pursuit race with four entries was won by Burns' Autocar, after which came the big race—and the deluge, which set the 15,000 in attendance scampering like mad for shelter.

Start of the Fifty-Mile Event, Which Was Stopped by the Storm

The Quakers are much gratified over the announcement of the early granting of the sanction for the third annual renewal of their Fairmount Park classic, which is scheduled for Saturday, October 8. The mayor and city councils are much interested in the race, it having been borne in upon them that an event which can entertain a half million people for half a day has something in it of advertising value for the city which many other happenings upon which the municipality spends money do not possess.

An ordinance has been introduced into councils to appropriate a sum of money to add to the prize list and thus insure a representative entry list. The number of inquiries at this early date is an indication that these makers are beginning to recognize the claim of the Q. C. M. C. Contest Committee that the Fairmount Park race has become the big long-distance event of the year. The summaries:

Five miles, amateur—Division 1-C—

Car.	Driver.	Time.
1. Benz	E. R. Bergdoll	6.01 4-5
2. Alco	W. C. Longstreth	
3. Kline Kar	Harvey Ringler	

Five miles—Division 2-C—

1. Warren-Detroit	Scoot Miller	5.55
2. Schacht	Jas. H. Gray	
3. Black Crow	James Blind	

Five miles—Division 3-C—

1. Otto	George Jones	6.04
2. Mercer	W. Oliver	
3. Pullman	J. Adee	

Ten miles, amateur—Division 4-C—

1. Benz	E. R. Bergdoll	11.42 4-5
2. Buick	Bardsley	
3. Chalmers	Richards	

One mile, free-for-all, nearest 3 minutes—

1. Selden	Gordon Dyer	3.00 2-5
2. Alco	W. C. Longstreth	

***Fifty miles, free-for-all—**

1. Fiat	Ralph De Palma	39.59
2. Benz	E. R. Bergdoll.	

Trial for five-mile track record—

1. Fiat	Ralph De Palma	5.13
2. Former record		5.14 2-5

*Race stopped at completion of thirty miles.

Georgia-Florida Good Roads Boost


The large illustration shows a sample of the roads the tourists found between Savannah and Jacksonville. The figures in the right lower corner are: A. J. Salinas, president of the Augusta Cotton Exchange; C. B. Garrett, president Augusta Automobile Club; Judge A. B. Moore, chairman Chatham County Board of Commissioners; F. C. Battey, president Savannah Automobile Club, and Judge Oliver T. Bacon—a bunch of "Good Roads Boosters."

SAVANNAH, GA., June 20—The recent convention of the Georgia Good Roads Federation and dual endurance run from Augusta and Jacksonville to this city was a pronounced success. The Augusta contingent, consisting of sixteen cars, was met nine miles out by half a hundred cars from the Savannah Automobile Club and escorted into the city. En route the travelers, after an early morning start, stopped for breakfast at Millen, where they were the guests of Mayor Daniel and the City Council.

From Millen the party continued until Statesboro was reached, where dinner was ready and served. The roads between these two cities were in poor shape. A delegation of good roadsters picked up at Millen included E. E. Chance, chairman of the County Commissioners; J. P. Palmer, superintendent of roads; J. L. Boyd, one of the County Commissioners, and G. F. Storey.

On reaching Savannah a parade was formed and something like ten thousand people watched the cars as they rolled down the beautiful Main street of Savannah and around part of the Grand Prize race course to the yacht club, where a big luncheon awaited them.

But twelve cars made the two-day trip from Jacksonville to this city. The reason given is because one of the largest and hottest elections ever held in the State was on. The start was made early in the morning and the cars traveled over the same course as that of the Savannah Automobile Club during the month of April. The night stop was made at Brunswick.

Between three and four hundred were in attendance at the third meeting of the Georgia Federation of Good Roads Authorities, of which the two runs were a feature. Besides delegates from each county in the State there were several representatives from several counties in Florida and South Carolina. The following officers were elected: President, William F. Eve, of Augusta; secretary, J. C. Harper, Augusta; vice-president, W. H. Moore, Statesboro; N. F. Tift, Albany; F. Sheffield, Sumter County; R. H. Drake, of Griffin; W. M. Gammon, of Rome; W. S. Holma, of Athens. Albany was selected as the 1911 convention city.

Speeches were made by Mayor Tiedeman, who welcomed the visitors and extended them the freedom of Savannah; Judge William F. Eve, of Augusta; J. E. Pennybacker, expert from road department of the Department of Agriculture; F. H. Opper, an expert on road material; Prof. C. H. Strahan, of the Engineering Department of the University of Georgia, Athens; Frank F. Battey, of the Savannah Automobile Club, and Judge W. M. Gammon, of Rome.

After the convention the visitors were taken out to several of the county farms and shown how work progressed here with the convicts. At several of these places lunch was served and a trip around the twenty-five miles of the famous Grand Prize race course was taken. After this a trip was made to the Casino at Thunderbolt, where a banquet and speechmaking were in order.

The following cars made the trip from Jacksonville and Augusta:

Car	H.P.	Entrant	Driver
JACKSONVILLE TO SAVANNAH			
Oldsmobile	40	Hugh Barnes	Hugh Barnes
Ford	20	L. C. Oliver	L. C. Oliver
Ford	20	H. B. Race	H. B. Race
Overland	30	Jax. Motor Co.	E. Roberts
Buick	40	H. C. Hare	H. C. Hare
Cadillac	30	O. S. Albeltton	O. S. Albeltton
Cadillac	30	P. A. Holt	J. T. Gore
Cadillac	30	F. J. Hyde, Jr.	F. J. Hyde, Jr.
Cadillac	30	Geo. F. Bensel	Geo. F. Bensel
Oldsmobile	40	M. D. Johnson	M. D. Johnson
Oldsmobile	40	D. H. McMillan	Miss B. McMillan
Hudson	20	F. M. Phillip	B. A. Coleman
AUGUSTA TO SAVANNAH			
Rambler	45	C. B. Garrett	C. B. Garrett
Hupmobile	16	F. A. Wolfe	F. A. Wolfe
Brush	..	G. Speth	G. Speth
Ford	18	G. S. Lombard	R. Anderson
Ford	18	J. F. Doyle	J. F. Doyle
Pullman	30	B. S. Dunbar	B. S. Dunbar
Buick	30	A. Brill	A. Brill
Haynes	30	J. Cullum	J. Cullum
Haynes	30	R. Perkins	R. Perkins
Hupmobile	16	T. C. Vason	T. C. Vason
Elmore	36	M. Walton	M. Walton
Overland	30	J. A. Gaston	J. A. Gaston
Franklin	..	H. H. Alexander	H. H. Alexander
Ford	18	E. E. Chance	E. E. Chance
Maxwell	30	Speth Bros.	J. O. Applenhite
Falcar	35	F. Perroux	F. Perroux

Testing Steel—For Impact, Bending, Etc.*

(First Installment)

> **This paper presents, in a most capable way, an exposé of the methods employed and conclusions reached in two previous papers on this subject. In the two earlier papers it is pointed out that, while notched-bar testing has its value, it also has the hidden misfortune of casting reflections on good material. The authors employ some of the latest methods of determining the values they set out to fix, and the paper presents an exhaustive treatise on the subject from the several points of view.**

INTRODUCTORY—The general impression conveyed by the two papers† on Impact Testing of Steel, read in November, 1908, before this institution by Dr. Stanton and by Mr. Harbord,** was that, with notched test-pieces broken at one blow, the results were too erratic to be of real practical value except in special cases. This was contested at the time and there were some expressions of opinion that tensile-impact tests, on unnotched bars, were in many ways preferable; it appeared, therefore, desirable to examine the matter more in detail. It is undoubted that a notched-bar impact test will discover any inferior material, for in this case all the impact figures will be low. But it is also quite possible that good material may be condemned when only a single test is made, should it happen that this test-piece gave an abnormally low result. To take the average of a large number of test-pieces is not satisfactory, because the element of doubt remains whether the disparities are due to want of uniformity in the material itself or to errors in the measurements. The view, as expressed in those two papers, would appear to be that the measurements were at fault, but there is other evidence that the microstructure of the material is in reality the main cause.‡ It is to be observed that in a notched bar, ruptured at one blow by cross-breaking, it is the material at the bottom of the notch that has to bear the brunt of the impact, and it has not time to receive support from the bulk of the material. Should the microstructure, or it may be the macrostructure, at the bottom of the notch be weak, a low impact figure will be obtained. In actual use in a piece of mechanism, however, where anything in the nature of a notch is avoided so far as the design will admit, the contiguous portions of the material assist each other, and therefore weaknesses of the order of magnitude of the microstructure or even of the macrostructure are more or less obliterated by the stronger portions.

Following this argument, it would appear that, for an impact test to be of practical value, it ought to bring the whole of the material, in the cross-section under observation, simultaneously under the influence of the impact stress. A one-blow tensile-impact test on an unnotched test-piece fulfills this condition, and it is to be observed that M. Pierre Breuil, after collating a large number of the published results of various methods of impact testing and adding thereto many of his own, has come to the same conclusion.§

In the discussion on Dr. Stanton's and Mr. Harbord's papers Mr. Bertram Blount referred to a tensile-impact testing machine devised with the assistance of Mr. Hurry —to whom the idea was largely due—and an abstract of some of the preliminary results were given. It was decided to continue these experiments on a larger and more comprehensive scale and compare the results obtained with the usual static tensile tests.

On reviewing the matter, however, it was thought that the height of drop available, namely 6 feet, with this machine was insufficient, and that therefore the machine should be re-designed so as to admit of a drop of about 30 or even 40 feet, so as to obtain a striking velocity of 40 to 50 feet per second. By the foresight of the late Mr. David Kirkaldy, trap doors had been provided on the various floors of his testing works to accommodate a falling-weight apparatus, and owing to the facilities thus afforded the new machine was readily installed on the removal of the original one.

The new apparatus was designed upon the following principles, as distinct from the previous apparatus. The fall was to be a free fall, entirely independent of any sliding upon guides. The specimen was to move with the weight so as to avoid the complications arising when a tup is allowed to fall upon a stationary cradle, wherein the specimen is held, as the effects of inertia have then to be allowed for.

The machine being of the one-blow type, the only energy measurement required was the determination of the energy

* Paper read before the Institution of Mechanical Engineers (Great Britain) May 27, 1910. Presented by Bertram Blount, W. G. Kirkaldy, Member, and Capt H. Riall Sankey, R.E. (ret.), Member of Council.

† "The Resistance of Materials to Impact," by Dr. T. E. Stanton, D.Sc., and Mr. L. Bairstow. Proceedings 1908, Part 4, page 889.

** "Different Methods of Impact-Testing on Notched Bars," by Mr. F. W. Harbord. Proceedings 1908, Part 4, page 921.

‡ Proceedings, 1904, pages 1251 and 1254.

§ "Revue de Mécanique," 1908, page 537.

remaining in the tup immediately after rupture of the specimen. There are many ways of measuring this energy, such as receiving the tup upon a spring and observing the amount by which the spring is shortened, or compressing air in a cylinder and determining the increase of pressure.

The former method has been adopted in similar impact-tensile machines, and the latter appeared promising, but after much discussion it was decided, at the suggestion of Mr. W. J. Marshall, A.I.Mech.E., to measure the actual velocity of the tup just after the moment of fracture of the test-piece, by observing the time-interval between the breaking of electric contacts at known distances apart. It is, of course, easy to deduce the energy remaining in the tup after fracture so soon as this velocity is known. The actual apparatus will be described later.

In order that these impact tests should have as great a practical value as possible they were made with a considerable number of the types of steels used in mechanical engineering. The original machine was designed to break test-pieces 1-4-inch diameter, and this diameter had been adopted and all the test-pieces machined accordingly before the new machine was designed. It was, however, decided later to make another series of tests with specimens 0.357-inch diameter to take advantage of the greater capacity of the new machine; the effective length for extension was 2 inches. The ordinary tensile tests were carried out, not only with test-pieces of standard size, but also with smaller test-pieces of the same size as the impact-tensile test-pieces, namely, 0.357-inch diameter. A full chemical analysis was also made. In this way it was possible to establish a comparison of the tensile impact tests with the usual methods of determining the characteristics of steel. A further comparison was also established by making a series of tests with a repeated-bending machine of the type described by Captain Sankey in the discussion on Mr. Harbord's paper, and on which further particulars are given later.

In every case the material was tested exactly as received from the manufacturers; that is to say, in the condition in which it would be actually sent out for use. It is considered that this is a matter of great importance because the mechanical characteristics of steel are affected by heat and other treatments.

Types of Steel Tested.—The authors gratefully acknowledge that, by the intermediary of the secretary of the Engineering Standards Committee, a number of makers were good enough to supply the various types of steel tested in accordance with the British Standard specification of each type; with one exception, however, namely the steel suitable for motor-car crankshafts, etc., which was purchased.

Refinements in Point of Detail for 1911

ONE of the principal causes of accidents to automobile drivers and owners is due to starting with the gears in mesh, someone having possibly meddled with the levers, placing one of them in mesh while the owner or driver was away. A lock which would dispense with this trouble would also reduce the number of cars stolen, for if it would prevent shifting of the levers, it would render the car inoperative.

A lock of this character has been designed and placed on the market by a Detroit concern, the Autö Sure Lock Company, which has not alone these salient points of merit, but also is simple and very low in price.

This device is called the Sure Lock, and although the first one to be brought out was designed for Cadillac cars, and especially fits that make, the lock is suitable for any make of car having a similar gear-shifting quadrant. Others are being brought out for other makes of cars, having a different quadrant. Such is the merit of the little device that the Cadillac Motor Car Company has taken it up and listed it in their catalogues as an extra.

The device consists of a brass plug, with a lock attached to the upper end by a strong chain, while the lower end of the plug carries a lug or ear with a hole for the lock to go through. The padlock is of the Corbin make, and two keys are supplied. In size, the whole thing is small enough to be conveniently carried in the side pocket of one's coat.


Fig. 1—Showing application of lock to the side lever which makes the car thief-proof

In the upper end of the plug there is milled a notch, just the size of the hand lever at the level of the top of the quadrant. One of the sides of the plug carries down in a long extension, which is both wide and thick—so wide and thick, in fact, as to take up the space in the shifting fork that the hand lever takes up when shifted over, making it possible to shift the lever to that side. Similarily the hand lever might be shifted over to the other side, but the long extension would then come directly in line with the stationary bars of the quadrant, and thus prevent any forward or backward motion. The hand lever is thus to all intents and purposes not movable, without unlocking the padlock, removing it, and then removing the brass plug. The latter may not be removed without unlocking the padlock, on account of the size and shape of both the shifting fork and the extension of the brass plug, designed for this purpose.


Fig. 2—The lock and the parts that go with it before applied to the side lever

While probably not appealing to people of small towns and the country, this device is practically a necessity for city use, and by reason of its low price and inherent simplicity, should soon have a great vogue there. The peace of mind and protection of knowing that one's car is perfectly safe, through a thoroughly good preventive device rather than something on the cure-afterward order, should make for wide sales. As stated, the company is working on a number of other models, and soon one will he able to secure a Sure Lock for any make of car.

1911 Ideas for Preventing the Growth of Noise

The question of how long an automobile will last has received some attention at the hands of users, and to some extent the purchasing of successive models year after year has been due to the fact that while the old automobiles were capable of running, they nevertheless offered food for serious reflection because they became noisy. This together with the rate of speed at which bodies went out of style represent the two serious matters which will have to be dealt with in the long run, but it is gratifying to note that the progressive makers of cars are not awaiting the decision of the buying public. Fig. 4 is offered to illustrate the new trend. This is taken from the new "Silent Six" Matheson, and shows grease cups G1 and G2 in a get-at-able position outside of the chassis frame. These cups feed grease to the bearings of the shafts which support the clutch and brake pedals. In the earlier types of automobiles, designers labored under the impression that the bearings of parts which did not rotate were not entitled to their serious consideration. They are slowly learnning, however, that there is something more than the mere question of the incidental operation of an automobile. The considerable number of small bearings scattered around the chassis, even though they may not have to withstand the rack due to rotation and high pressure, do, nevertheless, become the sources of unbearable noise unless the bearings are sealed by grease so that dust cannot enter, and serve as an abrasive substance introducing excessive "shake" and its companion, noise. It takes quite a numher of these grease cups to properly care for all the non-rotating small bearings in a car, but it is almost a waste of time and cost to introduce them, unless care is exercised to so locate them that an autoist, even though he may not be familiar with the inner intricacies of the mechanism, will be able to ohserve by a superficial inspection that they are present, in which event his good sense will permit him to inquire as to the reason for their presence, and if they are accessible, he will be inclined to give them the care and attention which are in keeping with the great importance of this part of the automobile subject.

Fig. 3—Illustrating the method of applying the parts in assembling

Fig. 4—Part of the Matheson "Silent Six" showing an application of grease cups

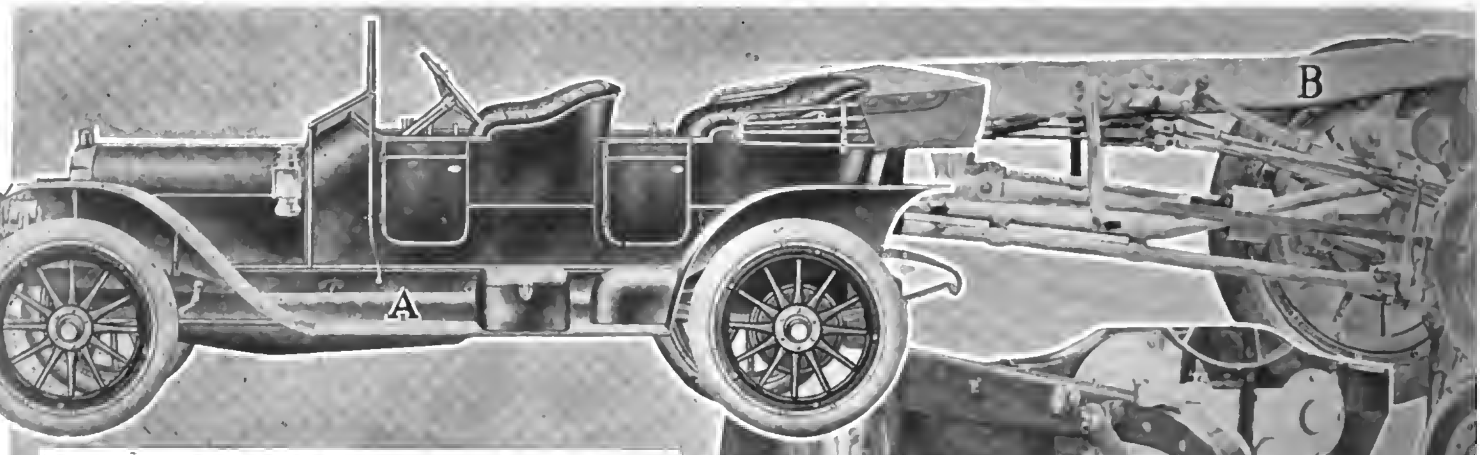
To the autoist who wishes to get good service out of his car, without having to pay too much by way of cost of maintenance, it is not too much to state that empty grease cups offer no possible advantage: it is necessary to keep them constantly filled with grease.

Knox Comes Out with 1911 Models

THE discontinuance by leading firms of American automobile makers of the custom of turning out yearly models is an indication that the industry is approaching that acme of perfection in design and construction which is the goal of all who strive to excel. The Knox Automobile Company, of Springfield, Mass., for instance, has approached so near perfection in general construction that it has decided to abandon yearly models, preferring to incorporate and put on its cars any slight changes or meritorious features as soon as they have been approved by the experimental and testing departments. This innovation will doubtless prove of decided benefit to Knox owners, agents and customers, present and future, as it insures a continuance of the general features of the various models for years to come. In Knox cars, indeed, are incorporated the same general construction features that have been so pronounced since the introduction of the water-cooled types in 1907. The original ideas have been developed entirely in the engineering department, under the supervision of Herman G. Farr. The steady advancement of the Knox product is due to conservatism in working out details of construction and careful consideration of even the slightest changes before they are adopted.

Torpedo fronts will he a feature of 1911 Knox body types except the closed cars, all bodies being made from steel and aluminum over wood frames and designed and built in the company's body works. They include five- and seven-passenger touring cars with torpedo-type front, five-passenger tonneauettes, raceabouts and regular torpedo types, all made with flush sides, except that the touring car tonneaus widen out back of the rear doors, as do also the tonneauettes, the tonneaus of which are made detachable. The different types of 1911 models will be designated by series, the classes to be known as Model R, four-cylinder, 40-horsepower, and the Model S, six-cylinder, 60-horsepower, as in 1910. Comparison of the 1911 models with those of last year brings to light a few minor changes in construction, among which may be mentioned the lengthening of the Model R wheelbase to 121 1-2 inches, and the placing of the front axle 1 1-2 inches farther forward than in the 1910 design. The rear springs are lengthened to 58 inches over-all, and 5 inches have been added to the length of the top half, or scroll, improving the good riding qualities. Rear axles are Knox full floating type, running on Hess-Bright annular ball bearings. The entire differential is easily dismounted if necessary. Torsion rods will be used on full floating axles. Frames are made of heavy-gauge nickel steel with deep side channels and wide flanges. A slight change has also been made in the 1911 transmission, due to the use of double annular bearings at the rear of the transmission and also in the rear bearing of the lay shaft—both these changes making for quieter running on the intermediate and low gears. A change in the front timing gear is the adoption of a cast-iron magneto idle gear in place of that of fiber used in the 1910 models. There has also been a change of price, the 1911 Model R being quoted at $3,300 instead of $3,250, the prices of the Model S series remaining unaltered.

The Knox power plants for 1911 will retain all of the features that have made them so satisfactory and successful ever since the water-cooled motors were adopted—i. e., unit construction and three-point suspension; valves in the heads, with detachable heads; force-feed system of lubrication; side arms of the yoke are detachable and bolted to the sides of the crankcase at the rear, and with the transmission case forming the rear of the yoke. An exceptionally wide flat-tube radiator is used on both models, thus avoiding overheating.



KNOX TECHNICAL REFINEMENTS FOR 1911

(A) General view of the 1911 tonneauette, series A, showing side doors for front and back seats, a graceful overhang dash effect, well regulated height of the running board, flaring mudguards which not only protect the chassis but are so shaped that they will not rattle loose, and become a source of noise and annoyance.

(B) The rear end of the chassis, showing three-quarter elliptic springs with a secure double U-bolt anchorage, wide leaves, and ample clearance at the shackles so that when the springs depress the semi-elliptic lower portion will not interfere with the movement of the half-elliptic upper portion—the springs are aided by shock absorbers, are sufficiently long to make the vertical movement slow, and have retainers. The torsion rods are shown of tubular material, and so centered that the relative motions are in correct relation, and of sufficient strength to resist the torsion of the rear axle. The frame of the channel section is of the drop type, is strongly supported at the rear, and pressed steel members are employed to the exclusion of castings. This particular illustration represents the Model R 1911 construction.

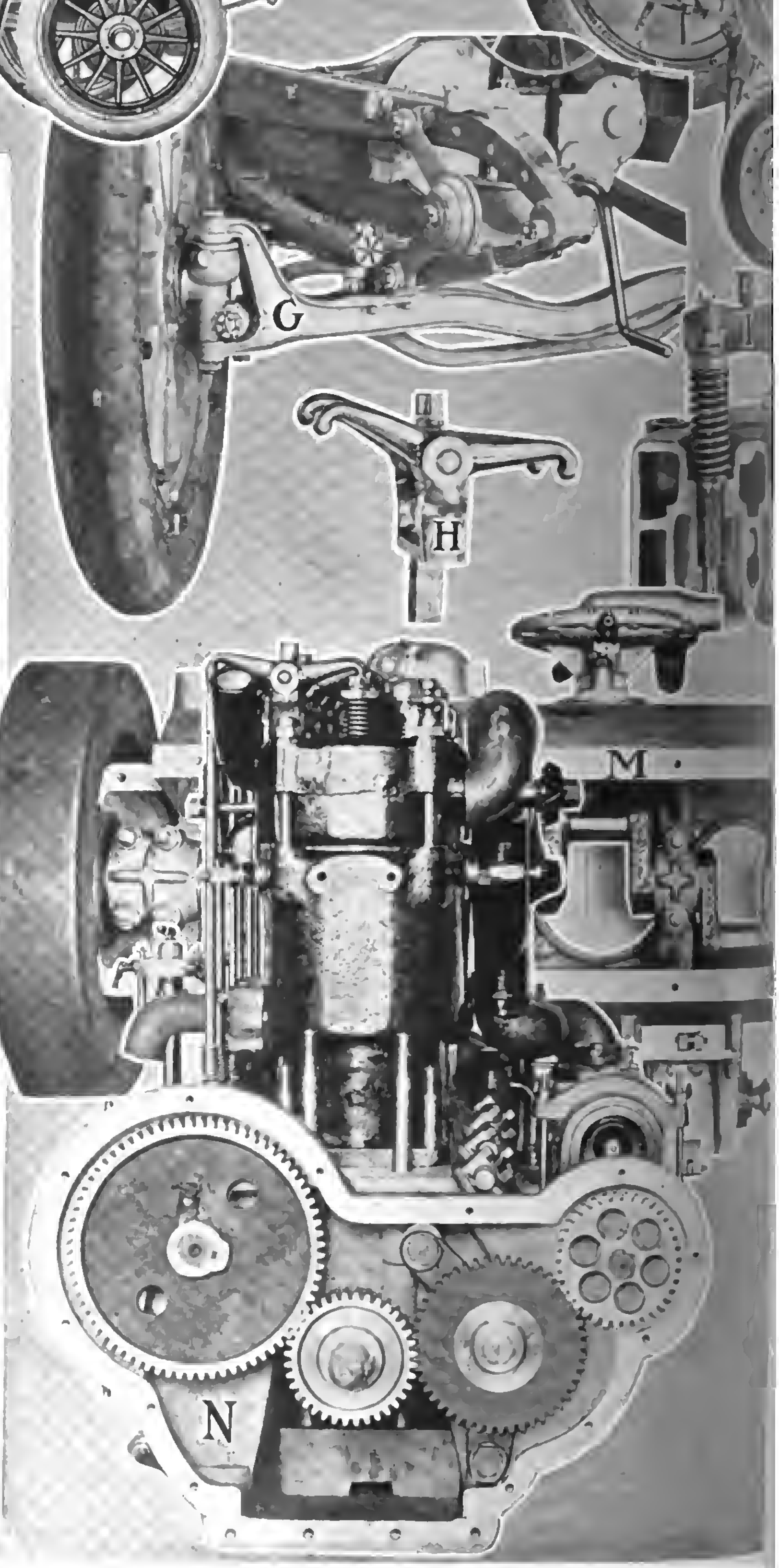
(C) Shows the brake drums separated, also the holes which are used for bolting them to the hub flanges.

(D) The brake construction shows a drum of large diameter with an internal expanding shoe actuated by an oval cam, and an external constricting band actuated by a Napierian toggle system. The shoes are faced with fireproof fabric, and the area exposed is sufficient to afford the requisite breaking effort, to snub the motion of the car and bring it to rest without having to compress the material to a point where it will lose its fiber-like ability.

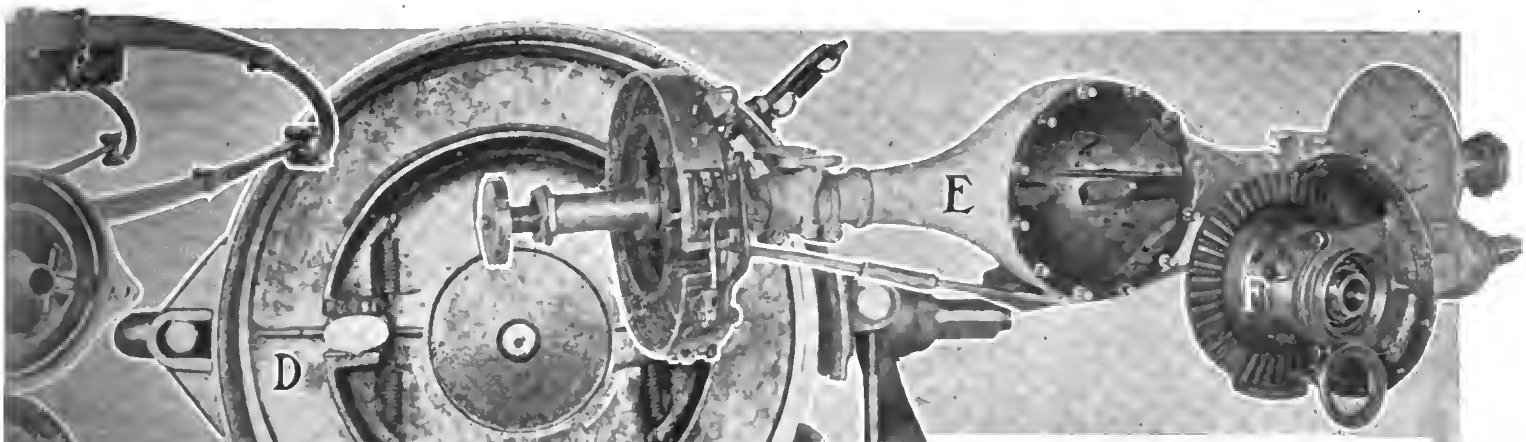
(E) Full floating type of live rear axle running on annular type Hess-Bright ball bearings, showing the brake bands in place, the enlargement at the mid position to accommodate the compensating gear and bevel drive, the bracing to prevent sag, and the spring perches so arranged as to be free to rotate on the shaft.

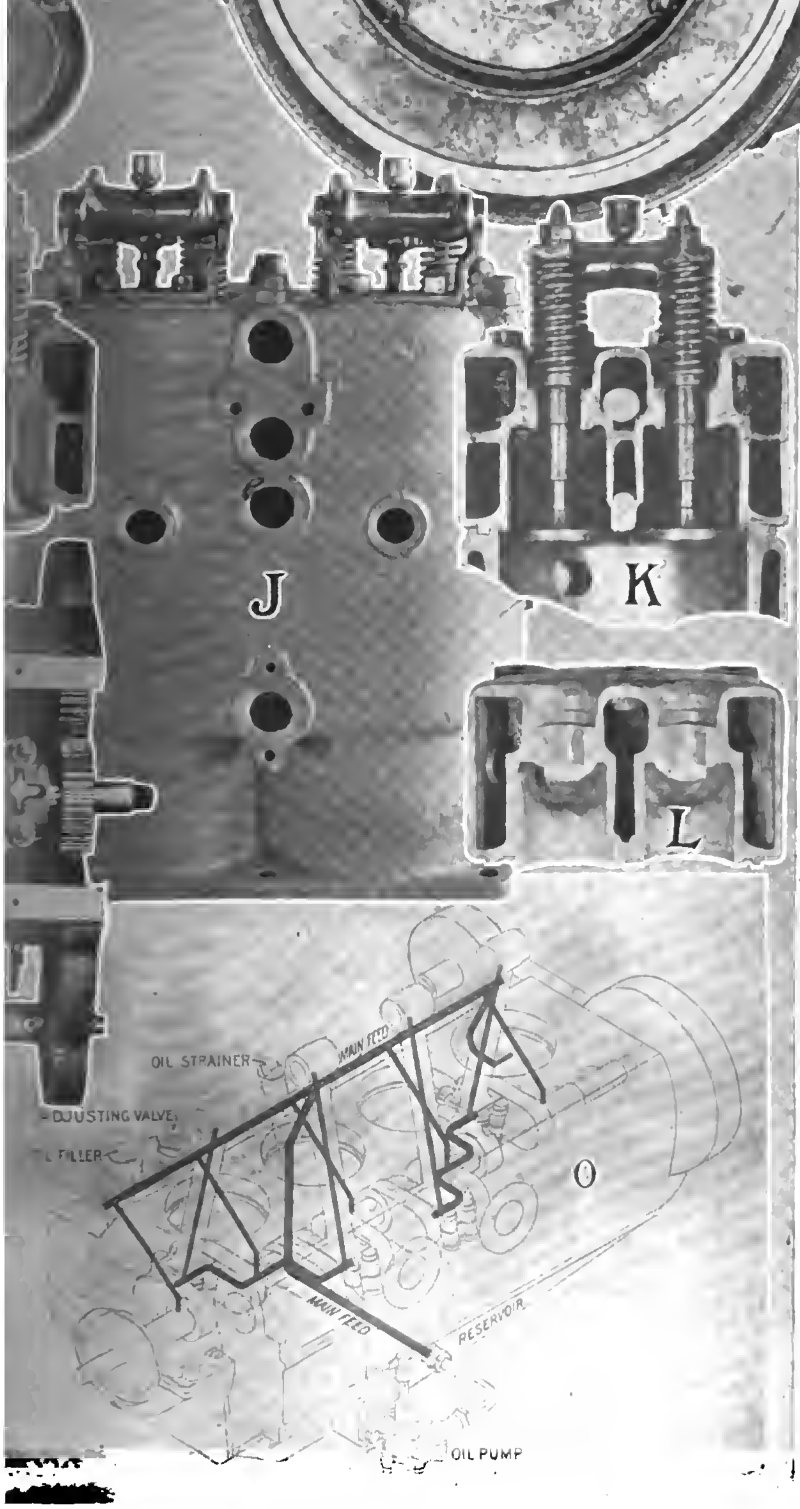
(F) The bevel drive and differential system removed from the enlargement of the live rear axle housing as shown at E, disclosing the use of annular type ball bearings, and a unit method of assembling so that the whole system may be removed from the housing at will for the purpose of inspection, adjustment or repair. The bevel drive is noiseless in operation, due to the excellence of the work done, and further to the fact that the unit method of assembling permits of adjusting the pinion in relation to the gears so that they run on the pitch line.

(G) Front axle of I-section forged steel without a weld, using the Elliott type of knuckle and a through pin with adequate means for locking. The termination of the chassis frame and its engagement with a half-elliptic spring, showing how the shock absorbers are securely fastened, and the cross member in front, which serves as the support for the motor, the lower half of which is in place to indicate how the starting crank extends out and drops down clear of the front axle. The wheel is turned, presenting a view of the knuckle, and it is interesting to note that the distance between the center line of the knuckle pin and the center of the wheel is sufficiently restricted to make steering an easy matter.



DEPICTING THE MECHANICAL NICETIES OF THE KNOX 1911





AS PORTRAYED BY THE CAMERA

(H) Before glancing at the cylinder J, attention is called to the stout design of the valve rockers which are a part of the valve mechanism, and the relation of these parts will best be appreciated by examining the front end view of the motor M, which presents these members as they attach by means of rocker pins in yokes which in turn bolt to the tops of the cylinders.

(I) The valve head is here shown in section; it bolts to the top of the cylinders as shown at J, and the valves, being of the overhead type, are inserted in their guides in the head before it is placed on the top of the cylinders and bolted down. The section shows how well the head is water-jacketed, and how the valve springs rest upon a finished seat which is cooled all around.

(J) The cylinders are cast in pairs and are shown here with a separable head bo ted into place, and in this view the overhead valve system is shown to its natural size, affording an excellent opportunity to observe the entire harmony in the relations.

(K) This is another section of the cylinder and valve head which is given to show how the joint is made between the separable head and the cylinder. A tongue fits into a groove, and the joints are ground tight, so that while packing is eliminated, it is also true of this method that it makes the assembling easy in view of the self-centering relation.

(L) This view of a section of the head offers further evidence of the excellence of the water-jacketing system, and indicates the perfectly smooth and non-tortuous transfer ports for the incoming mixture and the exhaust; due to the excellence of design as here indicated the depression in the intake is reduced to a minimum, and back pressure of the exhaust is substantially obviated.

(M) This view shows the underside of the crankbox with the lower half removed, affording a view of the main bearings with the crankshaft in place, presenting the halftime gears at the front end, and the large main bearing next to the flywheel. The flywheel is also shown in place, and an opportunity is afforded to see how it overhangs so that the weight is taken off of the crankshaft to the maximum possible extent.

(N) End view of the motor at the front end, showing the halftime gears with the protecting cover removed, also the gear which drives the magneto. The oil well appears at the bottom and the cylinders are shown bolted in place, affording an excellent view of the valve mechanism, and disclosing the widest measure of accessibility.

(O) Shadowgraph of the crankbox showing the methods of oiling, with the oil pump fastened to the lower half, affording a hydraulic grade for the oil out of the well into the pump. The pump is placed vertically, and the driving shaft with its safety spring dog are shown. The system of piping is brought out in heavy shading, and arrows indicate the direction of the flow of the lubricant as it circulates through the system positively due to the force of the gear pump. The oil filler, oil strainer, and adjusting valves are shown in an accessib'e position, so that the autoist on the road is enabled to replenish the oil, adjust the feed, and clean the strainer without trouble.

UTOMOBILES AND SHOWING THE RELATIONS OF THE UNITS

The selling prices include full car equipment, as in 1910, including top, glass front, speedometer and clock, shock absorbers, baggage rack, Prest-O-Lite, nickel or brass trimmings, combination oil and electric side lights and tail light, Fiske demountable rims, tire cover, tire iron, horn, tire outfit and set of tools.

The prices for Knox cars for 1911 will remain practically unchanged, the Model R touring car with regular body being now listed at $3,300 instead of $3,250, the price of last year's model. In the Model S six-cylinder the touring car sells for $5,000 with front seat doors, and the limousine at $6,000. The other types are listed as follows: Close-coupled with front seat doors, $4,900; tonneauette with detachable tonneau, $4,900; torpedo type, six passengers, $5,000; double rumble raceabout, $4,800; standard 106-inch wheelbase raceabout or runabout, $4,700.

In the Model R, besides the touring car at $3,300, there are the tonneauette with regular front, $3,250; tonneauette with torpedo front and high doors, $3,350; close-coupled type, $3,250; torpedo type, $3,400; double rumble raceabout with torpedo front, $3,300; standard raceabout, 104-inch wheelbase, $3,200; seven-passenger limousine, $4,250; special folding landaulet, six-passenger, $4,250.

Fisk bolted-on tires with detachable rims will be the regular Knox equipment for 1911, 36 x 4 1-2 for Model R and 38 x 5 1-2 for Model S. In the raceabouts the purchaser will be given the option of 34 or 36-inch wheels.

How the Cadillac "Thirty" Is Made

PRICEWISE this car sells for $1,600. The standard equipment as given in the specifications is included. The remaining important matters, which are here to be discussed, involve the methods of manufacture and the details of design. In order to give the reader a capable insight into the details of design of the car, working drawings were reproduced by the wax process and are here given as follows:

Fig. 1.—Assembly of the clutch showing a section of the flywheel, the truncated cone member, and the clutch, which is made of pressed steel, also the sleeve, clutch spring, method of adjusting the spring tension, ball bearings for taking thrusts, and the control mechanism with a distance rod which fixes the relations with a view to preventing lost motion, which distance rod extends from an eye in the end of the trunnion fork to its anchorage on a lug which extends down from the front end of the transmission gear case.

Fig. 2 shows the motor in part section, longitudinally, and a cross-section of the same cutting through one of the cylinders, exposing a section of the piston, also the connecting rod, and giving relations of the half-time gears, besides indicating how lubricant is stored in a well in the bottom of the case. The longitudinal section, in addition to showing the flanging of the lower half of the crankbox, also affords details of the methods employed for driving the fan in front, and presents the section detail of the fastening of the copper water-jacket to the cast gray-iron cylinder, which is an important innovation in Cadillac work. The camshaft is also shown in part, being cut away at the front end, which does not prevent indicating the method of engagement of the valve lift through a roller which rides on the cam, and the means of adjustment which are necessary for the proper timing of the motor. The cylinders, according to this construction, are machined on the inside and outside, so that any imperfections which may be concealed under the skin as the cylinders come from the foundry are bound to be discovered. It is also a feature of this type of cylinder construction that the cooling will be much more efficacious, due to the fact that the heat transfer is on a more efficient basis, it being well understood that the heat conductivity of the hard skin on the surface of a casting is not nearly up to the level of that which obtains for the section of the metal under the skin.

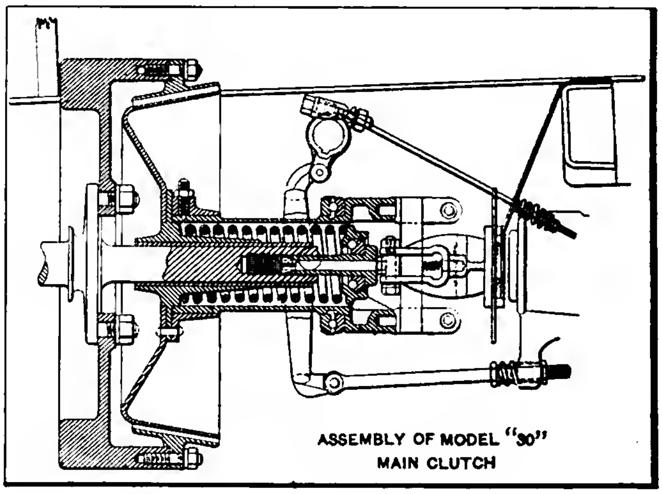


Fig. 1

Fig. 3.—Cross-section of the steering gear, which is of the worm-and-sector type, with ball thrust bearings at the extremities of the worm, with a grease-tight housing, and a ratchet on the sector shaft, which is there placed for the purpose of adjusting the worm and sector, with a view to the elimination of lost motion. The designer recognized the futility of providing an adjustment of this sort in the absence of some means for compensating for wear, and this important detail, by way of compensation, is accomplished in a very simple manner. The pitch line of the sector is not to unit radius. In other words, the sector is so shaped that as wear creeps in the eccentric bearings may be adjusted so that the sector will travel toward the worm, and the differences due to wear are

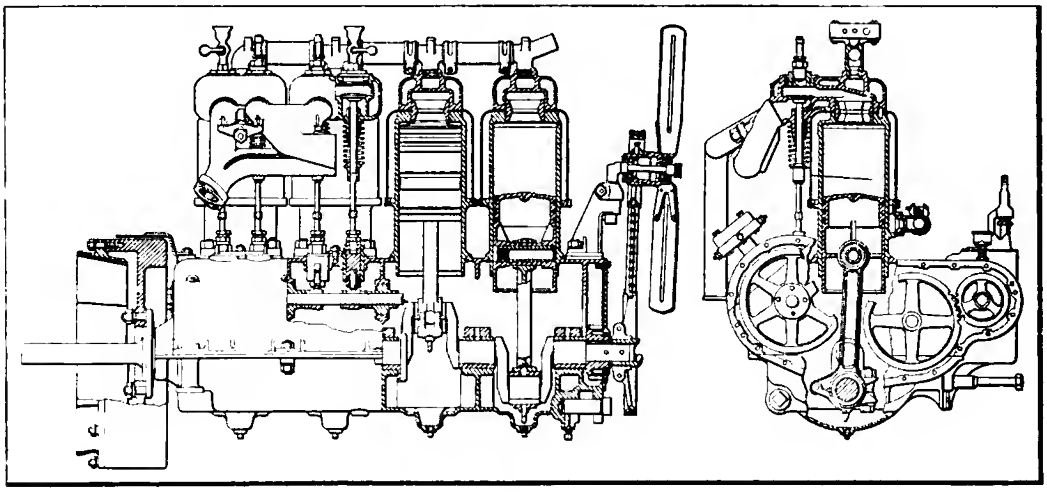


Fig. 2

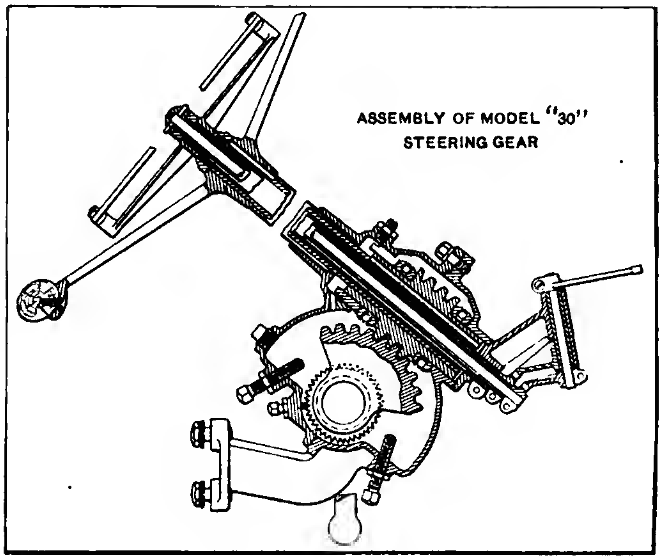


Fig. 3

neglected with impunity. In other respects, the steering gear is substantially made with provision for the spark and throttle control on the top of the wheel, and a lever system at the lower end, which transmits the motions of the spark and throttle lever for their intended purpose. The method of anchoring the steering-gear housing to a lateral of the chassis frame includes a stout arm integral with the housing, and a crow-foot on the extremity, which is faced off to make a good bearing, so that the holding bolts which pass through the lateral of the chassis frame are enabled to do their proper work. The steering wheel is of large diameter, with a substantial metal portion, and it is accurately fitted to the tube, and properly keyed, so that the autoist is introduced to neatness, comfort, and safety when he takes the wheel in this car.

Fig. 4 presents the transmission gear in section, the universal joints of the protruding shafts, also a section of one of the universal joints and a section of the selector. Glancing at the section of the transmission gear, it will be observed that it is of the three-speed selective type, that the gears are wide-faced, of symmetrical design, and are secured to the shafts (a) by riveting to integral flanges on the lay shaft, and (b) the sliding gears are accurately fitted to a square shaft. The shafts are of unusual diameter, and relatively short, so that they possess to a degree the measure of rigidity which aborts deformations. It is scarcely necessary to point out that in many of the older designs of automobiles this question of rigidity was neglected, the shafts were made long and relatively small in diameter, they deflected under the load, and the gears declined to slide. The universal joints are fetched up on a slow taper, so that with the pressure, which is exerted by the locking nuts, they are in sufficiently secure relation to transmit the torque of the motor even in the absence of keys, but with a view to proper insurance, a well-fitted key is used in each case.

Every effort is made in the manufacture of the units, as well as in the automobile complete, to have absolute interchangeability of parts, and the facilities afforded in the Cadillac plant are of a studied character, it being appreciated that this end cannot be secured unless the personal equation is eliminated.

SPECIFICATIONS OF THE CADILLAC "THIRTY"

Motor—Four-cylinder, four-cycle; cylinders cast singly; 4¼ inch bore by 4½ inch stroke. Five-bearing crank shaft.
Horsepower—Nominal 30. Actual, dynamometer tests, 33.
Cooling—Water. Copper jacketed cylinders, gear driven gear pump. Radiator of ample efficiency. Fan attached to motor, running on two point ball bearings. Center distances of fan pulleys adjustable to take up stretch in belt.
Ignition—Two new systems, complete and independent—low tension magneto; four unit coil with dry cells.
Lubrication—Automatic splash system, oil uniformly distributed. Supply maintained by mechanical force feed lubricator with positive sight feed on dash.
Carbureter—Float feed type.
Clutch—Cone type, leather faced, with special spring ring in fly wheel.
Transmission—Sliding gear, selective type, three speeds forward and reverse.
Drive—Direct shaft drive in housing to bevel gears of special cut teeth to afford maximum strength. Universal joint. enclosed in housing and running in oil bath.
Axles—Rear, special alloy steel live axle shafts running on special roller and ball bearings. Front, "I" beam section with drop forged yokes, spring perches, tie rod ends and steering spindles, the latter having ball thrust bearings.
Brakes—One internal and one external brake direct on wheels, large drums, double acting and compensating.
Steering Gear—Worm-and-sector type, adjustable, with ball thrust bearings.
Frame—Dropped, pressed steel, channel section. Width, 30 inches in front, 33 inches in rear.
Wheels—Wood, artillery type, with quick detachable rims. Special large hub flanges and special strength wide spokes.
Wheel Base—110 inches.
Tires—34 x 4 inches.
Tread—56 inches.
Springs—Front, semi-elliptical, 36 inches long by 2 inches wide. Rear, three-quarter platform; sides, 42 inches long by 2 inches wide; rear, 38 inches long by 2 inches wide.
Control—Spark and throttle levers at steering wheel. Steering wheel 17 inches in diameter. Clutch operated by foot pedal. Service brake (external) operated by foot lever. Emergency brake (internal) operated by hand lever. Speed changes by hand lever operating in "H" plate. Throttle acceleration by foot lever.
Speed—5 to 50 miles an hour on high gear.
Gasoline Capacity—About 13 gallons.
Oil Capacity—Six pints. Sufficient for 400 to 500 miles.
Upholstering—Black leather over genuine curled hair and deep coil seat springs.
Finish—Royal blue body and chassis striped.
Equipment—One pair gas lamps and generator; one pair side oil lamps and tail lamp, magneto, horn, set of tools, pump, tire repair kit, robe rail and tire irons.

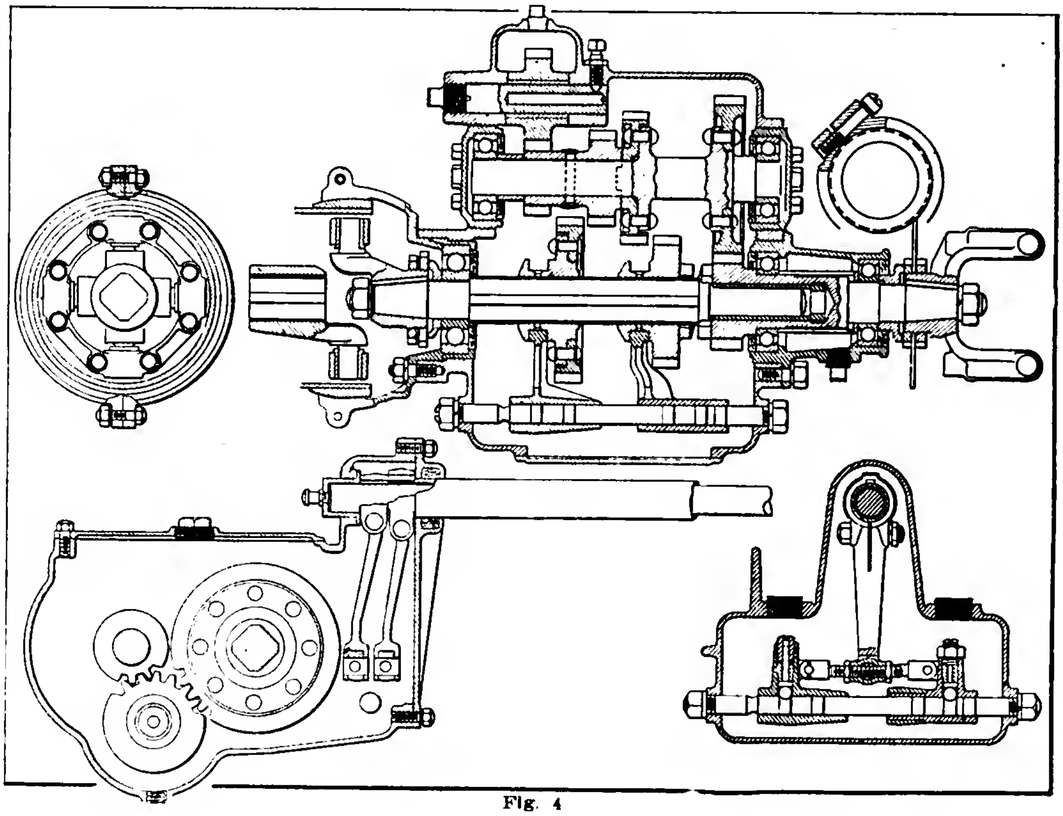


Fig. 4

Rejuvenating the Old Automobile

By J. B. MERCER.

Illustrating a modern fore-door type of body as it would appear on a Cadillac "Thirty" touring car, giving all the information required by a body maker, and showing how the body will appear when made. A means is afforded for clearing the side levers, and the material specifications are given in sufficient details to serve the end.

GENERALLY speaking, the process to be employed in the construction of a new fore-door type of body for the Cadillac "30" touring car is a mere repetition of the process which was laid down in THE AUTOMOBILE of June 16 for the rejuvenation of a Franklin Model H car. Barring the necessary changes in dimensions, and making sure that the new body will present an artistic appearance when completed, there is little else by way of skill which cannot be furnished by a body maker or a reasonably well-equipped repair plant upon demand.

In this case, the panel and moulding effect with the left side door, and the bent wood pillar to form the doorway, are identical with that of the process set down for the Franklin Model H, in which the framing is of wood, and sheet aluminum construction is employed, utilizing steel angle pieces and castings, to a certain extent, to strengthen the framing and brace the structure. In this example, Figs. 6, 7, and 8 show the side, front, and top elevations respectively, and the side levers are bent, as indicated in Fig. 7, so that they both fall outside of the body, whereas in the Franklin Model H the speed lever passed to the inside of the body through a slit. In the Cadillac model it is inexpedient to bend the levers so that they will fall inside of the body, due to the height of the quadrant, and the distance from the quadrant to the chassis frame. This specification calls for a new dash, which should be made to conform to the general finish of the doors and trim of the body throughout.

The pillars making the framing around the door are of bent ash in one piece, extending from the top line of the seat all the way around; fastening is provided for at the curve of the seat, and outer surface is finished so that it is in the plane of the seat panel. To prevent the joints from showing in the finished work the moulding is placed on the seat sufficiently offset to provide a good joint. Below the seat line, the pillar is fitted back onto the under body for a distance, as shown, it being the idea to have the moulding run along the edge of the panel, from the dash to the seat, so that it will come in line with the vertical moulding of the seat.

The pillar forms an offset, measuring from the side of the body, equal to the offset distance of the seat at its point of contact with the same, and, as in the Model H Franklin, the dash in front is brought out to the same line. The fastenings of the pillar to the body are by means of screws which pass through the panel and into the body framing. The new dash should be 3-4 of an inch thick material, which may be of white pine, if the cost is to be kept down, and of Mexican mahogany, if first-rate work is wanted. The lock-post is framed into the pillar at the bottom, and to the side rail at the top; the surfaces of the sides and the doors should be covered with No. 16-gauge aluminum, fastened under the moulding at the top, to the curvature

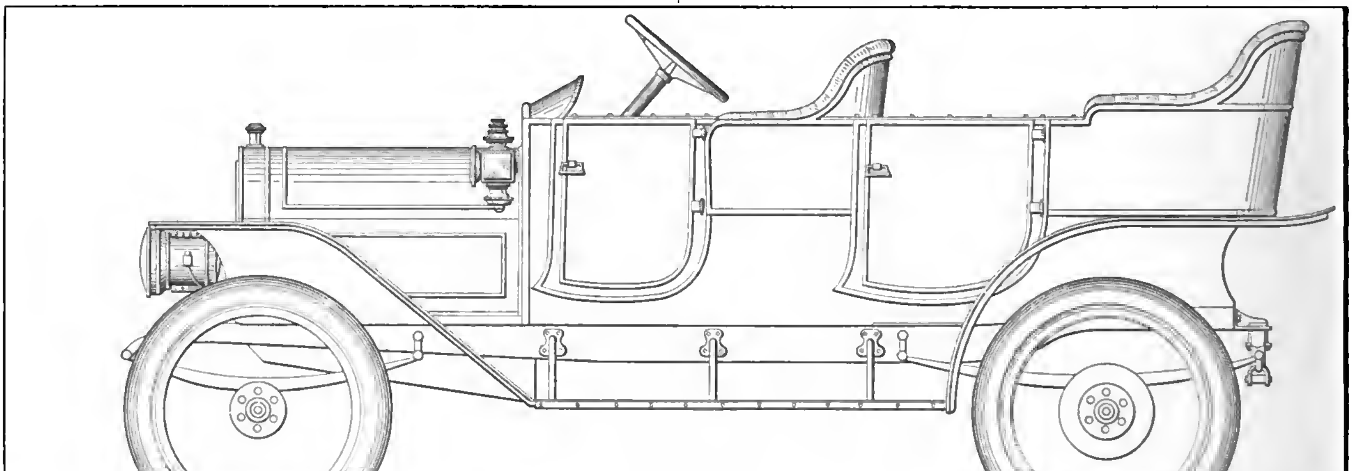


FIG. 5

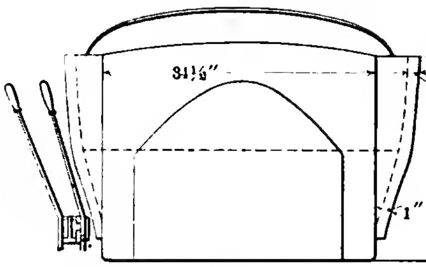


FIG. 7

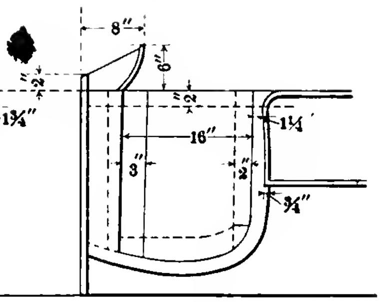


FIG. 6

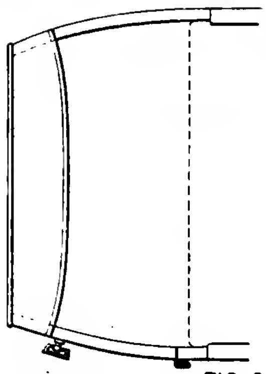


FIG. 8

Fig. 5—Side elevation fore-door type body for Cadillac "Thirty." Fig. 6—Details of fore-doors. Fig. 7—Front View. Fig. 8—Plan

of the dash and to the outer edge of the pillars; it should be turned in around the doorway, and at the joints around the front portion of the side of the seat. The upright curve moulding which gives effect at the pillar should be riveted at the panel. On either side, the framing and the moulding will be symmetrical in this example, because the side levers do not interfere. The door framing is indicated by dotted lines with sufficient dimensioning to govern the work. As a further aid, the body builder may consult Fig. 7, which is a front view, from which the lines, and the one important dimension may be had. The hooded dash, as here given, adds to the general appearance of the body, but this phase of the situation is subject to such change as the taste of the owner would seem to indicate, although care must be exercised not to go too far in a matter of this sort for fear the general harmony will be upset. The lower section fastens to the door top piece, and is so designed as to move outward with it. In the selection of the hinges and lock for the door it is worth while exercising some care, and the body maker is enjoined to use screws of sufficient length to fasten the hinges in secure relation.

Roughstuff Can be Mixed as Well as Purchased

Shop-mixed "roughstuff" for body finishing may be compounded by taking equal parts by weight, of keg lead, oil ground, and any good American filler. The two to be thoroughly reduced to a stiff paste by beating in equal quantities of coach japan and rubbing varnish.

Forced Lubrication—Trend in English Practice

By R. K. MORCOM

(Third Installment)

The pump should be of ample size—Charts are used to indicate the relation of pressure to quantity—Effect of a choking suction is discussed—Types of pumps are given attention—Result of a series of trials on different types of pumps are shown.

GENERALLY, in designing a forced lubrication system, the following points must be kept in mind:

Have a pump of ample size, with good big suction and delivery pipes. There is a tendency to fit pumps and pipes too small to realize the benefits of forced lubrication. The effect of a choked suction is well shown in curve IV (Fig. 14). From the curve of discharge given earlier it will be seen that the discharge from the clearance spaces is quite appreciable, and too small pipes or pump may lead to the ends of the system being starved. A good rule is to make the discharge from the pump at full speed depend upon the total clearance. Thus, with a plunger pump, if the volume swept out per minute on the discharge stroke be V, and the sum of the peripheries of all bearings at each discharge point be P, then $V = 8 \times P$ is a good value.

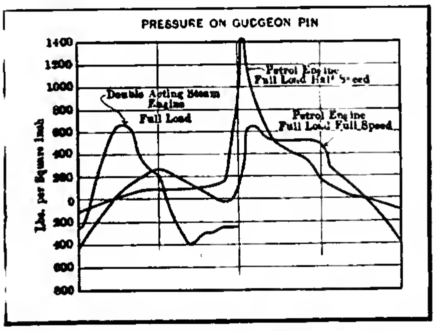


Fig. 10—Chart showing pressure on gudgeon pin and how it varies under different conditions of load and speed

For the main delivery pipe, if B be its bore,

take $B = \dfrac{P}{480}$,

Another point which makes it necessary to have an ample pump is that due to centrifugal and inertia effects on the oil in the moving parts, variations in pressure occur beyond those due to fluid friction and escape at clearances. To indicate the nature of such influences, a series of diagrams were taken with an ordinary indicator coupled direct to the main bearing, and through a flexible connection to the top end. The curves traced are given in Fig. 13.

Oil pumps of various types are used, the most common being:

(1) Plunger pump.
(2) Gear pump.
(3) Vane pump.

The first is the most positive, and probably the most generally efficient. The second is good, and lends itself to simplicity of design. The third does not appear to be any good for high pressure. Centrifugal pumps are generally unsuitable, especially with thick oil. A series of trials run on different types of pumps are recorded in the curves of Figs. 14 to 19. It will be seen that the horsepower unit is quite small, so that the question of drive is an easy one.

The filter which must be fitted in the system should be efficient and accessible. It would be an advantage to place it in such a position that by lifting a cover it could be at once got at and periodically changed. The spare filter could then be cleaned ready for the next change-over. The filter should have ample area, as the suction pump must be quite free. A good design of filter is shown in Fig. 20, but, of course, to suit special space requirements the design is subject to great modification. A point to be remembered which is often overlooked is that perforated zinc and copper are not good neighbors in an oil well where water may be present. The oil pipes and oil ways should be ample in area, free from sharp bends and corners, and of adequate strength to stand the highest pressures that may fall upon them. Steel pipes made to template are better than copper pipes, since the latter have been found to develop mysterious fractures. Where it is possible, hollow shafts and rods should be used to facilitate the distribution. All oil pipes should be

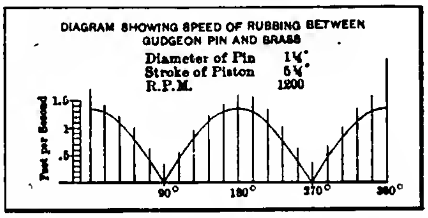


Fig. 12—Diagram showing speed of rubbing between gudgeon pins and brasses under fixed conditions as stated

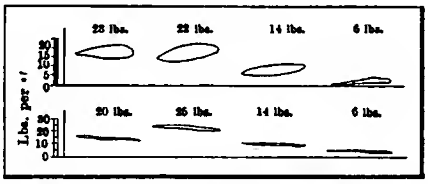


Fig. 13—Method of depicting the pressure in pounds per square inch for given pressures

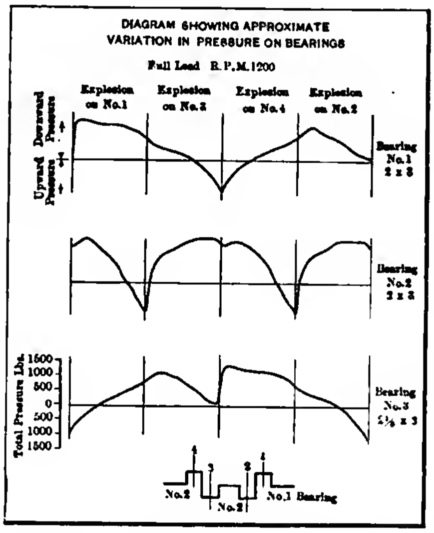


Fig. 11—Diagram showing pressure variations on bearings, also giving total pressures

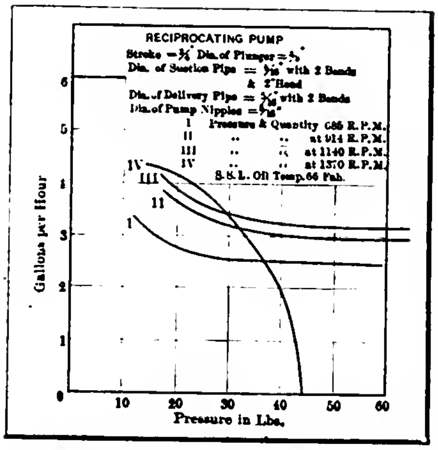


Fig. 14—Showing the capacity of a reciprocating pump under different pressures in pounds per square inch

carried in positions where they will not get in the way of overhauling, and will be protected from risk of damage. It is a good thing to bring the pipes up on the under side of the bearings in motor car engines, since they can be carried close to the cross-frames which usually support the bearings. In fact, the oil ways may actually be drilled in the crankcase casting. The edges of oil holes in parts subject to stress should be carefully rounded, or they may be origins of surface cracks leading to ultimate fracture.

In testing the pumps some trials (see pump trial curves) were taken on heavy oils to show the effect of congelation in cold weather. Owing to the small quantity which can pass, a heavy pressure may come on the delivery pipe and gauge, if fitted. This is one reason for fitting to relieve the pressure. A bye-pass valve alongside the gauge opening into the make-up oil tank was used with success in one instance. The best place for an automatic relief valve is on the delivery pipe close to the pump. Such valves are, however, a source of trouble, and should be avoided; as a rule, a gauge can be obtained to stand far greater pressure than will be put upon it in this way, and still be sensitive at the normal pressure.

A very short time is required to warm up the oil, and the trouble from this source is probably less with forced lubrication than with any other system.

The chief wear in the bearings on a high-speed engine occurs at starting and stopping. A pump very quickly forces oil into a bearing, probably more quickly than the oil will get there in any other systems. A non-return valve on the delivery pipe is possibly of value to ensure the system remaining full. The chief argument in favor of a pressure reservoir supplying oil is based on the need for oil at starting, and such a fitting for the pump to discharge into might be of value.

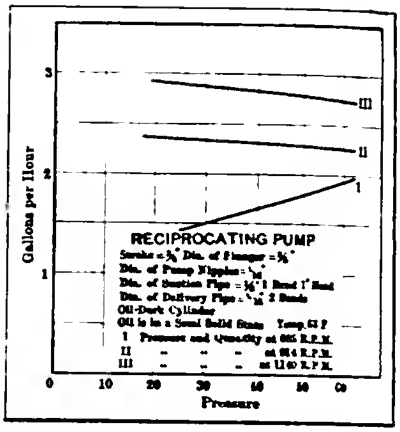


Fig. 15—Capacity of a reciprocating pump of the plunger type with oil in a semi-solid state

Any system in which a charge of oil is used for long periods may suffer from contamination of the oil. An experiment was made on a car fitted with forced lubrication. The sump was filled with a pure mineral oil called "SL," following the viscosity curve given in Fig. 21, and the car run for 3,000 miles in about four months on and off.

Meat from Foreign Exchanges—Cut to the Bone

Digest Along Technical Lines for the Engineer

Which to choose, the soft or the nervous motor, the normal or the pushed motor, is a question now demanding an answer. A similar question was mooted among horsemen. Could thoroughbred stock be used for common work or only for a few star performances each year, to be coddled all the rest of the time? The Americans have obtained excellent work from the refined stock by nourishing it well and giving it suitable care. The problem with regard to automobiles is: Between two motors, one giving 30 horsepower, with 110 mm. bore and 120 mm. stroke, and another giving exactly the same brake horsepower with 85 mm. bore and 160 mm. stroke, which should the purchaser choose?

An examination of the thermic and the mechanical efficiency in both cases will throw light on the question. The motor deriving a given power from the smallest amount of fuel is, of course, most efficient, and the question becomes, therefore, whether the means employed for reaching the higher efficiency are prejudicial to durability or other desirable properties of a motor, or perhaps are harmful under some conditions and not under others. From what is known of motors it is admitted that the utilization of fuel is more perfect in proportion as (1) the temperature of the cylinders is higher, (2) the piston speed is higher and (3) the initial compression is higher. But there is a limit to the possible temperature of cylinders. Lubricating oil decomposes at about 250 deg. C. The inner cylinder walls must be below this heat. In a water-cooled motor the outer walls must be below the boiling point of water, which is 100 deg. C. Other things equal, the air-cooled motor should give a better thermic efficiency than one cooled by water, since fewer calories are lost if the outer walls may be maintained at an external temperature of 200 deg. instead of 100, and, in accordance herewith, all fuel economy tests in the past six years have been won with air-cooled motors. (The author does not seem to consider that, with continued operation of the motor, as many calories may be lost to maintain 200 deg. as 100. The question is hardly one of temperature, but of how many calories must be carried away in order to maintain operating conditions, and this should lead to cooling of the piston rather than of the external portions of the cylinder walls, which play no other part than as conductors of the heat from the inner walls. Some cooling of the piston is actually effected by copious lubrication, and this may account for the winning of fuel economy tests by air-cooled motors. To keep a temperature of 200 deg. from rising further should in reality require the accession of more calories than to keep 100 deg. from rising further, considering that the outside temperature is nearer to 100 than to 200, and will carry away more calories from the hot than from the relatively cool surface.)

The quantities of heat transmitted through a wall of which one surface is at a higher temperature than the other are proportional to the extent of the surface through which the transmission takes place. If 100 calories pass through 1 square centimeter of wall in one minute, 200 will pass through 2 square centimeters in the same time. In a motor, therefore, one should choose the combustion chamber which has the smallest surface with the largest volume. As a spherical form is excluded, this leads to the hemispherical combustion chamber used in many modern motors, or to the system which causes the combustion chamber to remain of the same volume and wall surface during the entire stroke of the piston, by having two opposite pistons always moving in the same direction, as in the Gobron system and some horizontal two-cylinder motors with the two pistons working upon the same crank.

The logical consequence of a hemispherical combustion chamber is the location of valves in the top of the cylinder head, opening directly into the cylinder. The pushed or nervous motor is of this type, while the normal motor has the valves located in little lateral extensions of the cylinder, with plenty of wall space.

Here is a distinct thermic gain in the nervous motor over the normal one, without any loss in robustness or reliability.

With regard to piston speed, or rapid expansion of the gases during the power stroke, it is understood that the loss of calories through the walls is so much greater as the time is longer during which the heat is transmitted. If 100 calories pass in one minute, 200 will pass in two minutes. (This proportionality is scarcely established, nor well founded.) The time during which the hot gases are in contact with the walls should, therefore, be diminished. This is done by piston speed. On the other hand, when the exhaust gas is expelled it is still hot and carries with it many calories which it would have been better to have utilized. To reduce the number of calories lost in this manner the stroke should be lengthened. Here is an apparent contradiction. But, by doubling the speed of the stroke, one-half of the calories which would be lost by lower speed are saved and made available for expansion, which is useful work, and by doubling the stroke at least one-half of the calories so gained are turned into work, although the other half may escape through the added wall space. The net gain is realized in the nervous motor with 85 mm. bore and 160 mm. stroke which has a linear speed of 8 metres per second at 1,500 revolutions per minute. The normal motor, which also runs at 1,500 revolutions per minute, has a linear speed of only 6 metres. But in the first case the piston of 85 mm. diameter weighs less than the piston of 110 mm. diameter; the moving pieces are lighter, and, at the same r. p. m. it is seen that the pushed or nervous motor is less affected by the disastrous inertia of the masses. At this point there should be superiority in durability over the normal motor.

Let us pass to the third thermic factor, the compression. Our nervous motor of 85 by 160 is supposed to have a cold compression of 5.7 kilograms, based on the proportion of total cylinder to compression chamber volume, while the normal motor, 110 by 120, has only 3.5 kilograms initial compression. With these figures experience shows that the thermic efficiency of the two motors is as 36 to 24; that is, that the low-compression motor, for a given amount of work, will consume 36 litres of gasoline, if the other consumes 24. While the saving of one-third of the gasoline consumption, by using the nervous motor, is an advantage, it goes without saying that the mechanism of the high-compression motor is subjected to high stresses and that these must be taken into account in the manufacture and must result in a considerably higher cost of production. Besides, there are materials in all motors which have not the great strength of fine steels. The bushings of piston and wrist pins will be worn down so much quicker as the pressures are higher for the unit of areas. The pushed motor will begin to "knock" quicker than the soft motor. This is bad, but the saving in gasoline will easily pay for new bushings, as often as may be required. On the whole, with regard to thermic efficiency the superiority of the nervous motor seems to be established without serious drawbacks.

Among the means for improving the mechanical efficiency good lubrication comes first, and it must be admitted that this requirement is satisfied as fully in the soft as in the nervous motor. (The author should perhaps admit a little more.) The lateral pressures of the piston against the cylinder wall may be reduced in the nervous motor either by using a connecting rod long in proportion to the crank throw or by having recourse to offset. Our 85 by 160 is an offset motor, while our normal motor is symmetric. The substantial advantages of the offset have been demonstrated, and while the public is still a little wary of this improvement, its mechanical value to increase efficiency is undeniable, and several manufacturers employ some offset without saying anything about it to their clients. The features referred to produce a somewhat high motor, but this is scarcely an inconvenience, except in so far as it also results in a high price. The nervous, long-stroke, high-compression motor is mounted on ball bearings, while the normal motor still contents itself with smooth crankshaft bearings. At this point the public came near causing a fatal reaction, but fortunately experience has finally shown that the prejudice caused by a few errors in dimensions and design was groundless, and the leading houses now employ ball bearings on the crankshaft without misgivings, and their independence of regularity of lubrication constitutes another advantage of the pushed over the soft motor, from the average motorist's standpoint.

In this rapid survey of the situation a few points have been passed in silence, such as the increased pleasure in using the nervous motor and the great flexibility of its power. But, now, there is the driver, the caretaker. It is so pleasant to have a responsive motor that the accelerator remains unused. On the other hand, too many of the nervous motors are not provided with an advance of ignition, although this provision is really indispensable for them, and few drivers understand how to change speed at the proper moment. And the pushed motor demands not only expert driving but also competent care.

In conclusion it may be said that all those who love their vehicle and are willing to give it the care which every high-strung mechanical organism, as well as every animal organism, requires, may safely choose the pushed and nervous motor, particularly if they drive the car themselves. But those who must trust the vehicle to strangers and do not pose over a chauffeur who likes his work, had better be content with the soft motor of the less advanced type.—C. Faroux in *La Vie Automobile,* May 14.

Speaking about Lepape's experiments with two-cycle motors, F. Garlès gives an abbreviated account of the failures which were met and overcome. Lepape had first tried to replace the ordinary compression pump by two pumps, one for air, of a volume larger than that of the motor cylinder, and another for introducing a rich gas taken from a special carbureter. At each turn the pump introduced in the cylinder a larger volume of air than was necessary for filling it, so as to produce complete expulsion of gases, and then the little pump injected the rich mixture. The result was phenomena of condensation interfering with operation. Then he thought of using a small pump for injecting the liquid gasoline together with a jet of compressed air, also without success. The direct gasoline injection pump was also quickly abandoned. Then came the Giffard injection. A motor based on this principle gave a regular operation, but much too high consumption of fuel. The system of introducing the fresh gas by means of the suction produced in the cylinder automatically by the rushing out of the burnt gases was then tried. "This motor," says Lepape, "worked with extreme regularity but without giving much power. Then I varied the volumes of dead space between the suction pump and the motor, so as not to get too strong a vacuum, which aspired the fresh gas unnecessarily fast. It proved very difficult to find the exact volumes of dead space which should exist above the pump to correspond with the maximum speed and which would also work well with low speed."

With regard to the two-cycle motor's inclination to overheat, Lepape says: "I have been struck with the contrary experience with motorcycles, an experience often repeated. Two motorcycle motors of the same power, but one two-cycle and the other four-cycle, are set going without load at the same time, and the two-cycle motor will always run longer without overheating than the other, usually three times longer." Lepape explains this by the action of the bottom ports for exhaust in the two-cycle motor as compared with the jamming of exhaust gases in the top of the cylinder during their expulsion in four-cycle motors. Explaining the mechanical superiority of two-cycle motors, Lepape points to the waste occurring in four-cycle motors, because induction and expulsion and compression must be done with piston rings whose tension and friction with the cylinder walls are determined by the requirements for the power stroke. "The mechanical work absorbed by the frictions is therefore much greater in the four-cycle than in the two-cycle motor," concludes Lepape.—*La Technique Automobile et Aérienne.*

Questions That Arise—General in Scope

Completion of questions in relation to electrolyte for batteries——Principle employed in the removal of carbon from motor cylinders——Discussion of the dangers involved——Danger involved in making experiments——Precautions to take——Curves showing the pressure which will be generated in a cylinder, first by gasoline, and second by gunpowder——Gunpowder may be used to start motors——It is too much of a hazard for the average autoist——Requires special mechanism.

[110]—Granting that nitrates will behave to the greatest detriment of the battery, and assuming that it is of grave importance to eliminate such "forming solutions," how should the test be made?

Procure a test tube and proceed as follows:

(a) Place 25 grams of the electrolyte from the battery in the bottom of the test tube;

(b) Add 10 grams of solution of proto-sulphate of iron;

(c) With great care, add 10 grams of (chemically pure) concentrated sulphuric acid.

If there is nitric acid present, a brown stratum will appear between the electrolyte and the concentrated sulphuric acid. This test may fail if the presence of nitrate is as a mere trace.

MORE PRECISE TEST MAY BE MADE AS FOLLOWS

Procure a nitrate test tube as illustrated last week and then proceed as follows:

(a) Place chemically pure copper filings in the bottom of the tube at *a*:

(b) Place a few drops of proto-sulphate of iron solution in the neck of the bent tube *b*:

(c) Apply heat (gently at first) by means of an alcohol flame, at the point *a*;

(d) The test will fail if much chlorine is present.

In the absence of enough chlorine to defeat this test, provided nitrate is present, the color of the electrolyte will change to a blackish brown.

Suspecting the presence of chlorine, the process must be extended; add a small amount of gold leaf, and somewhat more of (chemically pure) concentrated hydrochloric acid to the electrolyte; boil. If nitrate is present in the electrolyte, some of the gold will dissolve.

If any of the gold dissolves, it will be denoted when a few drops of proto-chloride of tin is added; the color will develop the purple Cassius. This test is very delicate, and will develop the merest trace of nitrate in the electrolyte.

[111]—How may one determine the effect of temperature on the specific gravity of sulphuric acid electrolyte?

The tabulation as here offered will be a sufficient aid for the purpose.

SPECIFIC GRAVITY OF SULPHURIC ACID (ELECTROLYTE)

At Temperatures Below 60° F.

Temperatures	30° F.	40° F.	50° F.	60° F.
Sp. Gr.	1.1593	1.1562	1.1531	1.1500
"	1.2096	1.2064	1.2032	1.2000
"	1.2620	1.2590	1.2530	1.2500
"	[illegible]	1.3060	1.3030	1.3000
"	1.3620	1.3580	1.3540	1.3500
"	1.4144	1.4096	1.4048	1.4000

At Temperatures Above 60 F.

60° F.	70° F.	80° F.	90° F.	100° F.	110° F.	120° F.
[illegible]	1.1469	1.1438	1.1407	1.1376	1.1345	1.1314
[illegible]	1.1968	1.1936	1.1904	1.1872	1.1840	1.1808
[illegible]	1.2470	1.2440	1.2410	1.2380	1.2350	1.2320
[illegible]	1.2970	[illegible]	[illegible]	1.2880	1.2850	1.2820
[illegible]	1.3460	[illegible]	[illegible]	1.3340	1.3300	1.3260
[illegible]	1.3952	1.3904	1.3856	1.3808	1.3768	1.3728

[112]—Where can the reagents specified for use in testing for impurities in storage batteries be procured?

Any chemist will furnish them.

[113]—What is the principle of the removal of carbon from the combustion chambers of the cylinders of motors?

Carbon, which is the main element of the crust which forms, may be removed if it is combined with oxygen to form a gas as CO or CO_2. This may be accomplished by introducing some oxygen compound into the cylinders, which will, in the presence of the heat of combustion, disintegrate, and in the process of separating into its elements, free the oxygen and induce the formation of a gas, utilizing the carbon of the crust in the new organization. There are two oxides of lead which have this property. Lead oxide (PbO), and litharge or red lead (Pb_3O_4), the latter being the most efficacious for the purpose, simply because there is more oxygen in it. What happens is this: There is a sufficiently high temperature to melt lead, and the oxygen at the instant it is unlocked from its bond with the lead by the heat combines with the free carbon which is present in the crust, forming CO or CO_2. The new combinations are in gas form; CO represents carbon monoxide, and CO_2 is carbon dioxide. The residuum is metallic lead; it will either be heated sufficiently to vaporize and will pass out through the exhaust port in this form, or it will remain as molten metallic lead: the chances are that it will be driven off as a gas.

Manganese dioxide is another of the oxidizing agents that is relied upon to flux with. The formula for this compound is MnO_2; it is black in color, opaque, and a good conductor of electricity. When heated alone it is infusible, but gives off oxygen, forming Mn_2O_3 or Mn_3O_4 depending upon the intensity of the heat. In the presence of carbon the manganese dioxide is changed to MnO (manganese monoxide), and the carbon takes up the oxygen, forming carbon monoxide, or carbonic acid.

The exact composition of the decarbonizers which are used in motor cylinders, as furnished by the various compounders, has not been published: they may belong to the class as above, or they may be of that class of chemicals, as kerosene oil, which merely creeps in behind the crust, and detaches it from the walls of the cylinders. This latter principle is employed in connection with steam boilers for the purpose of loosening the scale, and it is given preference by some engineers on account of its ability to destroy the bond of the scale to the steel, without inducing oxidation.

It has been found that the so-called carbon formation in motor cylinders is a combination of carbon and silicon; the silicon comes in through the carbureter, and represents quite a large proportion of the whole crust. The silicon retards the action of the oxidizers which are capable of taking up the carbon to form compounds, for the reason that the carbon is shielded by the silicon.

Just how the silicon can be removed is a matter which will have to be struggled with; when the carbon is floated away as a gas, the silicon will remain, and it may be that a certain proportion of it will float out: it is not heavy in its "dust-like" state, as it is sucked into the cylinders through the intake: the one trouble lies in the paste-like mass it falls into as it mixes with the lubricating oil which is being continually injected into the cylinders.

Lead oxide has one facility from the point of view of silicon; a double silicate is formed if the heat is high enough, and the infusible character of the original silicon is thus reduced to a fusible formation, in which state it may more readily depart from the cylinders.

[114]—The question is frequently asked, Will the carbon remover (as it is called in the trade) attack the walls of the cylinders?

This is a question which thwarts answering when the composition of the carbon remover is unknown.

the composition of cylinder iron?

ın of cast gray iron, as it obtains in certain may be taken to be about as follows:

ITION OF CAST-IRON CYLINDERS

	Average of Other Elements			
tic	Silicon	Sulphur	Phosphorus	Manganese
	1.19	0.14	0.14	

ıe significance of this?

carbon (free carbon) which is in the greatest his carbon which would be open to attack.

ɘ attacked?

oxidizing agents were in sufficient presence e free carbon which might abound in the f the oxidizing agent were to be present. oted for their intense oxidizing properties, eason that they are classed as "fluxes" by who use them accordingly.

his matter be investigated simply and the be established?

of cast gray iron and immerse it in a mover; if it does not eat the graphite out e it is safe to use in a cylinder of a motor.

ɪerature should the test be made?

ı at the higher temperature which obtains amber of a motor.

high temperature which will have to be

lt lead.

elting point of lead?

rees Fahrenheit (334 degrees centigrade).

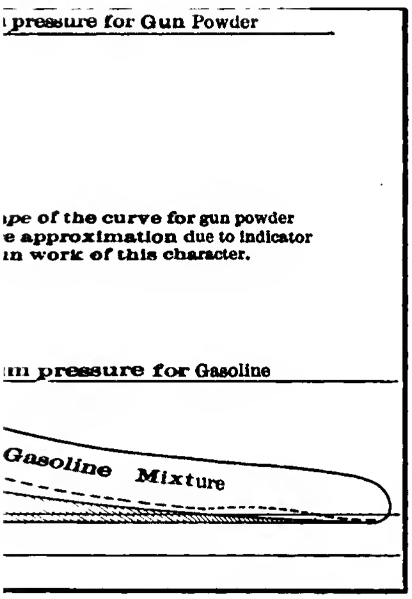
nplest way of going about it?

; lead in an iron melting pot to form arbon remover solution in a second and ɔut the specimen of polished cast iron in emover; (d) place the pot of lead on e the heat until the lead melts; (e) coal over the surface of the molten t the lead from oxidizing; (f) place (holding the cast-iron specimen and mover) in the molten lead bath; (g) several hours, if necessary, and when inated, remove the specimen of cast tacle and note if it is "etched."

r attached to the process?

er safe to experiment with unknown

ible sources of danger?



-istic Difference Between Pressures and Mixtures of Gasoline

(a) Explosives; (b) Inflammable; (c) Poisonous fumes.

[125]—What is to be done to avoid these dangers?

(a) Let an experienced chemist conduct the test; (b) heat a grain (a very minute part) of the carbon remover, under conditions of suitable protection, and note if it explodes; (c) take a second minute division, place it on an anvil, strike it a sharp blow and note if it detonates; (d) heat the anvil, then repeat the experiment, and note if detonation will follow a blow when the compound is heated; (e) in order to observe if the compound will burn, take a spark-plug out of one of the cylinders of the motor, place it in the solution in such a way as to get the benefit of a spark; complete the high-tension connections just as when the spark-plug is working in a cylinder; crank the motor, and when the spark is generated at the plug which is placed in the solution, if it is inflammable it will be readily noted. The spark should take place just at the surface of the solution so that atmosphere will be free to sweep over the surface and provide oxygen to complete the set of conditions which underlie success in the process of making a fire, i.e., fuel, oxygen, and a flame.

[126]—Will these experiments, if they show nothing, be all that is necessary to prove the absence of danger to the experimenter?

Not necessarily; besides avoiding the inhalation of fumes, there are always the precautions which must be taken when an experimenter is dealing with a series of unknown quantities.

[127]—Is there any reason for believing that there is a hazard of moment involved in this experiment?

No. It might even be pointed out that there is practically no chance of getting into trouble; this is no reason for going about it in such a way as to have to bear the brunt of an explosion if one is induced. All research work is dangerous—it is a case of dealing with unknown quantities.

[128]—Is it not possible to start a motor by means of gunpowder?

Yes. This method was employed in "Raymond" engines, as manufactured for stationary work about fifteen years ago.

[129]—How was it managed?

(a) Black blasting powder (BB DuPont) was loaded into a cartridge; (b) the cartridge was placed in a breech-block in the combustion chamber of one of the cylinders, and when the piston was over the dwell point, on the down stroke, a firing pin so placed as to dent the cap was struck a sharp blow. The powder thus ignited performed the function that is ordinarily performed when gasoline mixture is compressed and ignited.

[130]—What is the matter with this idea?

Nothing. The cylinder of the motor which is fitted with the breach-block, in which the powder is placed, is to all intents and purposes the equivalent of a cannon. The only question is, should cannons be made of cast iron; unless it is proper to add that cannoneers are supposed to have great skill and some bravery.

[131]—How did the idea work in the instance cited?

Very well; there was only one casualty; it was due to the use of an excess of "smokeless" powder. The cylinder walls of the Raymond engine were about 1 inch thick; in automobile motors the walls are rarely ever more than 5-16 of an inch thick.

[132]—What is the reason why danger is courted when gun powder is substituted for gasoline mixture?

Gasoline mixture is relatively slow burning, and the piston is capable of receding swiftly enough to prevent the formation of a high-pressure wave. The two curves, as here given, will tell the tale better than words. As the curve depicts, the maximum pressure for mixtures of gasoline is nearly 200 pounds per square inch. In the case of gunpowder it is given as 600 pounds per square inch. In a motor of the automobile type, during some experiments which were conducted a few years ago, it was found that the pressure due to the use of gunpowder was frequently very much higher than that as here given. The point to be made here, however, is that the piston cannot accelerate at a sufficient rate to run away from gunpowder pressure fast enough to prevent the pressure from piling up at the terrific rate which spells hazard.

Showing Connections of 4-Cylinder Coil

Editor THE AUTOMOBILE:

[2,301]—I have an automobile which is fitted with a magneto ignition system, and a single coil auxiliary. Please show the connections, if a 4-coil auxiliary system is used, with the understanding that separate spark plugs will be employed.

Kingston, N. Y. SUBSCRIBER.

Fig. 1 shows the arrangement of the 4-unit coil, storage battery, timer, and spark plugs. It is so arranged and marked that by following out the connections no further information will be required.

Carbureter Adjustment Is Unruly

Editor THE AUTOMOBILE:

[2,302]—I have a carbureter on my ——— car, which has a knurled disc on the end of the needle valve, and a lock spring as shown. The carbureter gives trouble, although it works all right for a time after I make an adjustment of the needle valve. I do not understand, however, why the adjustment does not remain permanent. Is the trouble due to temperature changes?

Newburgh, N. Y. READER.

It is a great mistake for an autoist to jump to an impossible conclusion when the performance of a carbureter is improper. In this case there is no temperature question involved, such as will give serious trouble. The real difficulty lies in the lack of permanence of the locking method, and the needle valve adjustment is disturbed. The remedy will lie in the direction of a proper fit of the needle valve stem where it threads into the casting, and a security lock. If the spring does not hold, replace it with one that will (see Fig. 2).

Overhanging Lug Source of Trouble

Editor THE AUTOMOBILE:

[2,303]—I enclose a sketch for your information, which shows that the exhaust pipe is held in place by two studs, one of which screws into a lug which extends down from the underside of the exhaust chamber. The lug broke off. Is there any way by which I can have it fixed?

Wilmington, Del. K. A. C.

It will be extremely difficult to do anything with this sort of a break. The extension lug is bad designing. Autogenous welding, however good it may be in general, cannot make the lug any stronger than it was in the first place, and it proved to be below the requirement. One way perhaps, would be to have the lug autogenously welded, and then put a 3-16 inch plate over the whole face, and the manifold up against the plate. In this way the 3-16 inch plate will furnish the strength necessary, and it will be held in place, to some extent by the lower stud, but in the main by the upper stud. Asbestos packing may be put on both sides of the plate to make a tight joint.

Spark Plugs Have to Be Tested Occasionally

Editor THE AUTOMOBILE:

[2,304]—In my motor, the spark plugs seem to soot up too soon, considering the performance which is obtained in other types of motors, and the space is so cramped that it is a good deal of trouble to take out the spark plugs and find a place to lay them down without undoing the connections, for the purpose of observing if the spark is good. In the first place, I would like to know why I have this trouble, and I would also be glad to have any suggestion you can offer which will make the work more agreeable.

Baltimore, Md. C. S.

The sooting up of the spark plugs may be due to a variety of causes, prominent among which are (a) an excess of lubricating oil; (b) lubricating oil which is not suitably built for cylinder work; it may have too much free carbon, or the flash point may be too low (if it is mineral oil); if it is not mineral oil it should not be used for this character of service, although certain forms of vegetable oil have been used with success, notable among which castor-oil may be mentioned; (c) too much gasoline; (d) spark plugs in the wrong place; they work best on the intake side.

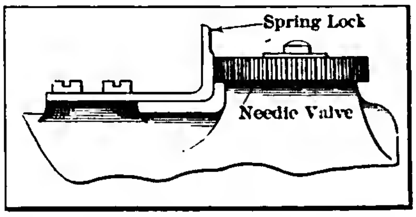


Fig. 2—A troublesome lock for a needle valve on a carbureter

Fig. 4 shows a scheme which helps considerably when it is necessary to remove the spark plugs from the cylinders and test them out. The spark plug A may be screwed out of the cylinder and then inverted, after which it is placed in a slot in the end of the bent flat iron member marked B. It is a convenient arrangement which any autoist can make for himself.

Number of Cars in Use in United States

Editor THE AUTOMOBILE:

[2,305]—Can you inform me as to the total number, and approximate value of the cars in use in the United States; also the value of the cars in use in the United States; also the value of the 1910 output.

Warren, Ohio. TRUMAN GRISWOLD.

Including foreign makes of automobiles, and discounting for the cars which are out of commission for various reasons, it is believed that the balance of automobiles in actual use will approximate 310,000, counting up to the 1910 output. What these automobiles cost originally is a matter which will scarcely be worth considering, but their present value, on a taxation basis, might be fixed at $620,000,000.

The 1910 output has been conservatively estimated at from 200,000 to a maximum of 280,000 automobiles, and the work involved in their construction, including all of the items which might well be considered, represents the comfortable sum of $485,000,000, an estimate which is believed to be conservative by those conversant with the situation.

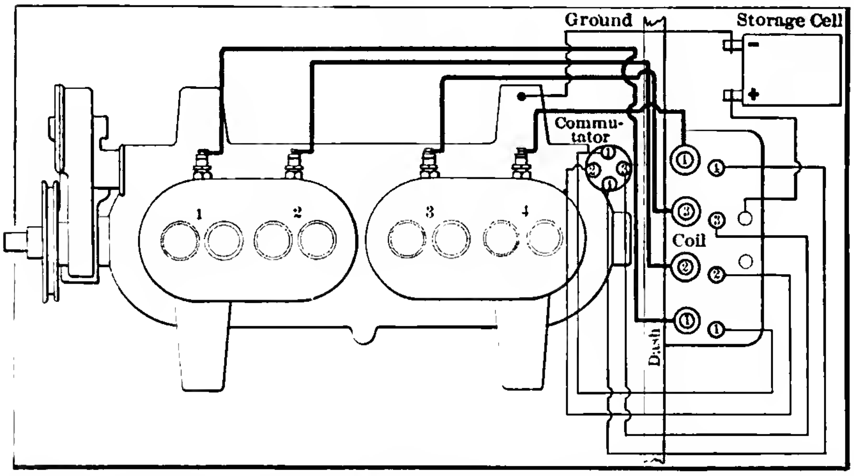


Fig. 1—Diagram of connections of a four-coil ignition system to spark plugs from a storage battery

All About Spark Coils for Ignition Work

Editor THE AUTOMOBILE:

[2,306]—1.—Please explain briefly the construction of a spark coil as used with battery ignition, giving the sizes of wire, and the amount of each.

2—What is the nature of the change of the current after leaving the coil, or that in the secondary winding?

3—What is the difference between direct and alternating current?

4—Explain what is meant by "selective-type transmission."

Erie, Pa. WILLIAM O. YATES.

1. Each unit of the spark coil is made up of an iron core, which is composed of a bundle of soft iron wire, about 3-4 of an inch in diameter, and about 6 inches long, over which an insulating spool is placed, upon which spool are wound first a primary coil, composed of about 1-2 pound of No. 36 double cotton insulated copper wire, and second the secondary winding of about 1-2 pound of No. 18 double cotton insulated wire. It is necessary to insulate the primary from the secondary with great care, using oiled silk or paper, overlapped at the joints.

2. The secondary current will be a modified prototype of the primary current; if an alternating current is impressed upon the primary windings, a somewhat modified form of the same wave will be induced in the secondary windings. If the primary current is periodic and pulsating the secondary current will he periodic and pulsating also. If a direct current is used an interrupter must be employed, otherwise the step-up transformer, which is what it amounts to, will fail to work. There must be a variation in the primary in order to produce induction in the secondary winding of the same coil to get the result.

3. The difference between a direct and alternating current is indicated by the language. A direct current is one which flows in one direction only. An alternating current is one which flows alternately in opposite directions.

4. A selective - type transmission is one which is so contrived that the operator may select at will the gear into which he wishes to engage, without having to engage the respective gears from low to high progressively, or from high to low progressively.

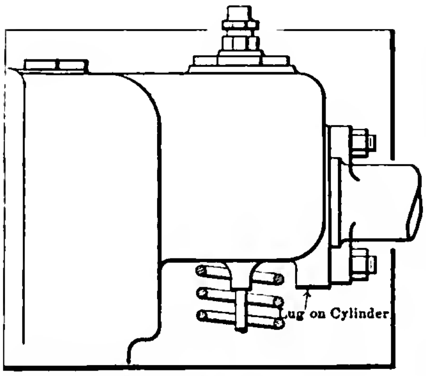


Fig. 3—An over-hang lug on a cylinder that is likely to break off any time

Merely Looking for Automatic Carburetion

Editor THE AUTOMOBILE:

[2,307]—On account of a difference of opinion between various automobile users, I wish you would answer the following questions through your inquiry columns:

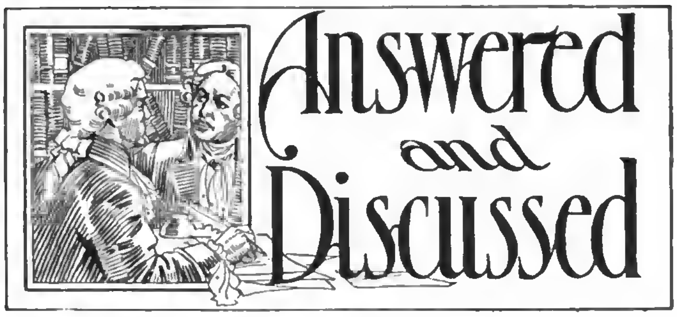
1.—Has it been your experience, or in your opinion is it possible, for an internal combustion gasoline motor to be so built that spark and throttle can be rapidly advanced with the machine under load and still not cause either a spark or gasoline knock?

2.—Is it possible to get a carbureter which, when adjusted for normal temperature, will work equally or nearly as good without adjustment on a cool or damp day?

St. Bernard, Ohio. LESTER E. KEMPER.

1. Sudden changes of the character or quantity of mixture when a motor is laboring should cause trouble. Shock is a bad condition to induce in anything. A motor is no exception to the rule.

2. A properly contrived carbureter will compensate within reasonable limits under all likely conditions of temperature change; the auxiliary air is usually heated before it enters the carbureter so that weather questions are more or less eliminated. The fact remains that the viscosity of gasoline changes considerably with temperature.



Trouble Will Come Soon Enough

Editor THE AUTOMOBILE:

[2,308]—I have had several arguments with friends as to the advisability of using ground cork in a selective transmission, also as to the use of Dixon's graphite and cedar sawdust mixture. I rather favored the idea that either ingredient would have a tendency to keep lubrication away from either the roller or ball bearings. Am I correct in this supposition? What do you advise where first and second speeds are not so quiet as one might wish?

Romney, Ind. C. L. B.

If the transmission gear is not properly made, and it emits a tuneless grind, no amount of sawdust will eliminate the prime difficulty. This cruel treatment would probably destroy a good transmission gear. Perhaps the noise can be reduced to a tolerable level by copious applications of beeswax, which will have to be applied to the teeth of the gears after they are warmed up sufficiently to melt the beeswax. Beyond this, a proper amount of suitable transmission gear grease should be used. The transmission gear grease may carry the right proportion of Dixon's graphite, which is regarded as an efficacious luhricant. The treatment here recommended will not interfere with the lubrication of the ball bearings. It is useless to recommend that you use one of the available gear ratios; the road condition will settle this phase of the problem automatically. Fix the automobile up so that any one of the gear ratios may be used when the road condition demands, otherwise the automobile will have all the minus virtues of a sore thumh.

Air-Cooled Motor Starts on the Spark

Editor THE AUTOMOBILE:

[2,309]—I have started a 4-cylinder air-cooled motor on compression after removing plugs and cleaning them, which was said to be impossible in your "Letters Interesting, Answered and Discussed." Please let me know why this is impossible.

New York City. SUBSCRIBER.

This question was very completely answered in THE AUTOMOBILE of June 2, under the caption "How About Starting on the Spark," beginning on page 998.

In the meantime it might be well to add that starting on the spark, when the conditions are such as to make it possible, is no very great sign of unusual quality; it is one of the things to be expected of a motor with enough cylinders, provided the gasoline is heated up to its boiling point. In other words this is largely a problem in connection with the gasoline, and to a very slight extent with the motor.

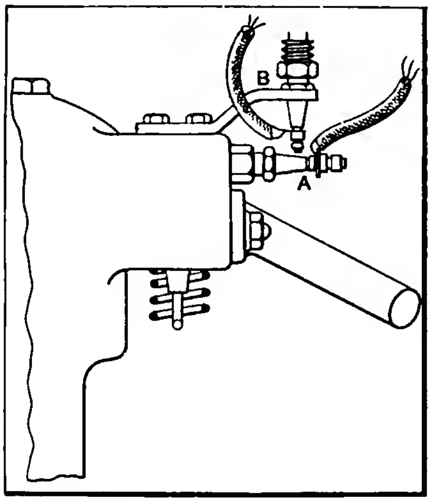


Fig. 4—A means for facilitating the testing of spark plugs, especially when room is at a premium

Studies in Aviation Theory and Practice

By MARIUS G. KRARUP.

THE machine will stop advancing in the new upward direction and it will fall, unless it is self-righting; that is, unless the wind, in tilting the machine upward, has stored a power of gravitation which, in conjunction with the arrangement of the air resistance to movements of its areas, will bring it back to a horizontal position.

If the machine is tipped too far laterally at the same time as upward, the ability to return to equilibrium by operation of rudder planes of any kind, is still further reduced. Reserve power in the motor, to be turned on at such moments, would, however, be very helpful, but would tax the aviator's art or presence of mind.

If the motor becomes stalled at the same time, as is more likely to happen during a disturbance of the balance than when the machine is on an even keel (carbureters in which the gasoline might swash away from the needle valve would seem to be dangerous in this respect), and the machine takes a position in which gravity will not operate it safely, there is no art which will restore the equilibrium by means of rudders. This property must be in the machine itself. In other words, either control by rudder action must be supplemented by some form of control by power (both gravitation and speed are, of course, power elements) which, unlike the ordinary speed of the machine, is independent of the normal but not assured coincidence of direction of propulsion with direction of motion, or, the two available factors, gravitation and the shape and distribution of areas, must be enlisted by the designer of the aeroplane to establish a progressive resistance against the disturbance of equilibrium. Such progressive resistance compounded from the two factors mentioned, as will be readily understood, is the essence in the property of self-righting for a heavy body in air, though the same property is more simply constituted in the case of the lifeboat. By calling both these means into requisition, one for forcibly restoring equilibrium under conditions when the customary rudders become useless, and the other for maintaining it, some independence of weather would seem to be in prospect. And both these means seem to be available in the aeroplane without departing far from its type. A discussion of them should constitute a study in equilibrium.

Arrived at this milestone in the analysis of equilibrium, one finds the subject split into two divisions, equilibrium by control action, which should be reduced to its simplest and least perplexing form, so that the art of aviation shall not depend too much upon exceptional personal traits or qualities in the aviator, and inherent equilibrium or stability, which must be built into the machine, must be the basis for control action, but must not be so pronounced as to interfere with the range of this control action or with quick results from control action within the desirable range of the latter. It must permit considerable deviation from the normal horizontal poise of the structure without offering great resistance, but the resistance must be progressive.

If either control or stability depends upon speed, it is not well secured, as motors may be stalled and wind may interfere with direction, which is a vital element in speed, and may also interfere with that advance movement with relation to the surrounding atmosphere which is the other vital element in speed, as this term is understood in connection with this subject.

In aeroplanes of the present day there is some stability and some control, but, as shown in practice and explained in the foregoing, at least in part, not enough stability to make control safe and not enough control to make up for the shortcomings in stability.

All the control elements are rudders adjusted to act only when momentum is available in a direction which comes within the range of about twenty degrees on either side of the normal direction of the rudder areas, or when gravitation may be made to act within the same narrow range. There is lacking a power element which, assisted by increased stability, will produce control or rudder action when ordinary rudder action would be exhausted. For example, the machine is tipped laterally by a gust of wind, while the motor is stalled. The natural balance of the machine—and this balance must exist and does exist in every machine which is capable of descending safely when the power gives out—now permits the aviator, even if the momentum is at the minimum, which makes the tilt-rudder or deflector useless, to take the descending-tilt and gain some speed by the power of gravitation, and by means of this speed he can correct the lateral tipping by warping his planes, and he can emphasize this righting action by clever use of his side-steering rudder. Both these control actions would be of very slight effect if he could not gain speed first by gravitation. Now it is evident that in unfavorable weather he might not get sufficient time to gain speed by gravitation before the machine was upset laterally. Also, if the wind had tipped his machine backward as well as laterally—with the motor stalled and momentum gone—his natural balance, which ordinarily tends to produce a suitable descending-tilt, may be so nearly exhausted by the half-upset position of his machine in the air that he cannot get back to a safe position at all with the means at present employed. He needs the new additional control element referred to above, and, like all control elements now employed, it must be actuated by power of some kind, in order to fight the disturbing gust of air. The supposition is that the motor power has failed or has become useless for control, because the only areas it has to act upon, the customary rudders, have been thrown out of commission by the power's insufficiency to produce the progress through the atmosphere which is required for rudder action. This is the situation, when the wind throws the nose of the machine so sharply upward that the sustaining action of the planes is lost or almost lost, and it consequently remains for momentum and direct propeller thrust to overcome gravitation.

The forms of power available for the new control element are motor power, which it is not permissible to depend on, gravitation and the aviator's muscular power. All these are used in the customary control system, but their use is limited in utility by the constant relations established in the aeroplane by its designer between the direction of the power thrust and the direction of the main plane, or planes, as well as the normal direction of the control planes. It has been the gist of the foregoing remarks to indicate how the wind may make this limitation a sharp and decisive one, acting in conflict with gravitation instead of in unison with this force. Now, what is left, without changing the type of an aeroplane completely, in order to give the necessary range and power to control action? Gravitation is the only force which acts in a constant direction, wind or no wind. It ought to be the sheet anchor of the aeroplane. The motor power which is more or less unreliable and whose direction depends upon the very wind which it is meant to counteract through its influence on control planes and main planes is intrinsically not quite fit for the work. The main and control planes, which are also shifted around in the wind and whose action moreover depends on either the motor or gravitation, preferably both, are also in themselves insufficient. How can gravitation be called to work to right the machine, independently of the position which the wind has given it? By employing one constant force always available, which is the aviator's muscular power, to release the force of gravitation or overcome the force of gravitation, as the case may be, and thereby changing the relations of the main planes, to the center of gravity of the machine and to the direction of the machine's movement against atmospheric resistance.

Relative mobility of the weighty parts and the planes of the machine is the only means left for control action, after the wind has exhausted the resources at disposal in the form of natural

inary rudder action. It is also the means em-
/ by all winged creatures. The distinction be-
and rudder action is that it acts directly on the
uscular power or gravitation, while the rudders
the main planes by the intermediation of either
or gravitation, and may fail to act. Whether
of the parts of an aeroplane should be employed
the use of various small control planes or as
stomary system, is a question on which theorists
in general will naturally differ. For the avoid-
d design and the extra weight it involves, sole
itive mobility between the weighty and power
roplane, on one side, and the area elements on
uld seem to be advisable, and this would also
of the aviator. But in practice less radical
ly to prevail. The warping of wings in the
and in those of other designers who follow
le, may be mentioned as a control action akin
posed, in so far as it consists in a change in
main planes effected by direct muscular action
thout the assistance of gravitation, however.
limited scope, it is used principally for steer-
ht degree for assisting in preserving the equili-
ng of weights, especially the weight of the
been frequently proposed as a means for
sufficient for effecting quick changes in the tilt
lanes or in their lateral equilibrium, while also
cting the relations between the planes and the
pulsion. When equilibrium is to be regained,
se, that the relations at that moment existing
s elements require to be changed, and the
its the changes to be made most radically is
nd resourceful one.

e into construction details, the system which
ed as necessary for safety in bad weather
d theory, practice having shown the present
involves the rotation through a small angle
plant and the aviator, as well as the whole
anes or whatever is retained thereof, in rela-
nes.

s, the main planes or plane (if a monoplane
doubtless be divided into two wings which
parately, the motion of one compensating
her, as in warping, or the two wings may be
s for rising or descending. In the latter
control movement of the aviator will be
sisted by gravitation, according to whether
are to be raised or lowered, but under all
ect must be a mutual one; that is, the full
d between the portions carrying the power
trol members, on one side, and the carrying
h adjustability is required laterally as well
fore-and-aft equilibrium may be doubted,
ich turns one wing of a main plane sharply
affects the sustentation on that side, and it
l necessary control motions may be accom-
l means for adjusting the lateral balance,
just as no such means exist with the present system, but i
Nature all fliers have in addition the ability to raise one win
tip much higher than the other, thereby reducing sustentation o
the side which is raised most.

While there seems to be no logical escape from the necessi
of the system which has here been indicated in its large feature
the mechanical details involved in executing it mean no dout
a considerable addition to the cost of production for aeroplane
and the employment of much ingenuity to keep the weight of th
machine within bounds, since the relative movements of the tw
principal portions of such a machine as contemplated call fo
much greater strength of construction than is necessary in th
present type.

The smaller these movements may be made, while yet sufficier
for their purpose, the better are evidently the chances for devisin
a control apparatus which will not be too bulky and weighty, an
the better may all forces be economized in its operation and th
work of the aviator lightened. All other suitable means for pre
serving equilibrium, in addition to the system of relative mobilit
of parts, should therefore be employed. Among these means in
herent stability comes perhaps first, and this forms a separat
subject. But reserve power and the greatest possible reduction o
the areas of the carrying planes are also important element
The reserve power which may be thrown into the propellers an
faithfully transmitted by these driving-wheels of the aeroplan
to the responsive atmosphere will permit propulsion at a steepe
angle than a lower power will support, and may save the balanc
of the machine when the wind may have cast it around to suc
a steep angle. Generally, it is readily understood that in an
position of the machine the speed resulting from propulsion i
always a helpful factor, as the effect of every control movemen
is governed by both speed and gravitation, and speed is th
variable of these two factors. Both the development of goo
motors and the efficiency of propellers are therefore bound u
with the problem of equilibrium. With regard to the area o
the planes, this must of course be determined in part by the loa
and somewhat by the speeds which are considered maximum fo
safe starting and stopping, but, other things equal, it evidentl
serves equilibrium to employ planes with a maximum of sustenta
tion per square foot, a strongly curved plane rather than a fla
one and all improvements which may be devised to make sustenta
tion efficient, as the disturbing influence of the wind will as a rul
attack the machine with a force commensurate with the area
and without regard to their penetration or resistance to propul
sion. And the smaller resistance to propulsion is at present th
only argument in favor of flat planes or planes with small curva
tures. When operating with muscular power and gravitation a
the active factors for changing the relative positions of planes an
weighty portions, it is also evident that the small areas are mor
easily pulled to the position it is desired to give them.

It is believed to have been shown that equilibrium is not
separate property of an aeroplane or to any great degree th
result of an art of the aviator, but a product in which all factor
in the construction of an aeroplane enter deeply for consideratior
The question of inherent stability remains for separate discussior
its merit requiring treatment in a way to bring out, unhamperec
the salient features.

›ming Events in the Automobiling World

it, Mich., Industrial Exposition, Detroit
of Commerce.

es, Hill-Climbs, Etc.

nati. Seventh Annual National Reliability
or Glidden Trophy, Through the Southwest.
Jefferson, Long Island, N. Y., Hill-Climbing
st. Automobile Club of Port Jefferson.
bility Run, Automobile Club of Philadelphia.
ce Hopatcong, N. J.
uis, Mo., Three-day Reliability Run, St.
Manufacturers' and Dealers' Association.

July 1-4..........Indianapolis, Ind., Track Meet. Cobe Troph Race—Held on Speedway Track, Chicago Automobile Club.
July 1-10.........Los Angeles, Cal., Road Carnival of License Dealers.
July 2-4..........Los Angeles, Cal., Speedway Meet.
July 2-4..........Wildwood, N. J., North Wildwood Automobil Club, Speedway Races and Club Run.
July 4............Auburn, N. Y., Hill Climb of Automobile Club o Auburn.
July 4............Cheyenne, Wyo., Track Meet of Cheyenne Moto Club.

THE AUTOMOBILE

Vol. XXII Thursday, June 23, 1910 No. 25

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

WHY should the hoarders of gold cry "wolf" every time they see an automobile go by? It is easy enough to understand the mutterings of those who, in view of their cuteness, coupled with a little learning, are trying to earn their stipend. But, why should men who have money to lend want to stifle an industry? The automobile has the fault of being relatively new; for this reason it is open to suspicion. It is right to be conservative, but it is a crime to be stupidly so.

* * *

The best answer to the charge that men who cannot afford it are buying automobiles, is at the beck and call of every man in America; let him but look over his list of acquaintances, and decide for himself whether or not the owners of automobiles that he knows are beggaring themselves.

* * *

It is claimed that the automobile is a plaything; that it has no economic value; that it lures men into idleness. Must a man work his nails off, reduce himself to a stage of mute idiocy by all work and no play, and then step aside for a newer, fresher slave? Is there no sign of economic advantage in going out into God's fair country, filling his lungs with oxygen, getting a glimpse of the green fields, recouping the energies that lag, and, in fine, come back invigorated, ready to do more and better work? Is it an economic advantage to die acquiring experience?

Do bankers object to having men purchase beef to eat? Why should not these same men purchase oxygen to consume? Is beef a better preserver of life than oxygen? Is it not necessary to go to a slaughter house for beef? Can pure oxygen be had in an ill-smelling shop? Is it not an economic advantage to jump into a swift running automobile and ride out to the storehouse of oxygen for the supply that cannot be obtained otherwise?

* * *

Wise financiers long ago recognized the economic advantage of quick transportation, the liberal dissemination of information, and the results which follow when men and women learn more about each other than they are likely to know if they all stay at home. Are we to forget the fate of China; what befell 400,000,000 of the earth's inhabitants when they elected to isolate themselves and forbade communication? Is there any difference between the "Wall of China" and the wall that surrounds the man who does nothing but go to business and come home at night? His family gets to know him as a dull bore; his neighbors forget that he is on earth.

* * *

Does the economic situation demand that men shall so abuse themselves by all work and no play that they will be hated by those who do not know them excepting as dollar-chasing plodders, and hated more by those who know them best, because they are made into cranks by overwork and lack of fresh air? Must men surrender the love and esteem of all who are in a position to judge of their qualities in order to satisfy the economic situation? Can a man command love and esteem when the smile that cheers wears off, and its place is taken by a pensive drawn map of dull care? Who ever succeeded in keeping dull care as a companion in an automobile for more than the time it took to ride out past the last house and give the weazen-faced beggar one glimpse of Nature?

* * *

When the steering gear develops enough lost motion to annoy the chauffeur, it is pretty nearly time for the owner of a car to call in his family lawyer, make his will, and arrange his earthly affairs. The chauffeur is not easily annoyed; his acquaintance with lost motion, if he is the kind who waits until enough of it developes in the steering gear to annoy him, must be that which would be designated as intimate. Of course the owner of the automobile has one other choice—he can look for a new chauffeur; but before the new chauffeur accustoms himself to lost motion it will be in the path of wisdom to get a new steering gear. True, the old one might be repaired, but it is highly improbable that an ordinary worm and sector, after lost motion develops, can be corrected sufficiently to make it worth while. In any case, the class of steering gear which develops lost motion freely is probably a member of the family which has "defective design" engraved on its crest.

* * *

Judging from the character of the declarations which are being made by the makers of 1911 automobiles, descriptions of which are now rapidly coming out, the newer models are more in the nature of 1910 models refined than outright new designs.

hat the Brains of the Industry Say About Finances

Some of the "abstract" thinkers who devote their time to economic problems, not being used to efforts in a large way such as the automobile represents, are endeavoring to refrigerate the further efforts of active workers in the vineyard by means of radiant energy from "cold feet." History was made by the character of men who do things and a series of editorials, as here presented, reflect at first hand what the brains of the industry has to say about financing.

Death-Bed Speculation

H. E. COFFIN,
CIETY OF AUTOMOBILE ENGINEERS

ntlemen have recently aired vs as to the motor car pon the economic conditions . Mr. J. T. Talbot, Chan- the Hon. James J. Hill have t at the rubber-tired pests to swarm over and destroy country much as did the cal fame. Other views of ve been aptly presented by and Briscoe.

we do not all agree upon this subject. I believe ever all agreed upon any one subject since the the probabilities are that we never will.

1 of Mr. Hill's persuasion would have us all one-horse chaise in which most of us have gone e centuries past. We are surprised to note this e part of a man who owns as many railroads . We will expect next to hear him advocating ransportation of a hundred years ago.

hink Messrs. Reeves and Briscoe have replied the remarks of the other gentlemen mentioned. us to say a few words as to a few of the esti- enditures for 1910, because we are most of us cked when we hear mentioned such sums as h expressions may roll easily off the tongues of and Talbot, but they give most of us a cold ures quicken our pulse, because they represent most of us have ever thought there could be in atement that this amount will be expended this try for automobiles makes us feel more like siness affairs than did the proximity of Halley's after all, the American citizen is a pretty good e first shiver we are still willing to admit that e some money, but are inclined to get out the ow much we are spending this year for other ll of us apt to ask ourselves whether some of have in the past done or will in the future do s a nation as much good as will the automobile. r intoxicants alone during 1910 $1,800,000,000— as for motor cars. During 1910 we will spend 0,000—between two and three times as much For life insurance we will invest $550,000,000. Now, we can't help believing that a little economy in the money spent for booze and tobacco might be a very good thing for us all and it would not take very much economy upon these items to buy a devil of a lot of automobiles.

ident Society of Automobile Engineers

Life insurance is a very good thing —after a man is dead. But unless a man is 86 years of age, and has married a young wife, it is a ten-to- shot that his family would rather have spend a thousand dollars for a health- ing and life-prolonging family motor than to lay up his coin in the form of a c consolation after he has been planted. is barely possible, too, that he might prolong his life as to take care of the surance policy as well as of tires, gaso and lubricating oil. All this entirely a from the question of the pleasures in wh the family share—the evening trips into country, the Sunday rides, and the th sand and one little enjoyments so gener denied to the working man because of transportation limitations.

It is not to be expected that a lot of us should appreciate what these things mean. A good many us, like Mr. Hill Mr. Talbot, can afford to own a private car or two and do a of other things beside which the little jobs and pleasures of man who slaves ten hours a day look mean and insignificant.

Even the figures given above do not give a very good idea to our yearly expenditures for things other than these fo wheeled "calamity carts." We have mentioned only two or th of those things which might strictly be termed the "unnecessari of life. But we do not for a moment place the motor car in classification. The horseless vehicle, the pleasure and commer car are with us to stay, just as certainly as are the steam electric railways and the steamship lines—just as certainly are the telephone and the telegraph—we could not do with them. The motor car is an indispensable factor in progress

The comment, favorable or unfavorable, of such wor gentlemen as Messrs. Hill, Day, Talbot, Reeves and Briscoe r strengthen the interest in the motor car and may help to fo the attention of the country generally upon the tremend growth and importance of the automobile industry. It will help in the cause of the greatest benefit to our civilization si the days of Fulton and Stevenson—almost since the days of Ad

Our hats are off to the motor car and to the men wh work has made the motor car possible.

Payroll Goes to Great Army

By THOMAS HENDERSON,
VICE-PRESIDENT WINTON MOTOR CARRIAGE COMPANY

It is difficult to understand how money expended in the p chase of motor cars is a menace to the country's finan Finance is beneficial to any country only as money is distributed among the industries. Money while stored in banks is serving no good purpose, and when used for gambling on the stock exchange may be doing positive harm; but money expended in the purchase of motor cars is of benefit to many industries, since the

Thomas Henderson, Vice-President Wi ton Motor Carriage Company automobile makers' payroll is distributed to a great army of heads of families, who in turn distribute it to the grocer, the butcher, the clothier and the real estate dealer. The automobile manufacturer in the payment of his bills for supplies distributes money to the iron and steel industry, the lumber industry, the leather industry, the rubber industry, and the paint industry, and these industries in turn distribute the money to their employees, who in turn distribute it to the grocer, the butcher, the clothier and the real estate dealer, and in its passage from hand to hand the banks profit. What industry is injured? Is it wrong to give employment to many men and to help them live comfortably? Is it wrong to take money for a product that saves time, decimates distance, takes its purchasers out of doors, gives them service, enjoyment and health that they can secure in no other way? Suppose even that people buy motor cars who can ill afford to do so, what is the result for each such case looked at in its first light—the individual purchaser makes a mistake that cramps him, and money that he does not know how to use properly is put into circulation among the country's workers who do know how to use it; thereby the country's balance is preserved. As a matter of fact, that talk of foolish buying is largely exaggerated. Among our thousands of patrons we fail to recall one who is not amply able to maintain himself and his family without the slightest inconvenience due to his motor car purchase. The motor car industry was practically the only industry giving regular employment to men during the panic of 1907 and the years following, and an industry that can do that is one that the money industries ought to support and not hinder. Incidentally, this campaign against motor car buying seems to be prompted in but one quarter. Might it not be well to investigate that quarter?

Thoughtless Men Can Do Great Harm

By BENJAMIN BRISCOE,
President United States Motor Company

Recent spasmodic statements emanating from prominent men who have attacked the automobile as representing an economic waste, "a menace to the American home," etc., have aroused the indignation of motorists throughout the country, and statements emanating from such prominent men as James J. Hill, Chancellor J. R. Day, of Syracuse University, and Mr. J. T. Talbot, of the National City Bank, New York, call for a reply not because what they say is true, but because of their prominence. Thoughtless men can do a great deal of harm, whether those statements be founded upon facts or fiction.

During 1909 there were made in the United States, approximately, 120.000 automobiles at an approximate valuation of $150,000,000. For 1910 the indications are that there will be sold about 180,000 automobiles for which the valuation will be in the neighborhood of $239,000,000. Separating the 1910 automobiles by price, the following, I think, is a fair approximation:

Automobiles ranging in price from	Number of cars 1910 production	Selling Retailing at
$ 485 to $ 750	16,000	$8,800,000
751 to 1,000	49,000	41,650,000
1,001 to 1,250	58,000	64,000,000
1,251 to 1,600	22,000	33,000,000
1,601 to 2,000	8,000	14,000,000
2,001 to 3,000	15,000	36,000,000
Over 3,000	12,000	42,000,000

To secure a correct idea of the economics involved it is necessary to have these figures before us, because by having them we realize to how great an extent the automobile is coming to be a business vehicle. Generally speaking, all cars up to $1,250 are a very considerable part of the time used for business purposes—that is, as an aid in one way or another in production.

It is safe to say that fully half of the use of the next two classes—that is, cars selling from $1,251 to $2,000 and from $2,001 to $3,000—is devoted to commercial use. This use represents improvement in the facility of production. We may admit for argument's sake that cars selling above $3,000 represent mere enjoyment and health-giving recreation. Many business men, however, use these high-priced automobiles to and from their business at a great saving of time, with consequent enjoyment of their producing value.

Follow the dollar paid for an automobile, and what becomes of it? It is distributed for almost countless purposes. It is wages for working men; it builds their homes; it educates their children; it furnishes employment for almost every class and kind of mechanic; it circulates as lively when used in the automobile business as in any other business except perhaps banking.

The automobile has brought the country nearer the city; it has raised land valuation in nearly all sections of the country; it has cured sick people when medicine did them no good; it has made the strong stronger and the automobile is wiping out more border lines and through the automobile there will be no South, no North, no West, and no East. It is bringing the ruralite and the city folks into closer connections. It has been the cause of making hotel proprietors and merchants in country towns more prosperous and has given employment to thousands.

This, then, is the great industry which these men would lead the country to believe is an "economic waste" and a "menace to the American home." I believe that the intelligent people of this country will conclude that the automobile is worthy.

3,000,000 Automobiles for the Farmer

By FRANK BRISCOE,
President Brush Runabout Company

I believe that an understanding of the automobile business and its future will be made easier if all of us will have the courage to act on what we really believe. By taking the attitude that it is too good to be true, we not only fail to get all there is in it during the time of the "ups", but we also get into

Benjamin Briscoe, President United States Motor Company

Coker F. Clarkson, General Manager Society of Automobile Engineers

S. D. Waldon, Vice-President Packard Motor Car Company

Alfred Reeves, General Manager, Association Licensed Automobile Manufacturers

Frank Briscoe, President Brush Runabout Company

B. F. Everitt, President Metzger Motor Car Company

the habit of thinking that there can be no "downs," as is the case with every other business.

In this topsy-turvy condition, we find it a stigma of shame to have any goods to sell, and it seems to be considered good advertising to tell the public that we have fine cars, but that they will have great trouble in buying one, and that even if they place their order, they probably can't get delivery. This false standard has got to go before the business will be right.

In considering the future of the business, we have two elements—supply and demand. The demand, heretofore, has grown by itself, and we have been struggling to create a supply. We are now getting somewhere within gunshot of the present normal demand. In fact, we now hear mysterious rumors that the supply has caught up with the demand as to certain types of cars in certain places.

The present situation seems to consist of the following elements: The season for buying pleasure cars is now growing old Our bad habit of announcing next year's models nine months ahead has something to do with this marking of seasons.

In view of the vastly increased production plans for next year, we must now turn to the other end of the business, viz., the demand, and study that. There are two kinds of demand—the active and the passive. The active demand is when people insist on buying goods of their own volition. The passive demand is the kind that is created in you when the piano salesman, after camping out on our lawn for three weeks or so, finally cajoles you into a purchase, against your will and expectations.

Heretofore, we have never done much with this passive demand, although in most other lines it is the greatest end of the business. Personally, I shall welcome the time when we begin to need the passive demand. It will eliminate the high-salaried order-takers and substitute for them real salesmen who earn their money. It will prevent the wild craze to start new companies which are alike demoralizing to the trade and damaging to the public. It will also prevent serious over-production, as it will give us some idea of the limits of the demand.

I am absolutely firm in the belief that the ultimate normal demand in the United States will be upwards of 500,000 automobiles per year. We could not sell that many this year, or next year, due to the fact that the selling mechanism is not even complete enough to take full advantage of the active demand.

Before we get through, there will be 3,000,000 automobiles in daily use on farms. The average per capita used in cities is not half what it will be. Ninety per cent. of the physicians, city salesmen, collectors, grocery stores, etc., etc., etc., will have them, because they must. Gasoline excels oats in economy, speed and service. There is no other answer.

Those of us who in the time of plenty have been storing up equipment and organization against the time of need can have nothing but the most optimistic outlook for the future.

The Manufacture of Automobiles Requires Skill

By CHARLES MOORE,
Secretary-Treasurer Security Trust Company, Detroit

The supremacy of Detroit as the automobile manufacturing city of the United States is assured by the number, and particularly by the variety, of the types of machines manufactured here; and also by the production of automobile accessories here.

The location of these manufactories in Detroit was not fortuitous. The wave of manufacturing progress began in Europe after the Franco-German war had settled the status of the German Empire. When the wave reached this country articles requiring skilled labor for their production began to find a location in Detroit, until now more kinds of manufactured articles are produced in and around Detroit than in any other city in the United States.

The future of the automobile seems certain. As cities increase in size—and all the large cities in the whole world are increasing—two forces are at work. Those persons who can afford to live in the country will do so. Those persons who are forced to live in city flats will seek to get out into the open for their pleasure. Therefore, both the suburban estate and the city apartment promote the use of the automobile. The doctor, the architect, the builder and various other professions and occupations not restricted by neighborhood require the automobile. Long-distance deliveries from stores and shops already demand the use of the automobile. The farm motor now in process of development on the Ford 1,200-acre farm at Dearborn promises to do more work in a day than can be done by six men and twelve horses. At least such are the unofficial reports.

People fear that the automobile is a fad, and will disappear like the bicycle. Only a superficial view of the situation suggests a likeness. One difference between the two is that with the bicycle one rode and walked at the same time.

The courage, capital, energy and perseverance of the younger generation of Detroit business men have established the automobile industry in this city; and to-day they are devoting their abilities to strengthening the foundations of the business and putting the structure into shape. Permanency rather than expansion is now the watchword with the established companies.

Automobile Industry's Benefits Widely Diffused

By ALFRED REEVES,
General Manager Association of Licensed Automobile Manufacturers.

It is regrettable that the automobile industry cannot benefit every other line of trade. It is true that it benefits scores of different lines, but the trades not advanced naturally make the motor car the subject of criticism; pessimists now declaring that its death is near at hand, just as they have been making declarations of a similar nature for the past few years.

Never giving a thought to the economical advantages that make it an important factor in our fast-moving life, these pessimists declared at first that the motor car was only a fad; then it was stated to be a luxury for a few; then a necessity for a few; and now, with almost 400,000 motor cars in use, the business of making them has recently been termed by men (who could not have taken more than a casual survey of the situation) to be an extravagance, a waste of capital and representative of everything that is bad.

Scores of trades have benefited by the manufacture and use of the automobile, but leaders in other lines can too easily blame the modern vehicle for any slackening in the demand for their products. Some few highly respected and learned men have undertaken, presumably without investigation, to criticise the automobile business. Their position in many cases is illogical. For example, Vice-President Talbot, of the National City Bank, appearing before the Texas bankers, said that the motor-car manufacture was a woeful waste and extravagance, and indicated that the business was coming to an end. On the other hand, his associate vice-president in the same bank, Mr. H. M. Kilborn, has just organized and heads a company to make automobiles.

People of late may have declined to buy stocks and bonds (the result possibly of what they have learned from recent investigations), so we have a prominent railroad man who blames the automobile for this. Chancellor Day, not to be forgotten, follows in the same footsteps.

The many reasons for the growth of the automobile industry, the fact that it is the greatest advance in the individual transportation line since the days of the Roman chariots, and the further fact that it is almost as important a factor in the economics of the country as the railroads, all prove what grave injustice some of the leading men are doing the industry, which, without the help of Wall Street, without the blare of trumpets, but by hard work on the part of the pioneers, and scientific study, has developed into one of the greatest of American industries. Its use has not cheapened the horse nor decreased its numbers, according to figures recently published. The motor car has simply filled a place and supplied a want which has been open for years. It has enabled people to be transported, and has permitted the transportation of goods with a greater degree of comfort and safety and in faster time, and for that reason is certain to have its use increased.

It is safe to say that fifty different lines of business have been benefited by the manufacture of automobiles, which has distributed millions of dollars every year to other trades, to the real estate field, to hundreds of thousands of laborers, and to the railroads, whose freight shipments of motor cars supplies no mean part of their revenue.

The raw materials used in the manufacture of the motor car include steel, brass, iron, wood, leather, aluminum, glass, cloth, cotton, oil and electrical apparatus.

The trades which have prospered as a result of the industry are far beyond what would appear at first thought. They include machinists, blacksmiths, assemblers, pattern-makers, tool-makers, electrical workers, carpenters, trimmers, finishers, upholsterers, painters, body-builders, mill wrights, tinsmiths.

Those gentlemen, who have undertaken without careful consideration, to warn the public against the automobile industry, are doubtless now aware, through the information which has been supplied in recent articles, of the error which they committed in making statements that were apparently without foundation, and which appears to be only the cry of those who may have been slightly hurt by the advance of the motor-car industry.

Automobile the Triumph of Evolution

By COKER F. CLARKSON,
General Manager Society of Automobile Engineers

The outcry against the automobile, as to its great and increasing popularity, despite the prices at which it sells, is the hoary old cry against progress. That the world needed this improved system of quicker transportation, and was ready for it, has been proven by the immediate and well-nigh universal response to and approval of it. As the telephone, by its practical annihilation of time and distance, has in many substantial respects doubled the hours of every day for the possibilities of practical human achievement, saying nothing of its equal gifts in contribution to human comfort, happiness and manifold enjoyment, so has the automobile greatly increased the possible and even the certain chances for every man who can employ this great new agency, to very often nearly double his day's profit.

The automobile has helped to solve the problem of congestion in cities, and to make possible both cheaper and better residences in the country. In the serious menace of the past few years of the surprising and undesirable growth of city population over country population, the automobile is greatly helping to solve a most important question. It has added new hours of opportunity to every business man's day, contributed to the enjoyment and happiness of his family, and by the creation of a great industry furnished new employment to hundreds of thousands of laborers and many thousands of business men. Instead of encouraging extravagance among those who are not wealthy, it has more often taught those who had not the money to buy a machine, to economize and save to that end.

Why should rich critics deny to those who are not rich the privilege of gaining the means by which they, too, may be able, by comparative economy at the most, to enjoy this last and most remarkable invention for both human need and human comfort? The popular faith in the stories of so many homes being mortgaged to buy automobiles rests most largely, if not entirely, on false assumption—an assumption which has been created doubtless in large part by banking and deposit companies, which naturally believe that the most patriotic and wisest money is that which is kept on deposit, either without interest or at a rate very low. This is not a fitting time to impugn the sense of the large number of American families who have found in the automobile a chance to widen their lives and to increase their joy of living.

One just criticism of our people as a people has been that the average family does not aspire to and gain for itself a life with more of sane and healthful pleasure and enjoyment in it—something to brighten, inspire and gladden it, and joyously make life more worth living. That an automobile can add greatly to the happiness and greatly widen the life of any family able to buy it, no one will deny.

So with the automobile industry, risen to fifth in rank in the American industries, and paying hundreds of millions of dollars for the manufacture of machines—and in the last analysis 90 per cent. of all this money going to the pay of labor—why should college presidents and bankers and railroad presidents be unhappy over the action of many thousands of American families in finding through this great new invention an opportunity for larger happiness and enjoyment?

The automobile is simply a manifestation of the forces of evolution that are working out the world's destiny, and its appearance, in this sense, is no more remarkable than was the advent of discoveries in other lines of endeavor.

The commercial phases of the automobile are practically unlimited. The world wants labor-saving devices. The automobile is one.

From the first the automobile has been the butt of prejudice and doubt. No invention of modern times has had a more bitterly presented antagonism to overcome. The industry was not, however, to be destroyed by the prejudice of men.

The business man who now motors from his residence to his office in town, in place of traveling by train, arrives at his destination with his senses fresh and alert, and with a clear brain to tackle the day's doings. And in the evening, instead of, as under the old régime, reaching home jaded and tired out after a stuffy train journey, he enjoys a motor run which, as a recuperating agency cannot be surpassed, and is fresh for the evening.

Generally speaking, a change has overtaken the entire country as a result of the economical reliable motor car. So much for that. And don't forget that as a result of the existence of the automobile, each year there are spent (aside from the capital and men directly employed) hundreds of millions of dollars; every farmer, hotel-keeper or industrial worker in the nation receiving his portion of expenditures from the use of the hundreds of thousands of automobiles now running in this country.

On the Whole We Are Optimistic

By H. H. NEWSOME,
General Manager McCord Manufacturing Company (Detroit)

There has been a great deal said of late concerning the unprecedented growth of the automobile industry and the "calamity howler" has had his say along with the conservative and the optimistic.

Up to the present time the manufacturers of automobiles have been able to count their sales by the limit of their production and, even now, this may be done with the possible exception of one or two of the medium-priced models. There is, however, every evidence that this condition is fully comprehended by the large manufacturers, as they are now limiting their production to what conservative figuring shows they can sell.

There must be a time in every business when the manufacturing will overtake the sales and we believe that this condition is just being reached in one or two models, and the fact that the industry is reaching a point of stability where the manufacturer cannot go on building regardless of sales, must not be confused with over-production or unwarranted growth. As to the parts manufacturers, their growth is merely a reflection of the automobile builders' growth or, at least, a reflection of their judgment as to demand, because the parts people equip to execute actual orders and, generally speaking, the automobile manufacturer is a positive governor between the parts manufacturer and the automobile buying public.

On the whole we are optimistic of the future and do not agree with the frequently expressed opinion that the growth of the industry is an unhealthy or unnatural one.

Making Preparation to Double Capacity

By B. F. EVERITT,
President Metzger Motor Car Company

In my opinion the automobile business is just started. A canvass of the situation from coast to coast, which has just been completed, points to but one conclusion, i. e., the demand for good automobiles is greater than the present supply, and my company, believing in the situation, is preparing to increase capacity, first, to take care of the 800 orders that lap over present capacity, and again, in view of the positive demand indicated by a systematic call upon the trade. If the incoherent discussion of the economic situation, which is now going on, has any foundation in fact, how are we to account for the pressing demand for automobiles in general, and why are "commercials" now so rapidly filling up the places that once belonged to the realm of the horse?

Not Real Cause for Business Fright

Detroit, June 20 (Special Telegram)—The automobile industry is on a substantial footing because it is the future vehicle business, both in pleasure and commercial cars. It may have its ups and downs, and the tribulations of adjustment to permanent conditions. This is to be expected, and it is not the real cause for business fright.

(Signed) S. D. Waldon, Vice-President,
Packard Motor Car Company.

Detroit Gains Two Factories and Many Buildings

Detroit, June 20—Two new automobile companies have been formed here during the past week. They are the Hupp-Yeates Electric Car Company, $100,000 capital, which will build a new type electric, and a concern headed by Hugo Scherer and F. E. Wadsworth, of the Michigan Steel Boat Company, which will have a capitalization of $250,000 and which will build a small car of more than 20 horsepower; about 100-inch wheelbase, to weigh under 1,900 pounds. This car will sell under $1,000.

The Hupp-Ellis-Rutley Company, a building organization which will undertake the construction work for the Hupp-Yeates Electric Car Company, has also been formed.

Among the other concerns outlined during the week are the following: the Aluminum Solder Company, capital $200,000; the Dominion Stamping Company, capital $100,000, and a large concern to manufacture automobiles at Alpena.

The initial car of the University Motor Car Company, called the 'Varsity, has been finshed. It will be used by the Exalted Ruler of the Elks during the coming conclave. The regular product of this company for next year has been contracted for. The selling price of this car will be $1,300-$1,350.

Buildings to the value of $365,500, to be used for automobile purposes, were projected during the week in Detroit. The chief permits granted to members of the trade authorized the E-M-F Company to construct an addition to cost $125,000, and the buildings of the Anderson Forge Company, which will cost $73,000.

The Metzger Motor Car Company has purchased a large tract of land near Highland Park, where a number of large factory buildings will be erected in the near future. The first of these will be the truck works of the company.

Another concern even larger than the Metzger company is said to be contemplating building a factory in this section of the city.

Buicks and Maxwell Prove Winners

Pittsburg, Ind., June 15—The hill-climb that was held here yesterday was a success; thrce events being run, two of which were won by Buicks and the other by a Maxwell. The distance was 1-2 mile and from a flying start. The grade was 8 per cent. at the take-off.

In the $750 and under event a Maxwell, driven by Reeser, finished in 1:30; Maxwell, B. O. Benn, 1:39 1-2.

$751 to $1,000—Buick, Gardner, 1:57; Buick, R. R. Penn, :58 2-5; Ford, Bartee, 1:00 3-4: Ford, Ryan, 1:03 3-4; Ford, Grider, 1:05; Ford, Eikenberry, 1:10; Overland, Gardner, 1:14 2-5.

$1,001 to $2,000—Great Western, :48 4-5; Buick, R. R. Penn, :50 1-5; Buick, R. R. Penn, :52 1-5; Buick, A. Dunn, :53 1-5; Ford, Grider, :55 2-5; Ford, Ryan, :59 4-5; Oakland, 1:03; Buick, R. R. Penn, 1:06.

Boston Motorists Fight Overcharge

Boston, June 20—The Automobile Legal Association has inaugurated a campaign whereby it proposes to call a halt on hotels where motorists are charged more than other guests. Circulars have been sent out to all the members asking for confidential information of their experiences. One question asks if any garage has overcharged the motorists, and when and where this has been the case, while another one asks regarding hotels.

Some 200 members of the Massachusetts Real Estate Exchange have planned a two-days motor tour from Boston to Springfield and return for June 28-29. Many of the members own their own cars and with those supplied by Boston dealers it is expected that about 50 machines will be used. Gov. Draper and Mayor Fitzgerald of Boston will go along.

The E-M-F car that is laying out the route for the Munsey tour reached Boston Monday and left next day for the White mountains. Driver Skeggs says the roads so far have been splendid.

S. A. E. Will Soon Issue Complete Specifications

Taking Position Formerly Held by "Mechanical Branch"

The good work of the Mechanical Branch of the Association of Licensed Automobile Manufacturers, which was discontinued for various reasons, has been resumed under the direction of the Society of Automobile Engineers, and the revised specifications of materials and methods will be issued at an early date. Among the matters of moment which will be handled is the proper way to heat-treat the several grades of steel used in automobile work.

ANNOUNCEMENT has just been made at the new offices of the Society of Automobile Engineers, 1451 Broadway, New York City, that the society has completed the preparation of, and will issue shortly to its members exclusively, the most complete list of material specifications ever made for motor car engineering work.

The engineering end is the originating or creating element of the automobile business. The adherence to sound engineering principles of designing and construction spells safety and economy, both to the motor car manufacturer and to the user. Too much stress cannot be laid upon the choice of the proper material for each motor car part and too much care and knowledge cannot be exerted in the treatment of these selected materials. The reliability and the satisfactory performance of the motor car are dependent entirely upon the wisdom which has dictated the design and selected or specified the materials for its construction.

The motor car business has been largely responsible for the great development of certain materials, particularly alloy steels and other metals. The list of material specifications to be published by the Society of Automobile Engineers is not a list of theoretical possibilities, but a list of materials, the qualities of which have been thoroughly demonstrated for motor car uses. These materials are practical in that they can be purchased readily in a commercial way, can be worked economically and are in every respect suited to withstand the severe service to which they are subjected in the motor car. Individuality of design is one thing and should be encouraged. Individuality in specifications for raw materials is largely useless and should be restricted within reasonable limits. Special specifications upon materials mean high prices and a restriction of the delivery of raw materials. Standardization is a necessity of progress.

The Society of Automobile Engineers' specifications were prepared under the advice of Henry Souther, metallurgist, and are accompanied by complete notes and instructions on the method of purchasing, inspecting and handling the materials used in motor car construction, in what condition they should be ordered and how they should be treated, before and after being worked into finished parts.

The work covers such materials as low and high carbon steels, carbon spring steel, screw stock, low and high carbon nickel steel, chrome nickel steel, chrome vanadium steel, chrome vanadium spring steel, silicon spring steel, alloy steel for pressed frames, valve metals, steel castings, gray iron castings, malleable iron, babbitt metals, white brass, phosphor bronze bearing metal, valve bronze, yellow brass, aluminum alloys and all kinds of automobile-engine lubricating oil.

There is an adequate discussion of specific materials suitable for seamless tubing, pressed steel brake drums, sheet steel brake bands, and pressed steel parts of many varieties, forgings, axles, structural parts of any importance whatever, steering arms, steering spindles, levers, connecting rods, crankshafts, main driving gears, nuts, screws, steering connection pins, rocker arm pins, parts called upon to resist wear but not bending strains or severe shocks, propeller shafts, driveshafts, connecting-rod bolts, transmission gears, leaf and spiral springs, crankcases, gearcases and many other parts.

A great deal of space is given to matter on the heat treatment of steels. It has long been known that the proper heat treatment of a high-grade steel is as essential for satisfactory results as its composition.

This work will be issued only to members of the Society of Automobile Engineers, the membership of which is open to every man whose interests are of an automobile engineering nature, and whose qualifications fit him for Society of Automobile Engineers affiliation, regardless of his business connections.

Bridgeport After Open Mufflerites

BRIDGEPORT, CONN., June 20—Following complaints of hundreds of residents of this city, the Board of Police Commissioners has issued orders to Superintendent Eugene Birmingham, that every member of the department arrest violators of the State muffler law. This week the officers will start the crusade, and offenders will receive the maximum penalty in the courts. The complaints come from residents in the outskirts, who claim that passing automobiles with open mufflers make sleep impossible at any hour of the night. Investigation has proven that the greater number of offenders have come to the city from New York, and already the numbers of several have been secured. Section 6 of the general statutes of the State, which refers to the use of mufflers, provides a penalty of a fine of $1, or ten days' imprisonment, or both, for every infraction. The local authorities will strive to secure the jail sentence rather than the fine imposed in order that the custom may be stamped out.

In an interview this afternoon Police Commissioner S. E. F. Hallen said: "We are preparing to enforce the law concerning mufflers. We are going about it quietly, but believe the best results will be secured." The only difficulty which will be encountered during the coming crusade will be with the officers making the arrest.

Winners in Good Roads Tour

Charles Jerome Edwards, referee of the recent National Good Roads Tour from Atlanta to New York, has announced the winners in the various competing classes, as follows:

Division 1 A; cars selling for $800 and under—Hupmobile of N. W. Wallace, Jr., Charlotte, N. C., 20 points penalty.

Division 2 A; cars selling for $801-$1,200—Ford entered and driven by E. M. Willingham, Atlanta, Ga.; clean score.

Division 3 A; cars selling for $1,201-$1,600—Cadillac entered and driven by Dr. K. McColl, Bennettsville, S. C.; Mitchell, entered by James A. Gray, Jr., driven by R. Stowe, Winston-Salem, N. C.; both with clean scores.

Division 4 A; cars selling for $1,601-$2,000—Buick of W. E. Wimpy, driven by P. A. Parmalee, Atlanta, Ga.; 108 points.

Division 5 A; cars selling for $2,001-$3,000—Columbia, entered and driven by Marcellus Rambo, Birmingham, Ala.; Pullman, entered and driven by Norman Gallatin; both with clean scores.

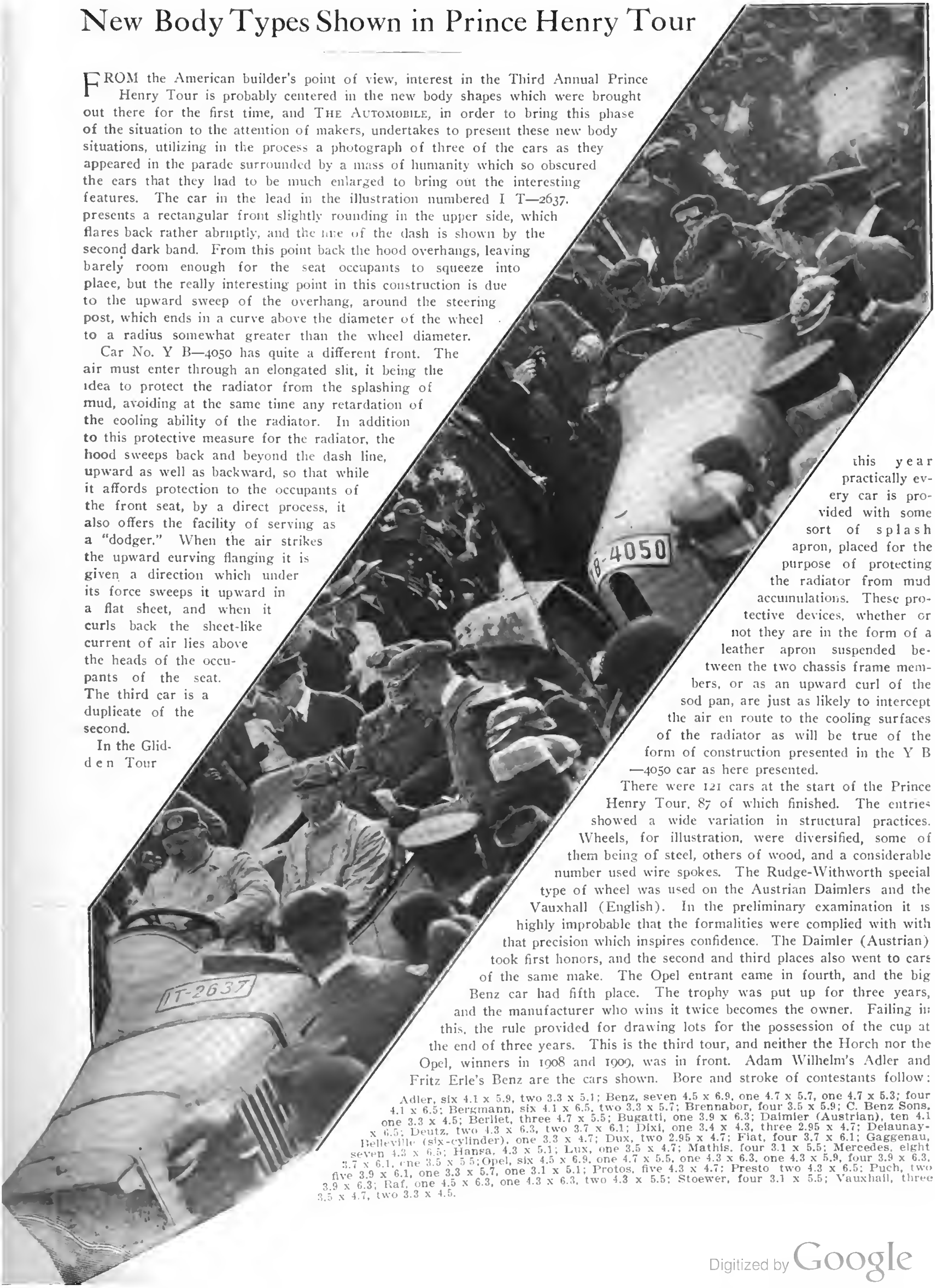
Division 6 A; cars selling for $3,001-$4,000—Pope-Hartford, entered by E. H. Inman, driven by A. L. Almand, Atlanta, Ga.; clean score.

Division 7 A; cars selling for $4,001 and up—Lozier, entered by Asa G. Candler, Jr., driven by F. H. McGill, Jr., Atlanta, Ga.; Pope-Toledo of Edward M. Durant, Atlanta, Ga.; both clean

New Body Types Shown in Prince Henry Tour

FROM the American builder's point of view, interest in the Third Annual Prince Henry Tour is probably centered in the new body shapes which were brought out there for the first time, and THE AUTOMOBILE, in order to bring this phase of the situation to the attention of makers, undertakes to present these new body situations, utilizing in the process a photograph of three of the cars as they appeared in the parade surrounded by a mass of humanity which so obscured the cars that they had to be much enlarged to bring out the interesting features. The car in the lead in the illustration numbered I T—2637. presents a rectangular front slightly rounding in the upper side, which flares back rather abruptly, and the line of the dash is shown by the second dark band. From this point back the hood overhangs, leaving barely room enough for the seat occupants to squeeze into place, but the really interesting point in this construction is due to the upward sweep of the overhang, around the steering post, which ends in a curve above the diameter of the wheel to a radius somewhat greater than the wheel diameter.

Car No. Y B—4050 has quite a different front. The air must enter through an elongated slit, it being the idea to protect the radiator from the splashing of mud, avoiding at the same time any retardation of the cooling ability of the radiator. In addition to this protective measure for the radiator, the hood sweeps back and beyond the dash line, upward as well as backward, so that while it affords protection to the occupants of the front seat, by a direct process, it also offers the facility of serving as a "dodger." When the air strikes the upward curving flanging it is given a direction which under its force sweeps it upward in a flat sheet, and when it curls back the sheet-like current of air lies above the heads of the occupants of the seat. The third car is a duplicate of the second.



In the Glidden Tour this year practically every car is provided with some sort of splash apron, placed for the purpose of protecting the radiator from mud accumulations. These protective devices, whether or not they are in the form of a leather apron suspended between the two chassis frame members, or as an upward curl of the sod pan, are just as likely to intercept the air en route to the cooling surfaces of the radiator as will be true of the form of construction presented in the Y B —4050 car as here presented.

There were 121 cars at the start of the Prince Henry Tour, 87 of which finished. The entries showed a wide variation in structural practices. Wheels, for illustration, were diversified, some of them being of steel, others of wood, and a considerable number used wire spokes. The Rudge-Withworth special type of wheel was used on the Austrian Daimlers and the Vauxhall (English). In the preliminary examination it is highly improbable that the formalities were complied with with that precision which inspires confidence. The Daimler (Austrian) took first honors, and the second and third places also went to cars of the same make. The Opel entrant came in fourth, and the big Benz car had fifth place. The trophy was put up for three years, and the manufacturer who wins it twice becomes the owner. Failing in this, the rule provided for drawing lots for the possession of the cup at the end of three years. This is the third tour, and neither the Horch nor the Opel, winners in 1908 and 1909, was in front. Adam Wilhelm's Adler and Fritz Erle's Benz are the cars shown. Bore and stroke of contestants follow:

Adler, six 4.1 x 5.9, two 3.3 x 5.1; Benz, seven 4.5 x 6.9, one 4.7 x 5.7, one 4.7 x 5.3; four 4.1 x 6.5; Bergmann, six 4.1 x 6.5, two 3.3 x 5.7; Brennabor, four 3.5 x 5.9; C. Benz Sons, one 3.3 x 4.5; Berliet, three 4.7 x 5.5; Bugatti, one 3.9 x 6.3; Daimler (Austrian), ten 4.1 x 6.5; Deutz, two 4.3 x 6.3, two 3.7 x 6.1; Dixi, one 3.4 x 4.3, three 2.95 x 4.7; Delaunay-Belleville (six-cylinder), one 3.3 x 4.7; Dux, two 2.95 x 4.7; Fiat, four 3.7 x 6.1; Gaggenau, seven 4.3 x 6.5; Hansa, 4.3 x 5.1; Lux, one 3.5 x 4.7; Mathis, four 3.1 x 5.5; Mercedes, eight 3.7 x 6.1, one 3.5 x 5.5; Opel, six 4.5 x 6.9, one 4.7 x 5.5, one 4.3 x 6.3, one 4.3 x 5.9, four 3.9 x 6.3, five 3.9 x 6.1, one 3.3 x 5.7, one 3.1 x 5.1; Protos, five 4.3 x 4.7; Presto two 4.3 x 6.5; Puch, two 3.9 x 6.3; Raf, one 4.5 x 6.3, one 4.3 x 6.3, two 4.3 x 5.5; Stoewer, four 3.1 x 5.5; Vauxhall, three 3.5 x 4.7, two 3.3 x 4.5.

To Promote the Cause of Good Roads

THE movement for good roads received its first great impetus from a private source. Colonel Pope, the pioneer bicycle manufacturer, has often been referred to as "The Father of Good Roads." He was quick to see the commercial importance, not to himself alone but to the whole country, of good roads. This participation by a business corporation in such a movement has a counterpart to-day in the efforts of a manufacturer of auto tires. The B. F. Goodrich Company, of Akron, Ohio, is setting out on a project that will synthetize the rural sections of States, identify the interests of country and city, and unite the interest of a large section of the influential public, namely, the automobile owner, on the subject of highway improvement.

Plate With Explanatory Symbols

This company is placing a sign-post at every four miles along the main highway from Cleveland to Buffalo, across to Albany, and down to New York. From New York the line of posts will run out to Philadelphia, over Long Island, and to Atlantic City and Lakewood. Farther east the posts will be put up through Connecticut to Boston, and then into the mountain resort regions of New England. After this the work will be farther extended.

The 12-foot, 4 x 4-inch post is thoroughly creosoted to make it weatherproof. On the top is the round metal sign plate, 2 feet in diameter. Through the center of this plate are drawn two arrow blades with spaces for the names of three towns—the next town, the next largest town, and the ultimate destination. Opposite each name are the distances, carefully reckoned to the fraction of a mile. Projecting out from the disc and pointing in the remaining directions are two other blades. These are brightly painted in contrasting colors so that the information is easily read by the traveler as he sits in his conveyance.

Opposite the name of a town is a symbol indicating the kind of repair, or relief, there is to be obtained. Lower down on the post is a plate bearing a copy of all the symbols together with an explanation of each one. For example, two rings, one enclosed within the other, indicate "Goodrich Tire Station"; a large solid black circle means "Gasoline Supply Station"; a hammer and wrench crossed, call attention to a "Reliable Repair Shop"; besides these are the proper designations for "Danger Crossing," "Curve Danger" and "Go Slow." In locating the posts a series of topographical maps from the United States Geological Survey has been used.

This entire scheme recognizes the new obligation of the manufacturer who makes a product that is identified so closely with the economic life of the public.

"The Vanadium" Formally Opened

In the heart of the Pennsylvania hills, at Cambridge Springs, the Vanadium, which was formerly known as the Hotel Rider, has been reopened under new ownership and with an entirely new policy of administration. The hotel is known as the "Carlsbad of America" on account of its wealth of medicinal springs and magnificent facilities for using them, is beautifully situated and is thoroughly equipped.

The management is under the personal supervision of Messrs. Matthews, Quinn and O'Loughlin, formerly of the Waldorf-Astoria.

Among its other attractions the hotel has a fully equipped garage where supplies may be obtained and minor repairs made. The most notable new feature of the hotel is the medical staff and physical instructors that have been added.

As a resort for touring automobilists the hotel is well situated and every facility for enjoyment and comfort of such parties has been provided by the management.

Nailing on the Timber Cross Piece

Attaching the Arrow Blades to the Disc

Motor Notes from Michigan's Capital

LANSING, MICH., Jun 20—J. Edward Roe, cashier of the Lansing State Savings Bank, has been elected secretary of the Reo Company to succeed Edward F. Peer, resigned. Mr. Roe will assume his new duties September 1. Donald E. Bates has been elected treasurer of the company.

The fourth annual orphans' day of the Grand Rapids Automobile Club was held June 15, and 200 inmates of the Blodgett Home for Children and St. John's Orphan Asylum were given an outing.

Incorporation papers of the Alpena Motor Car Company have been forwarded to the Secretary of State. The capital is $450,000, of which $300,000 is common and $150,000 preferred stock. The officers are: President, D. D. Hanover; vice-president, William Krebs; secretary and treasurer, William Roberson. The company will manufacture a four-cylinder, 35-horsepower, 112-inch wheelbase automobile, to sell for $1,450. To secure the industry, the people of Alpena gave a bonus of $50,000.

Velie Service Held Defective

MILWAUKEE, June 20—Judge W. J. Turner, in the Milwaukee Circuit Court, has dismissed twenty cases in the suit of the Velie Motor Vehicle Company, of Moline, Ill., against twenty-five automobile companies operating in Wisconsin under the name of the Association of Licensed Automobile Manufacturers. Of the five other companies, four were held to have been served and one was released. The four companies held are the Pope Manufacturing Company, the Locomobile Company, the Chalmers-Detroit Motor Car Company and the Pierce-Arrow Motor Car Company. The Peerless Company was released. The Velie Motor Vehicle Company, in its suit alleged that the defendants operated under an organization for restraint of trade and damages to the extent of $500,000 were demanded.

The Completed Post Ready for Erection

On the ground that they were foreign corporations, doing business in other states, and have no authorized agents in Wisconsin, the defendant companies had filed motions asking that the complaint be dismissed. They claimed that the dealers who represent them buy their goods in the cities where the automobiles are manufactured, the companies delivering them free-on-board at the shipping points. When paying for the goods, the money was received by the companies at the place of manufacture.

Service had been rendered upon the defendants through their alleged agents in Milwaukee, but these dealers claimed that they were not agents, that they were working for themselves, buying and selling as in any other business.

Two Weeks' Tour on Boston Streets

BOSTON, June 20—The E-M-F 30, which has been making a reliability and durability test through the streets of Boston, was stopped at 11 this morning, just two weeks from the time Charles J. Glidden gave the crank a twirl in front of the State House. When the car stopped, 3,382 miles had been covered. The gear shifts totaled 8,072, while the brakes had been applied 5,712 times. The clutch had been thrown 10,146 times.

Nailing the Explanatory Plate to the Post

Detroit Exposition Opens Doors

DETROIT, June 21—The Detroit Industrial Exposition is in full blast, having been opened on electrical signal by President Taft. The show ranks high in its class and from an automobile viewpoint is particularly impressive. Numerous 1911 models are exhibited. The show is being held in the old Wayne Pavilion, which has been much enlarged and improved for the purpose. It will continue until July 6. The following concerns are represented:

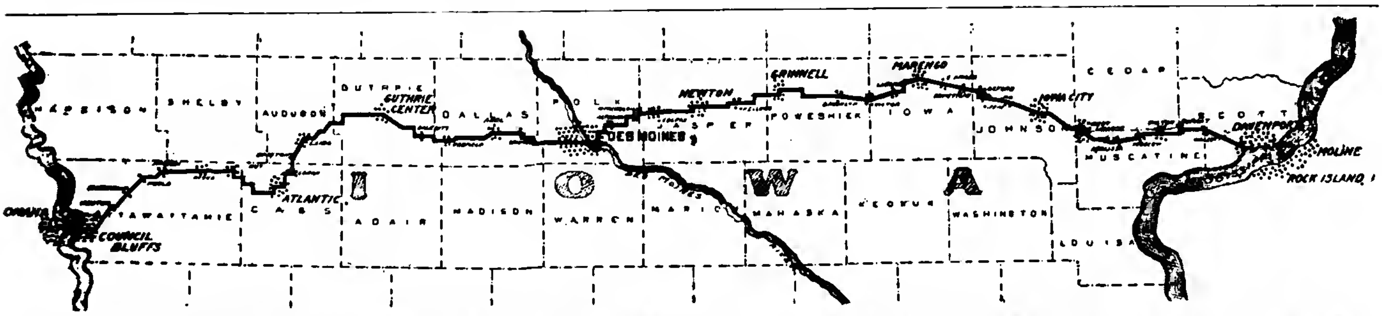
Brush Runabout Company, Brush; Cadillac Motor Car Company, Cadillac; Carhartt Automobile Corporation, Carhartt; Chalmers Motor Company, Chalmers; Everitt-Metzger-Flanders Company, E-M-F, Flanders 20; Ford Motor Company, Ford; Hudson Motor Car Company, Hudson; Hupp Motor Car Company, Hupmobile; Metzger Motor Car Company, Everitt 30; Paige-Detroit Motor Car Company, Paige-Detroit; Regal Motor Car Company, Regal; Warren Motor Company, Warren-Detroit; Anderson Carriage Company, Detroit Electric; American Motor Truck Company, American Truck; Beyster-Detroit Motor Car Company, Beyster-Detroit delivery wagon; Grabowsky Power Wagon Company, Grabowsky trucks; Stuart Commercial Car Company, Stuart trucks.

The accessory makers are:

Aluminum Castings Company, Anderson Forge & Machine Company, American Lubricator Company, American Motor Castings Company, American Motor Washer Company, Auto Marine Appliance Company, Auto Parts Mfg. Co., Briscoe Mfg. Co., Corcoran-Detroit Lamp Company, Detroit Carbureter Company, Detroit Lubricator Company, Detroit Motor Castings Company, Detroit Radiator Company, Detroit Roller Bearing Company, Detroit Screw Works, Detroit Steel Products Company, Detroit Steering Wheel & Windshield Company, Diamond Mfg. Co., Dodge Bros., Edmunds & Jones Mfg. Co., Fisher Body Company, Gemmer Mfg. Co., Gray Motor Company, Griswold Motor & Body Company, Hall Lamp Company, Hayes Mfg. Co., Hydraulic Oil Storage Company, Kelsey-Herbert Company, Kelsey Wheel Company, McCord Mfg. Co., Michigan Lubricator Company, Seitz Auto & Transmission Company, Russell Motor Axle Company, Timken-Detroit Axle Company, C. R. Wilson Body Company.

Flanders "20" Makes Progress

The Flanders "20" car, en route from Quebec to Mexico City, is now well on its way across the Mississippi Valley. The tour from Quebec to Detroit proved particularly arduous, but the car came through unscathed. Considerable progress westward and southward has been made during the past week, the course lying through Toledo, Fort Wayne, Indianapolis and Terre Haute.



Crossing the river at Davenport Miss Scott will strike the long trail on her way towards the setting sun, passing Iowa City, Marengo, Grinnell, Newton, Des Moines, and from there on, as the map here shows, landing in Council Bluffs. The Overland will be given a test over all kinds of roads—the run will extend to the coast.

The Contest Rules of 1910

By HOWARD E. COFFIN, Chairman of the General Rules Committee of the Manufacturers' Contest Association

THE 1910 rules governing motor car contests in this country provide classes in which may be entered anything from the "one-lunger" to the biggest six- or eight-cylinder road locomotive that has been or can be built. They provide classes wherein can be entered *bona fide* stock cars and yet other classes for cars of special construction built for racing only.

An especial effort has been made to restrict "stock car" events to those cars which are really "stock" in accordance with the meaning of this term in the mind of the public.

The 1910 definition of a stock car is as follows: "A motor car, the complete description of which, upon the official blank provided for the purpose, has been filed with the main office of the technical committee of the contest board at least thirty days prior to the date of the contest entered, the quantity production of which bears to the total yearly production of its manufacturer the ratio set forth in the following table, and which is on sale through the regular selling representatives of the manufacturer."

At the discretion of the contest board, any competitor may be required to file a bond of $5,000 that the entry made by him is a *bona fide* stock car within the meaning of this definition:

Total Output	Percentage	Number of Same Model
10,000 cars or more	4.5% equalling	450 cars minimum
8,000 cars to 9,999	5.0% equalling	400 cars minimum
6,000 cars to 7,999	6.0% equalling	360 cars minimum
4.000 cars to 5,999	7.0% equalling	280 cars minimum
2,000 cars to 3,999	8.0% equalling	160 cars minimum
1.000 cars to 1,999	9.0% equalling	90 cars minimum
500 cars to 999	10.0% equalling	50 cars minimum
200 cars to 499	16.0% equalling	40 cars minimum
100 cars to 249	30.0% equalling	30 cars minimum
50 cars to 99	50.0% equalling	25 cars minimum

Percentages are calculated on actual total output. For example, if the total annual output of a manufacturer is 2500 cars, at least 8 per cent. of said output, or 200 cars, must be of the same model in order to constitute such model a stock car.

During past seasons the records of the technical committees have shown many evasions of the stock car rule. These unsatisfactory conditions led to the formation about a year and a half ago of the Manufacturers' Contest Association, embracing within its membership nearly all the leading motor car makers.

As showing the scope and purpose of the organization, section 8 of the by-laws is quoted herewith in its entirety:

"The special rules and classification committee shall prepare classifications and formulæ applying to all contests. It shall submit on or before Sept. 1 of each year to the contest board, or its successors, or a similar board, recommendations as a basis for creating general contest rules to govern for the succeeding year."

It will be seen that the rules and conditions governing motor car contests have been evolved by a co-operative action upon the part of the representative motor car manufacturers of America.

The general rules committee, which has adopted the formulæ and classifications governing stock car and other contests, is composed of representatives of the following concerns: Chalmers Motor Company, Apperson Brothers Automobile Company, Buick Motor Company, Hudson Motor Car Company, Dayton Motor Car Company, E-M-F Company, Fiat Automobile Company, Nordyke & Marmon Company, H. H. Franklin Automobile Company, Knox Automobile Company, Locomobile Company of America, Lozier Motor Company, Maxwell-Briscoe Motor Company, Mitchell-Lewis Motor Company, National Motor Vehicle Company, Pierce-Arrow Motor Car Company, Renault-Frères selling branch, F. B. Stearns Company, E. R. Thomas Motor Company and The White Company.

Among the membership of the Manufacturers' Contest Association are the names of the following well-known makers: Apperson Brothers Automobile Company, American Locomotive Company, American Motor Car Company, Buick Motor Company, Brush Runabout Company, Benz Auto Import Company of America, Chalmers Motor Company, Columbia Motor Car Company, Dayton Motor Car Company, Everitt-Metzger-Flanders Company, Fiat Automobile Company, H. H. Franklin Manufacturing Company, Hol-Tan Company, Hudson Motor Car Company, Hupp Motor Car Company, Knox Automobile Company, Locomobile Company of America, Lozier Motor Company, Maxwell-Briscoe Motor Company, Mora Company, Marquette Motor Company, Mitchell-Lewis Motor Company, Matheson Automobile Company, Moline Automobile Company, Metzger Motor Car Company, National Motor Vehicle Company, Nordyke & Marmon Company, Olds Motor Works, Oakland Motor Car Company, Peerless Motor Car Company, Premier Motor Manufacturing Company, Pierce-Arrow Motor Car Company, Palmer & Singer Manufacturing Company, Renault Frères selling branch, Reo Motor Car Company, Selden Motor Vehicle Company, F. B.

Col. Roosevelt, Theodore Roosevelt, Jr., and Miss Alexander Leaving Douglas Robinson's House in the White Steamer

White Steamer Ambulance Used by the National Volunteer Aid Association During the Reception to Col. Roosevelt in New York

Stearns Company, E. R. Thomas Motor Company, The White Company and The Willys-Overland Company.

So flagrant did the abuse of the spirit of the stock car rule become in the contests of 1909 that the public naturally began to be extremely skeptical upon all matters touching stock cars and stock car competitions. That this feeling upon the part of the public (the owners and prospective owners of thousands of motor cars) did and does exist has been clearly proven by the many inquiries upon such matters which have been registered with the several technical motor car papers of the country.

Upon the contest board of the A. A. A. falls the administration of those rules which have been accepted by the manufacturers as for the best interests of the motor car industry as a whole. Motor car racing, if followed consistently by the manufacturer, is entirely too expensive to make it a matter of sport. If it is to be a matter of business, a source of publicity and a means of demonstrating to the buying public those qualities of motor car construction and endurance which must recommend his product for the every-day use of the purchaser, then certainly there can be no objection to the introduction into motor car contest affairs those same principles of honest business administration which the manufacturer and the public would expect to maintain in any other line involving similar expenditure of money and effort.

Moreover, the maker who elects to obtain through stock car racing and contest work those important advantages in an engineering, publicity and selling way, and who goes at it honestly, making entry of his *bona fide* stock product, cannot be blamed for insisting upon an impartial administration of those rules.

In stock chassis racing it is recognized that certain changes in equipment and arrangement of parts must be permitted for considerations of the safety both of occupants and spectators.

That the contest board might be given the necessary authority in the administration and enforcement of these rules, the following three rules were drafted:

First: It is the intention of the rules relating to stock car and stock chassis competitions that such competitions shall be restricted to those cars identical in specification, materials, and design with the manufacturer's product which is manufactured in quantity and is offered for sale and sold in a *bona fide* manner to the public through the regular agencies of the manufacturer.

E-M-F Pathfinder on the Road Between Somerville and West Point

E-M-F Pathfinder Crossing Bridge Over Gorge at West Point. The Car Is Well on Its Way Toward Its Goal

Second: In the event of evasion on the part of entrants of the spirit of the "stock car" or "stock chassis" definition concerning points not definitely stated in these rules, the contest board shall have full power to render such decision as it may deem for the welfare of the sport and industry.

Third: In any case where it may be necessary to establish the status of any car alleged to be a stock car under the definition contained in these rules, the technical committee of the contest board shall have the right to visit the factory of the manufacturer of such car, who shall be required to submit to the committee such evidence as it may require to verify the allegation on which the "stock" status of the car is based.

The technical committee shall also have power to take possession of any competing car, and make such examination thereof as may be necessary to establish its "stock" status.

Results of "Montauk Light or Bust" Run

With sixteen clean scores out of an entry list of thirty-seven, the "Montauk Light or Bust" two-day endurance run around Long Island of the Motor Contest Association was finished last Wednesday. The course aggregated 380 miles, and nearly fifty miles of the first day's run was through the Montauk Point badlands, as hard a bit of going as can be found in Long Island.

Four out of the five Buicks that competed finished the run with perfect scores, while two Mitchells out of three avoided penalization. The run was accomplished under favorable conditions and was successful in every way. W. J. Morgan, who has retired as head of the association, will be succeeded by E. L. Ferguson. The summary of the results:

Division 1A—$800 and under—

No.	Car.	Entrant.	Driver.	Penalty.
24	Hupmobile	F. L. C. Martin Auto Co.	Elmer D. Cutting	0
43	Hupmobile	F. L. C. Martin Auto Co.	R. E. Gillam	1010

Division 2A—$801 to $1,200—

No.	Car.	Entrant.	Driver.	Penalty.
20	Mitchell	Mitchell M. Co. (Bklyn)	D. M. Hasbrouck	0
32	Ford	Ford Motor Co.	W. B. Young	0
37	Buick	Buick Motor Co.	Charles Jones	0
31	Ford	Bishop, McCormick & Bishop.	McCormick	38

Division 3A—$1,201 to $1,600—

No.	Car.	Entrant.	Driver.	Penalty.
19	Mitchell	Wm. Simonson (Mineola)	Wm. Simonson	0
25	Chalmers	Continental Tire Co.	E. Miles Welch	118
44	Studebaker E-M-F	Studebaker Bros. Co.	E. A. Taylor	0
45	Staver	Short & Wright	C. S. Cheney	0
11	Regal	Regal-Detroit Auto Co.	George Ainslee	1000

Division 4A—$1,601 to $2,000—

No.	Car.	Entrant.	Driver.	Penalty.
36	Buick	Dr. Wm. H. Nafis	Dr. Wm. H. Nafis	0
38	Buick	Buick Motor Co.	W. Davenport	0
39	Buick	Buick Motor Co.	Phil. Hines	0
40	Buick	Buick Motor Co.	Frank Remson	8
35	Westcott	Dunlop-Taylor Co.	Thomas Wilson	79
1	Pierce Racine	Samuel W. Fromm	W. A. Wells	1000
2	Cadillac	Detroit-Cadillac M. Co. Award held up	L. R. Burne	1000
16	Auburn	LaDue-Carmer Motor Co.	Herbert F. Earl	1,000
34	Elmore	John L. Gwyer, Jr.	J. L. Gwyer, Jr.	1048

Division 5A—$2,001 to $3,000—

No.	Car.	Entrant.	Driver.	Penalty.
4	Haynes	W. E. Shuttleworth	W. E. Shuttleworth	0
18	Mitchell	Mitchell M. Co. of N. Y.	O. R. DeLamater	9
5	Mercer	Mercer Auto Co.	Joseph Trehou	1000
12	Franklin	Franklin Auto Co.	C. J. Hickman	1000
27	Selden	Cloud-Marts Auto Co.	Richard Carter	4

Division 6A—$3,001 to $4,000—

No.	Car.	Entrant.	Driver.	Penalty.
6	Palmer-Singer	Fred J. Titus	Fred J. Titus	0
13	Franklin	Franklin Auto Co.	Paul Harvey	0
17	Matheson	Matheson Auto Co.	Neil Whalen	0
41	Welch-Detroit	Buick Motor Co.	C. V. Searing	0
29	Knox	Knox Automobile Co.	H. K. Sutherland	15
3	Palmer-Singer	Palmer-Singer Mfg. Co.	A. P. Palmer	129
28	Palmer-Singer	R. D. Apperson	A. N. Henderson	180
42	C. G. V.	C. G. V. Import Co.	Arthur Coombs	356

Division 7A—$4,000 and over—

No.	Car.	Entrant.	Driver.	Penalty.
30	Amplex	Henry F. Siebert	Harold W. Sisop	0
8	Zust	American Zust Motor Co.	V. P. Pisani	30
10	Amplex	S. J. Wise & Co.	Walter Jones	1000
15	Fiat	Hugo Ricca	Peter Smith	1000
25	American	American Auto Co.	Earle A. Cryne	1034

CAUSES OF PENALIZATIONS

Division 1A—Hupmobile, No. 43, for motor stop, 9 for replenishments, 1000 for dropping out.

Division 2A—Ford, No. 31, 38 for replacing balls in bearing.

Division 3A—Chalmers, No. 25, 118 for stalled motor and time lost from car being stuck in the mud. Regal, No. 11, 1000 for rear differential trouble, causing withdrawal.

Division 4A—Buick, No. 40, 8 points for lateness. Westcott, No. 35, 1 for motor stop, 78 for lateness. Pierce-Racine, No. 1, 1000 for withdrawing on second day. Auburn, No. 16, 1000 for withdrawing by reason of broken axle. Elmore, No. 34, 40 for gearbox adjustments, 2 for motor stops, 6 for replenishments and 1000 for withdrawal.

Division 5A—Selden, No. 27, 1 for cut fan belt, 3 for taking on water, 4 for cleaning lubricator belt. Mercer, No. 5, 1000 for failing to check in at noon control and withdrawing; continued as noncontestant. Franklin, No. 12, 1000 for withdrawal due to magneto trouble.

Division 6A—Knox, No. 29, 15 for adjustments and replacing plugs. Palmer-Singer, No. 3, 6 for replenishments, 123 for lateness. Palmer-Singer, No. 28, 2 for stalling motor, 178 for lateness. C. G. V., No. 42, 1 for motor stop, 47 for engine repairs; 309 for lateness.

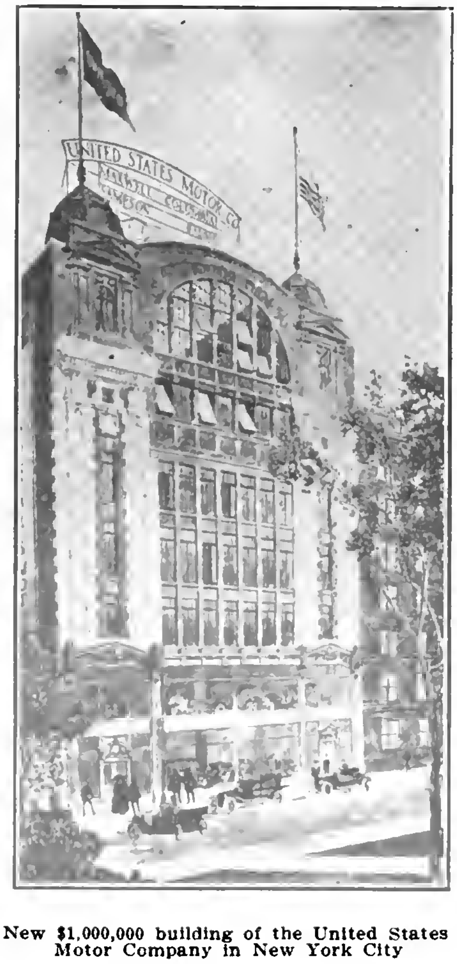
Division 7A—Zust, No. 8, 30 for removing carbon from igniters. Amplex, No. 10, 1000 for failure to check in at first control. Fiat, No. 15, 1000 for withdrawal on account of accident. American, No. 25, 34 for replacing spark plugs, 1000 for withdrawal on account of fire.

In the Realm of the Makers

Henry K. Holsman, formerly president and engineer of the Holsman Automobile Company, is now with the Independent Harvester Company, and the company is equipping factory No. 2 for the manufacture of a line of automobiles, motors, etc., under the Holsman patents.

President Benjamin Briscoe has announced that the Pittsfield plant of the Alden Sampson Mfg. Co. will be doubled in capacity. Ground will soon be broken for a building 170 by 70 feet, and an additional story is to be erected on the present main building, which is 85 by 100 feet. A new forge and blacksmith shop 60 by 100 feet and a paint and testing room 40 by 150 feet will also be erected immediately. An investment of $125,000 for new machine tools has been made, and a new building to be used as an engineering department, drafting and testing laboratory will be added to the plant.

Announcement is made that the Inter-State Automobile Company of Muncie, Ind., has been granted a license under Selden Patent No. 549,160. The Inter-State Company markets cars selling at $1,750 and at $2,000. Thomas F. Hart is president and general manager. The other officers are J. M. Maring, vice-president, and Otto Holdren, secretary-treasurer.



New $1,000,000 building of the United States Motor Company in New York City

The latest addition to The White Company's line of steam and gasoline cars and motor trucks is a new type of closed car known as the White gasoline coupé. The steering wheel and operating levers are located within the closed body and the operator is thus afforded protection from rain and cold.

The Fal Motor Company of Chicago has increased its capital stock from $200,000 to $500,000. The officers of the company remain the same. The Fal-Car is now in its second year.

James F. Baines, service manager of the Packard Motor Car Company, died at his home in Detroit, last Sunday afternoon, aged 35. His death was very sudden, being caused, it is believed, by ptomaine poisoning.

Franklin Car at Chimney Rock, 27 miles from Laramie, Wyo., 8,000 ft. above sea level

Henry F. Tully, a certified public accountant of Detroit, has joined the office force of the Clark Power Wagon Company, at Lansing, Mich.

Frank Dunnell has left the Ford factory to become assistant Ford manager at Atlanta, Ga. E. T. Backus, of Detroit, has joined the Ford branch at Houston, Texas.

Bert Morehead, Detroit branch manager for the B. F. Goodrich Company, is following the Glidden tour's progress by train to look after the interests of Goodrich tires.

C. E. Wheeler, with the H. H. Franklin Mfg. Co. for a number of years, is now with the Owen Motor Car Company, of Detroit, and will cover the territory east of Buffalo.

Sidney J. Stern, formerly New York City representative of the Automobile Trade Directory, has been promoted to the management of the Detroit office, just vacated by the resignation of C. K. Brauns.

Lambert Hollander, of the firm of Gray & Davis, makers of automobile lamps at Amesbury, Mass., has sold his interest in the concern to S. Preston Moses, of Boston. Mr. Hollander has retired from business.

C. K. Brauns, formerly representative of the Automobile Trade Directory, located in Detroit, has become vice-president and sales manager of the Radle-Clark Sales Company, which has contracted for the entire output of the Clark power wagons.

Joseph N. Spining, formerly with the Cincinnati Tire Company, Cincinnati, O., has severed his connection with that firm.

John W. McCrea, formerly with the Winton Motor Carriage Company, has assumed the office of secretary in charge of sales with the Standard Sales Company, of Detroit, which firm deals largely in parts for automobile manufacturers.

F. O. Durfee has joined the sales force of the Owen Motor Car Company of Detroit, and will be in charge of the Southern and Southwestern territory, including Florida, Tennessee, Alabama, Arkansas, Mississippi, New Mexico, Texas and Oklahoma.

Captain William Mitchell Lewis, president of the Mitchell-Lewis Motor Company, of Racine, Wis., and his family, returned recently from an automobile trip from Paris to Venice. Captain Lewis used a Mitchell six-cylinder car in making the trip. The whole party returned well, and declared the tour was a perfect success.

Twenty-five automobile owners of Ellwood City, Pa., have formed the Ellwood City Automobile Club with these officers: President, A. C. Frey; vice-president C. F. Buchanan; secretary D. H. Muchaly; treasurer, J. W. Offutt. The club will wage an active campaign for good roads and will act in conjunction with the Lawrence County Automobile Club, of New Castle, Pa., which has offered a prize for the best piece of road made in that county this year.

Fred R. Leuscher, at one time having a string of about fifty playhouses, has practically retired from the theatrical business to engage in the automobile business. He has become Rochester, N. Y., representative of Thomas B. Jeffery & Company, manufacturers of the Rambler cars, and has opened a garage at 745 Park avenue.

The tie for the first prize in the recent big Premier run from Philadelphia to Cape May between Charles H. Clinton, of Philadelphia, and M. S. Shakespeare, of Haverford, was decided by the toss of a coin, the former guessing the right side.

Kelly-Springfield Trophy for winner in Division 1 Class C, in Norristown Club's Scranton Run

The Hartford Auto Parts Company, Hartford, Conn., is opening a branch office in Detroit, Mich. This concern has added a complete line of cone clutches to its product. The success with this clutch is, no doubt, due partly to the fact that it is furnished with a double set of Universal joints of the trunnion block type. F. L. Martin, secretary and sales manager, will be in charge of the office for the next two or three months with temporary headquarters at the Pontchartrain Hotel.

E. D. Dunning, formerly with the Atwater-Kent Company, has taken hold of the Ohio car end of the G. Hilton Gantert Company's Philadelphia agency business, Mr. Gantert looking after the company's Stearns interests.

F. D. Dorman, formerly secretary of the Maxwell-Briscoe Motor Company, and more recently secretary of the United States Motor Company, was elected vice-president and general manager of the Maxwell-Briscoe Motor Company, with headquarters at Tarrytown, New York.

J. B. Hulett has resigned as sales manager for the Robertson Motor Car Company of Minneapolis, to become Western sales manager for the Owen Motor Car Company, of Detroit. He hopes to establish the Western headquarters of the company in Minneapolis.

Agency and Garage News

J. B. McCarthy, for six years with the English Daimler Company and seven years a member of the auto colony in New York, has bought the Fulton Garage on Auburn avenue, Atlanta.

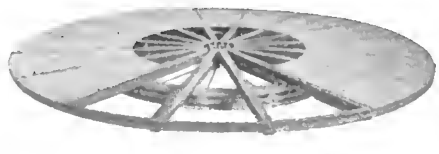
Collins & Company have taken the State of Michigan agency for the Marmon car, and are temporarily located at 732 Woodward avenue, Detroit. The Clark power wagon will also be handled, as well as several other makes to be announced later.

The North Jersey Motor Car Company has removed from 27 Washington place, East Orange, to 16 Railroad place, that city. The company has awarded the contract for the erection of a new garage on McKinley avenue, East Orange.

The E. R. Thomas Motor Branch Company, of Boston, is to have a new home, upon which it is planned to spend $200,000. It will be built at 915-921 Boylston street, on a site now occupied by tenement buildings. The exterior construction will be in French-Gothic style, with a façade of white, glazed terra cotta and large steel bay or show windows. The first floor will be occupied as show rooms, executive offices and dressing rooms, while the clerical force will be located upon a mezzanine in the rear. It is intended to have the new building ready for occupancy this fall. Turntables, said to be the largest ever built for the purpose, will be installed in the basement, second, third and fourth floors.

THE ELLIOTT GARAGE TURNTABLES

The private owner who builds his own garage must take the turntable proposition into consideration if work is to be facilitated upon his car, or cars. The Sterling-Elliott Company, of Newton, Mass., is making a specialty of wood- and steel-top turntables, which have many points of excellence to recommend them, not only to the private owner, but to the public garage manager as well. These tables are made in



Elliott Steel-Top Turntable

four sizes—12, 13, 14 and 15 feet in diameter, and are ball-bearing throughout. It is claimed for them that they run true, turn freely, are self-contained, require no oil, carry the heaviest cars without trouble and may be locked at any point. Drawings and specifications for any class of foundations are furnished upon request, so that an architect who is building a garage for a patron may incorporate one or more of these tables in his plans.

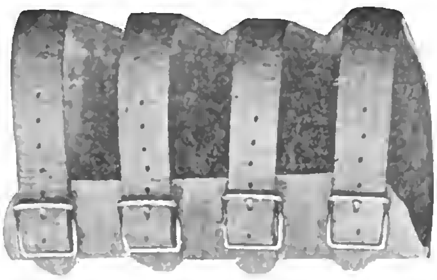
William L. Hibbard, of Milwaukee, Wis., has been appointed district representative of the Grabowsky Power Wagon Company in Wisconsin. Mr. Hibbard formerly was president of the W. L. Hibbard Motor Car Company, which handled the Chalmers-Detroit, Hudson and Thomas lines. Recently he has been associated with the Milwaukee branch of the McDuffie Automobile Company.

William Parkinson, the agent for the Overland and Marion in the Oranges, has leased the big fireproof garage formerly occupied by the North Jersey Motor Car Company, at 27 Washington place, East Orange.

The Regal car is now being handled in the Quaker City through a branch, the Philadelphia Regal Auto Company having succeeded the former agents, the Thomas M. Twining Company, at the same address, 330 North Broad street. R. M. MacCormack will manage the new branch.

ANTI-BLOW-OUT EMERGENCY PATCH

This handy device, which is manufactured by W. C. Davis, 1133 North Main street, Montello, Mass., will add considerable life



Anti-Blow-Out Davis Emergency Patch

to an old tire-shoe. It is made of unsplit horsehide, and will prevent weak places from blowing out. It is sold in sizes 3 1-2, 4, 4 1-2 and 5 inches for automobile use.

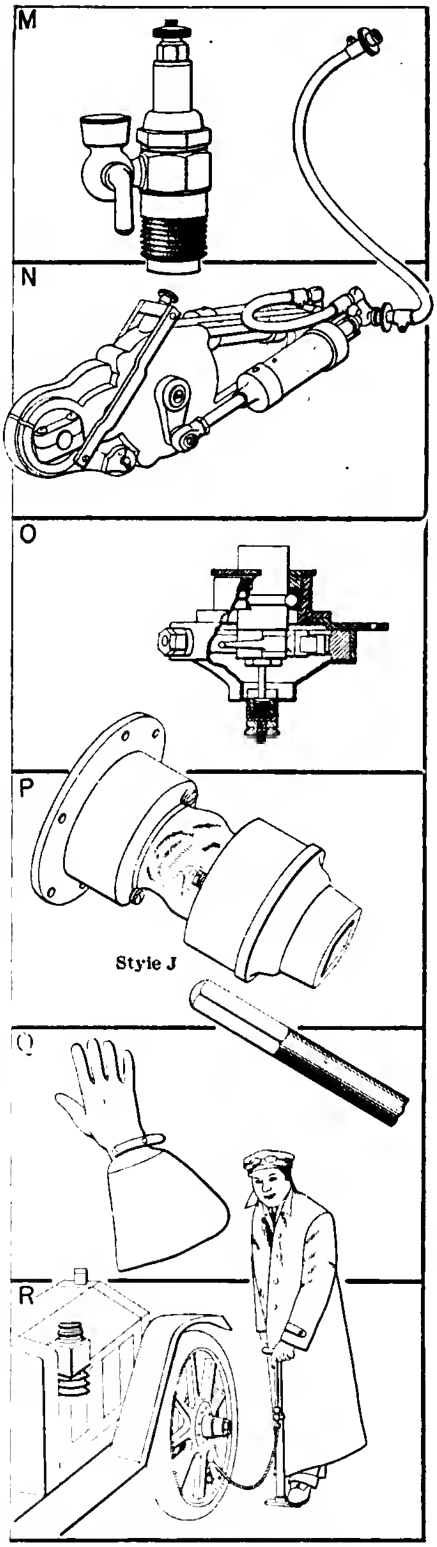
Worcester (Mass.) Motor Mart

Seen in the Show Window

WHILE sooty spark plugs may be more annoying to the aviator than to the autoist, they are yet sufficiently productive of profanity in the latter that any contrivance which promises to eliminate them, or even to materially minimize the nuisance, will be welcomed by the motoring fraternity with open arms. Such a device seems to be the All-in-One spark plug (M), now being marketed by the Buffalo Carbureter Company, of Detroit, Mich. Among the advantages claimed for these plugs are that by the mere opening of a stop-cock any accumulation of soot can be blown out instanter; a missing cylinder can be at once located by turning the petcocks; knocking in the motor can be stopped by priming with a few drops of kerosene, etc. This plug would seem to be just what is needed by the autoist who would sidestep the annoyances concomitant with imperfect gasoline combustion.

ALTHOUGH the development of muscle is all very well, and conducive to eager appetite and good digestive functions, it does not follow that the automobilist is so wedded to ancient, even if health-giving, customs that he will overlook the advantages inherent in such an article as the Quick Detachable Power Air Pump (N), recently put on the market by the Kellogg Manufacturing Company, of Rochester, N. Y. This pump will fill a tire in jig-time, and while its use may deprive the exponents of healthy exercise of the doubtful benefits derivable from hand pumping, it is a mighty handy thing to have around when one is in a hurry. Its attachment to almost any make of car is only a matter of mounting a split gear on some exposed shaft. The jaws of the pump clamp over this gear.

IN view of the fact that it is considered desirable to have a double ignition system, it is common practice to employ a magneto in the main, and a battery with a spark coil and a timer for the auxiliary work. The section (O) of the Leavitt Improved Wipe Contact Timer, as here depicted, is offered by the Uncas Specialty Company, of Norwich, Conn., for this exacting work. It is said to be an improved form of Lacoste Timer, and one of the detailed refinements to which attention is called is in the shape of a supplementary ground terminal, whereby contact is rendered doubly sure. In addition to this electrical refinement, an adjustable ball bearing is utilized instead of a plain bearing. The two principal faults in the original Lacoste idea are in these ways removed.



M—The "All-in-One" Spark Plug
N—Kellogg Quick-Detachable Power Air Pump
O—Leavitt Improved Wipe Contact Timer
P—Blood Bros. Dust-Proof Universal Joint
Q—The Hansen Perfect-Fitting Gauntlet
R—The Stapley Compound Hand Air Pump

IT has been found that universal joints, as they have to do service in automobiles, are likely to give out much too soon unless they are protected from the silt of the road. It is no easy matter to furnish this protection, and afford all the other qualities besides. Blood Brothers Machine Company, Kalamazoo, Mich., who have long given matters of this sort attention, solved the problem in the manner as here indicated (P), which is of the Style J (double) joint. In addition to the dust-proof qualities which are obtained by fastening a leather boot between the two flange couplings, the joint is of substantial construction and may be adequately lubricated.

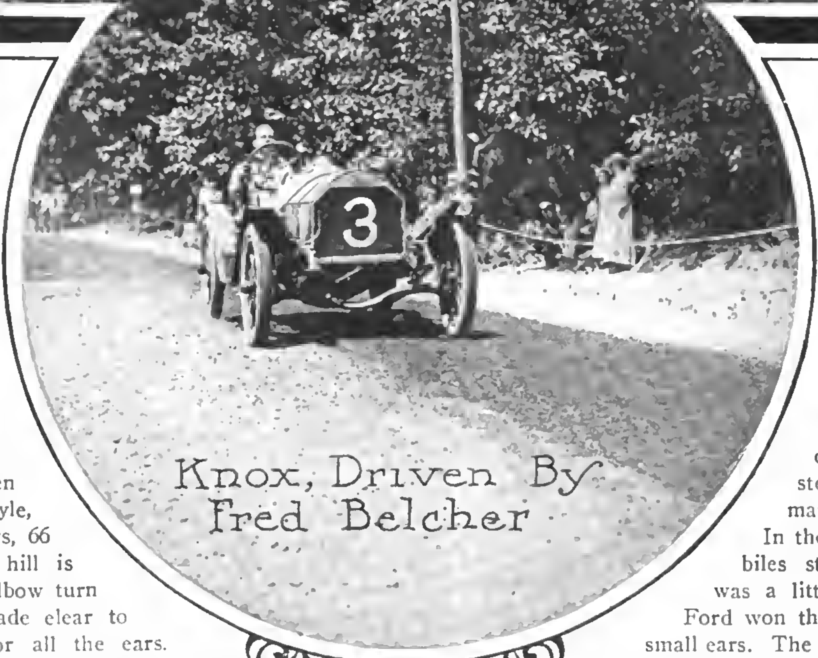
THE autoist who judges things by their utility only will not hesitate to invest when he can secure beauty of appearance along with the substantial quality which he always insists upon. This is especially applicable in the case of driving gloves, some of which are so undoubtedly built for service that all idea of dressiness seems to have been lost sight of. The O. C. Hansen Mfg. Co., of 335 East Water Street, Milwaukee, Wis., evidently had the dual idea of beauty and economy in mind in designing its No. 390 Auto Gauntlets (Q), which are made of a special tannage of black or tan leather or tan horsehide. They fit perfectly and do not cramp or bind the hands, being extremely soft and flexible. Being made with adjustable wrist strap and button fastener the wearer is enabled to have them tight or loose at the wrist, as he prefers. They are furnished with ventilated backs for summer use, if desired.

TO the legion of motorists whose cars are not equipped with power air pumps it is especially desirable that the hand pumps they carry are sufficiently powerful to deprive the work of filling tires of some of that onerousness which makes it hard labor. The Stapley Compound Pump (R), made by the Bridgeport (Conn.) Brass Company, whose headquarters are at 104 Crescent Avenue, is guaranteed by its makers to inflate tires quickly, easily and with little effort. Rustless because of its seamless brass tube cylinders, and positively non-leaking, its automatic tire valve-opener allows the tire valve to close without any loss of air.

HOW to keep the body finish up to standard is a difficult task and "Auto Renew Gloss" furnished in quarts by the Superior Specialty Company, Louisville, Ky., is regarded as effecacious for the purpose.

THE AUTOMOBILE

Knox Wins Feature Events on Port Jeff Hill



Knox, Driven By Fred Belcher

SPORTSMANLIKE, spectacular and satisfactory about describes the first annual hill climbing contest of the Automobile Club of Port Jefferson, L. I., held Saturday on Port Jeff Hill, a short, but trying, incline leading up from the level of Long Island Sound to the wooded crest of the first ridge.

The program of fifteen events filled in splendid style, and of the 90 entered cars, 66 actually competed. The hill is 2,000 feet long, with an elbow turn followed by a terrific grade clear to the finish—a fine test for all the cars.

The aristocratic residents of Port Jefferson turned out in force to witness the stirring contests and the cliff alongside the finish was lined with expensive cars occupied by dozens of prominent society women of New York. They experienced a lot of sensation during the running off of the program, but not a single mishap marred the satisfaction of the day.

A Knox car entered by Gerard and Hall, and driven by Fred Belcher, carried off the premier honors by winning the cups offered for its class, both in price classification and piston displacement, and by finishing third to the two Fiat special cars in the free-for-all. This car covered the course in the latter event in 27:61, while in the 301-450 cubic inches displacement event it won in 28:60. Protest was entered against the winner by J. Bell, who drove the Chalmers in all three events in which the Knox car competed. Of course, the protest was not lodged against the Knox in the free-for-all, as the claim of Mr. Bell was to the effect that it did not measure up to stock car qualifications. This matter will be decided later.

In the first event three Hupmobiles started and the best time was a little over 70 seconds. The Ford won the second event from three small cars. The third race went to the Correja rather easily, and one of the Buicks outclassed its field in the fourth event, winning by about 12 seconds. This car was the only one of the Buick team to have any racing luck during the afternoon.

The Matheson entry had an easy time taking the cup in its class, and the Houpt-Rockwell, which has had some difficulty in gaining entry, heretofore, as a stock car, landed the event for high-priced stock cars. The Fiat pair came perilously near somersaulting after the sharp turn in the free for all, showing, by their performance, the big advantage they had in the matter of engine power. De Palma swerved so far in making this turn that his machine seemed to be traveling on two wheels.

Aside from the showing of the Knox car in this race, the feature of it was the performance of The Only Car, an automobile built not far from Port Jefferson. This car is a one-lunger of high power and, of course, had no chance to win anything against its field. But the machine chugged its way to the top of the hill without seeming to be extended, making the course in 40:29, amid the cheers and applause of the Port Jeffersonites.

The other events were won by a Pope-Hartford, Knox owned by Mrs. J. N. Cuneo, Velie, National, another Knox owned by W. J. Fallon, and a Stearns entered by Kingsley Swan, which captured the contest framed for members of the Long Island Automobile Club and the Crescent Automobile Club.

The timing and scoring were done in a thoroughly competent way by F. L. Burges, G. E. Hand, Arthur G. Inderrieden, W. C. Poertner, H. H. Knepper, Steve Fallon, Leslie A. Davis, Chester L. Darling, and Archie Graham. The device was an automatic trip-wire arrangement which was checked by a particularly perfect telephone system.

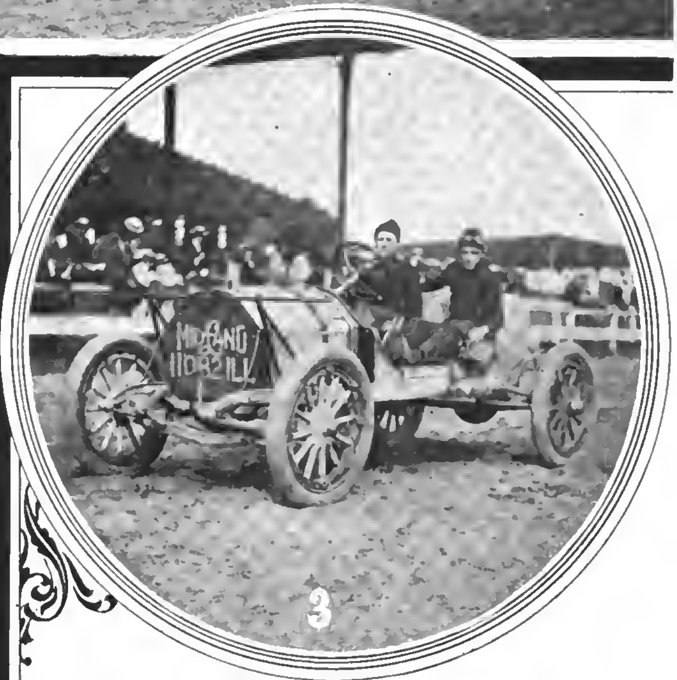
Frank G. Webb acted as referee and Fred J. Wagner wielded the flag at the start, assisted by Arthur Burnes. Among the list of judges were the following: William J. Gaynor, Henry S. Brush, Willard M. Bayles, Dayton Hedgess, Charles E. Pickett and Luther H. Chambers.

The most closely contested of all the events was that carded as "8A" for cars with less than 300 cubic inches displacement. In this race five automobiles finished within three seconds of one another. The car that was raced most during the day was the National owned and driven by C. M. Rutherford, an amateur. This car started in both the price and piston displacement classes, the free-for-all and in the amateur event for the Ardencraig Inn cup. In the first it finished a good second to the Knox that was protested, beating two Chalmers cars and a Palmer-Singer. In its piston displacement class it was a close third to the same Knox and the protesting Chalmers entry; in the free-for-all it was seventh, only a trifle over three seconds behind the Knox, which was regarded as the real winner by many of the spectators. Mr. Rutherford drove to a creditable victory in the amateur cup event. In the event of Bell's protest against the Knox being sustained, Mr. Rutherford will have two firsts and a second. The weather was perfect, the course in excellent shape, the police arrangements fine, and the sport was pronounced by many to have been the best of its kind this year. The officers of the club to whom credit is due for the success of the climb are as follows: Daniel M. Gerard, president; Luther H. Chambers, first vice-president; Charles A. Squires, second vice-president; George E. Darling, secretary, and Charles S. Dickerson, treasurer. The consistent performance of all the cars was commented upon. When the Knox, driven by Belcher, won the price classification race for which it was qualified, its time was 30:46; in the displacement classification race which it captured, the same car went under the wire in 28:60. Similarly, Rutherford's National did 30:80, 32:91 and 31:84. The Disbrow Knox did 30:64 and 31:09. Swan's Stearns negotiated two trips in 37:91 and 33:76. In the $800-or-under event, a trio of little "Hups" finished less than four seconds apart. As a rule those cars which were represented in events under both

(Continued on page 1192)

1—Correja, Winner of Event 3
2—Velie, First in Event 12
3—National, Victor in Event 13
4—"The Only Car," a Big One-Lunger

Mt. Vernon Club's Races Furnished Real Sport



1—Lined Up for the Start in the Inter-Club Race

2—The Buicks Had a Successful Day—Three Wins

3—J. M. Boyle's Midland, Second in Westchester Cup Race

UNDER particularly favorable weather conditions, the annual race meeting of the Mt. Vernon Automobile Club was held Saturday at the Empire City race track. There was an attendance of about 1,200, and the program of five interesting events passed off smoothly. The feature of the day's racing was the contest for the Westchester Gentleman's Cup, second on the program. Four elimination trials at five miles preceded the final heat, which was at ten miles. The cars were divided into classes under the piston displacement divisions and the winners in the elimination trials were eligible for the final. In Class C of this event two Buicks were entered and the winner turned up in the car of Russell Smith. Joseph A. Henning protested that Mr. Smith's car was a racing machine and the referee decided to avoid all question by allowing Mr. Henning's car to take part in the final also. The race was won by Spencer Wishard's ancient Mercedes, which has shown sparkling speed in several hill climbs this season. Neither of the Buicks was placed in the final dash.

The last race on the program furnished a bit of sensational work on the part of the winner, Russell Smith's Buick. The race was for the championship of the Mt. Vernon Automobile Club, and Mr. Smith got away flying and was leading at the commencement of the fifth mile when he suffered a blow-out. By a nervy exhibition of strength and cool-headedness, Mr. Smith held the car in the course, and finished first on a flat tire.

The referee was Charles P. Phillips; starter, George A. Lackey; judges, Mayor Edwin Fiske, James M. Gilbert, Frank A. Merrian and Walter F. Stickles. The officers of the club are: Pres., W. H. Mendel; vice-pres., F. A. Merrian, and secretary, L. A. Kissling.

4—Starting the Bunch in the Class A Race

Big Penalties and No Clean

The Cutting, Bisbee Driver, Crossing a Weak Bridge

WICHITA, KANS., June 24—Twelve cars started out and finished in to-day's run of 216 miles from Oklahoma City here and of these twelve seven are Glidden contestants and five are contending for the Chicago trophy. Of the twelve seven made perfect technical scores, these being No. 1, Premier; No. 2, Premier; No. 3, Chalmers; No. 7, Maxwell; No. 100, Moline; No. 103, Lexington, and No. 107, Maxwell.

To-day saw the last perfect road score in the tour pass out of existence when No. 5, Chalmers, driven by W. Bolger, broke a fender iron at 1689 miles from the start at Cincinnati. The fender iron had crystallized and broke with the car traveling at about 15 miles per hour over a smooth road. Bolger immediately stopped and wired it up, being taxed 3 points, or a point a minute for the work. In spite of this the car at present leads in the fight for the Glidden trophy, but the end is not until after the technical examination at Chicago, so it is very problematic as to where the coveted trophy will go.

Four other cars had misfortunes to-day which brought penalties against them. No. 10, Glide, broke a part of the rear-axle housing near Enid, 100 miles out. Another part was secured in Wichita and hurried to the scene so that it was 8 A. M., June 25, before the car checked into here. Its penalty for lateness appears on the chart in this issue.

No. 15, Cino, received 7 points for repairing a broken spring. In the Chicago trophy division No. 101, Moline, took on water seven times because of a leaky radiator and received 21 points. No. 102, Moline, lost 15 points for soldering a radiator leak.

KANSAS CITY, June 25—To-day saw a new record set in National tours in America and in the entire motor world, namely, a tour covering 234.5 miles in one day. The start in to-day's run was made by five cars competing for the Glidden and five for the Chicago trophies, all of which pulled out of Wichita at six this morning.

In addition to the twelve contesting cars in to-day's run there were two press cars, the Halladay and the Great Western. The Halladay had a bad skid on a highly-arched gumbo road 100 miles out and ran into a ditch, springing the front axle slightly, but it was repaired and the car arrived a little behind the contesting cars. The two Cutting cars and the Wescott press car are expected to join the tour here and make the run into Chicago. Yesterday one of the Chalmers confetti cars, which has been lagging behind, after undergoing repairs in Dallas, caught up with the tour and will continue as assistant pilot to Chicago. It is reported here also that the Reo, which has been behind since Hot Springs, will be ready to check out Monday morning on the four-day run to Chicago. Charles F. Van Sicklen, driving No. 106, Falcar, which broke a spring seating on the rear axle entering Dallas, caught the tour Friday night and is running along as a non-contestant. The two Cadillac gun cars are along with the tour, but the Rapid truck has not reported as yet in Kansas City.

Ohio, No. 12, Negotiating a Rocky Ford

Of the twelve contestants nine made the run with clean tech-

TOTAL PENALTIES OF CARS IN GLIDDEN TROPHY CLASS

No.	Car.	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th
1	Premier	0	0	0	0	0	0	4	0	3	0	0	0
2	Premier	0	46	0	86	106	0	10	0	230	156	0	0
3	Chalmers	6	20	0	378	0	0	0	18	3	571	0	20
4	Chalmers	2	6	0	120	0	0	0	6	1012	Continued as non-cont't & confetti car		
5	Chalmers	0	0	0	0	0	0	0	0	0	0	3	0
6	Cole	30	111	0	43	1000	Withdrawn						
7	Maxwell	0	0	0	0	0	0	6	4	43	0	0	0
8	Cartercar	0	0	0	432	28	0	728	0	1000			
9	Parry	3	3	0	0	20	0	8	155	1000			
10	Glide	0	0	0	22	0	0	0	0	104	52	1537	22
11	Ohio	0	135	0	42	114	18	Withdrawn					
12	Ohio	0	111	0	324	1000	Continued as non-contestant						
14	Pennsylvania	72	94	0	1338	Withdrawn							
15	Cino	0	0	0	42	0	50	78	1768	112	82	7	0

TOTAL PENALTIES OF CARS IN CHICAGO TROPHY CLASS

No.	Car.	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th
100	Moline	0	0	5	0	0	0	0	0	3	4	0	0
101	Moline	0	13	0	33	14	0	242	0	3	0	21	74
102	Moline	0	2	0	23	0	0	3	6	3	0	15	4
103	Lexington	0	0	0	105	0	71	1196	0	0	0	0	0
104	Cole	1042	103	0	250	1000	Withdrawn						
105	Parry	0	25	26	1000	Withdrawn							
106	Falcar	60	0	0	57	0	0	26		1000	Cont. as non-cont.		
107	Maxwell	0	0	0	14	0	0	11	2	0	0	0	0
108	Cartercar	0	0	2	359	405	896	1000	Withdrawn				
109	Cartercar	0	556	277	1000	Withdrawn							
110	Lexington	4	95	0	1000	Withdrawn							
111	Westcott	3	0	2	117	0	0	1000	Withdrawn				

Scores in the Glidden Tour

nical scores and three were penalized. No. 3, Chalmers, driven by J. Gardham, received 20 points for replacing a small pin in the gear-shaft connections, requiring 10 minutes for the work. No. 101, Moline, was assessed 74 points for soldering a small leak in the radiator, it requiring one man 74 minutes to do the work. No. 102, Moline, received 4 points, three for taking up some play in the steering gear and one point for loosening it a little.

KANSAS CITY, June 26—To-day has been house-cleaning day with Referee Whiting in the matter of business pertaining to the tour. A protest entered by the Premier company against being assessed three points for taking on water on the ground that the car was acting as confetti car, was settled by the referee allowing one filling of water on this score, but refusing to allow a second one. A protest from the Maxwell entry against being penalized for replacing a spring clip which also served as a part of the shock absorber attachment was withdrawn. A little flurry was caused Sunday morning when Max Parry, of the Parry Automobile Company, appeared before a Federal judge and asked for an injunction to stop the tour on the ground that the referee was refraining from penalizing certain entrants; but the judge refused to grant it, and the matter apparently was dropped. Since then the Contest Board has disqualified the Parry car running as a non-contestant and disqualified the Parry Company from entering sanctioned contests until further notice.


A Welcome Bit of Good Road Near Lake Cormorant


Loading the Cars on the Twice-a-Day Ferry at Helena, Ark.

No. 1 Premier, which is leading in the Glidden half of the contest, lost 2 points for putting on a new fan belt. No. 5 Chalmers, which was leading until Saturday, lost 16 points for tightening a valve cap and adjusting a valve-lifter rod. No. 7, Maxwell, had to fit a new spring clip on the front spring, the clip taken off being one made specially for fitting shock absorbers. Moline No. 101 was penalized 6 points for taking on water twice outside of controls, and No. 102 3 points for the same reason. No. 107, Maxwell, lost 20 points in checking out of the control this morning. No. 2, Premier, received 114 points for replacing a left front spring.

Winton Continues Sixes for 1911

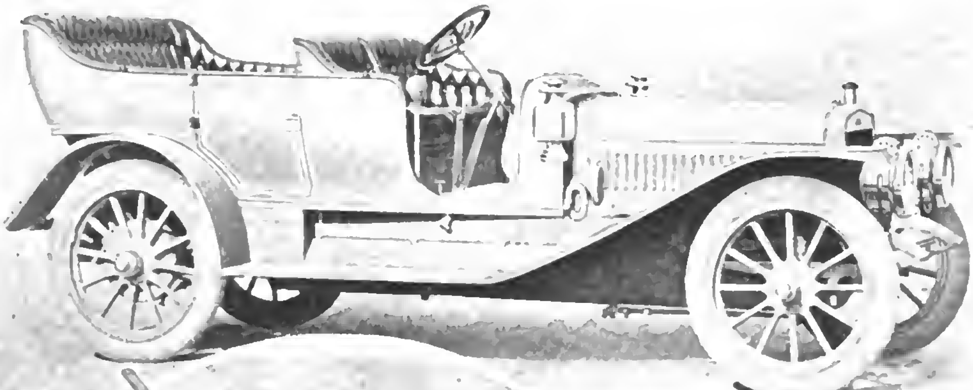
The 48-horsepower self-cranking "Six" without radical change from 1910 practice is tersely described in the Winton literature. The main features are: six-cylinder smoothness; self-cranking; jump spark high tension dual (magneto) ignition system; Winton single nozzle double throttle carbureter; positive water-cooling system; multiple-disc clutch; selective sliding gear; and a conspicuously well-designed screw-and-nut steering mechanism.

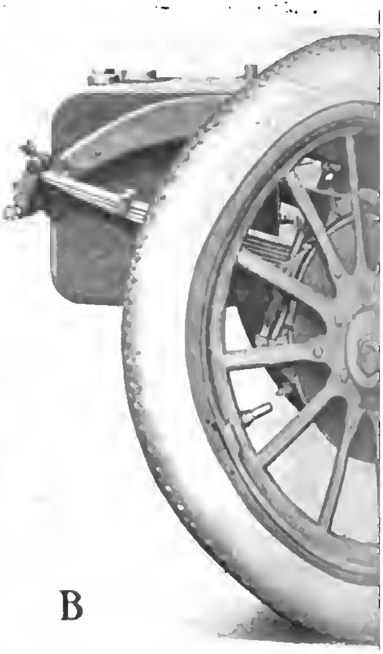
JUST as in the past the Winton output will be confined to continuing along well-defined lines, taking advantage of the experience gained, refining as the situation warrants, and remembering that a well-tried friend, even in the form of a mechanism, has attractions that are not necessarily present in an untried innovation. Under the circumstances it is but a normal expectation when the company comes out with its 1911 announcement of the continuance of the "six-cylinder type of automobile that has been an exclusive product of this plant ever since it was found that this character of equipment was what the company wanted to make and what Winton patrons express a preference for."

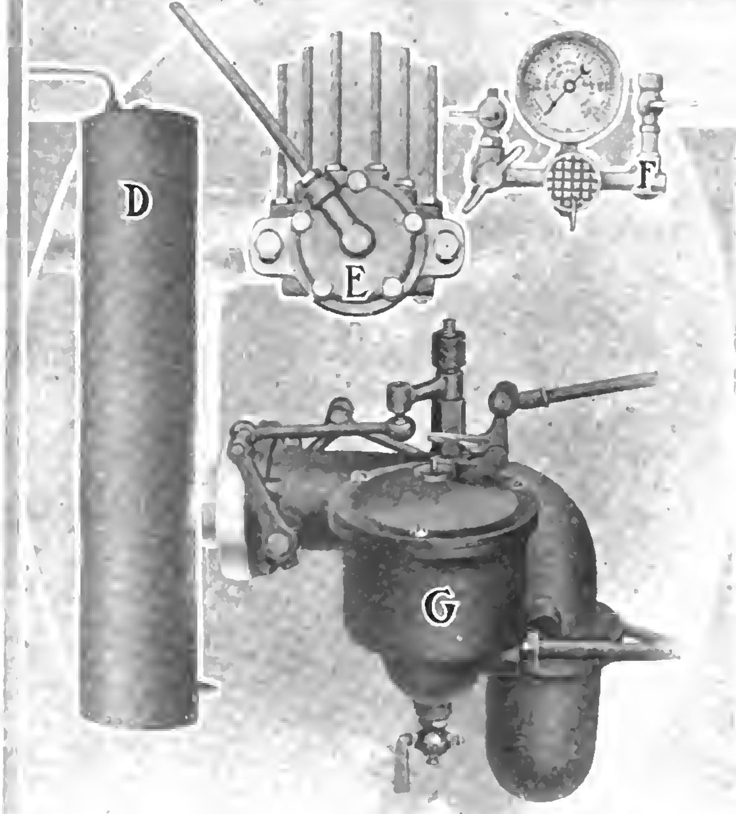
The six-cylinder motor is given an A. L. A. M. rating of 48.6 horsepower; the cylinder bore is 4 1-2 inches, attended by a 5-inch stroke. The cylinder castings are described as a tough character of close-grain gray iron, and the final finish is by grinding. The cylinders are offset from the crankshaft and are submitted to a hydraulic test of 300 pounds per square inch during manufacture. The connecting rods are long, and the stroke being greater than the bore, considering the offset relation, the work that the motor is capable of doing, without undue wear or disagreeable sound, is a fair expectation. The piston pins are made of hardened tool steel, and a great effort is made to balance the reciprocating mass in order that the motor will continue to deliver power in proportion to speed, without exceeding the safe limit from the point of view of extreme fibre strain in the section of any of the parts, even though advantage may be taken of the power which is rendered available by speeding the motor up.

In the Winton plant it is the aim to make all parts interchangeable in order that repair parts may be had at a remote date should the occasion require, with the assurance to the purchaser that the parts will fit in the place for which they are intended when they are received without having to be tinkered with. The positive-cooling system includes a gear-driven centrifugal pump, designed to afford a liberal supply of water, and among the advance features will be found a new design Winton vertical-tube radiator with "gilled" copper tubes. Attention is called to a long filler for the radiator with a notched hard-rubber cap. The radiator fan is gear driven through a friction clutch, and the air supply leaves a margin of safety against undue heating of the cylinders under severe conditions.

A







(A)—General appearance of the 48-horsepower touring car, the roominess of which is shown by dimensions as follows:

Driver's Section of the Body:

Distance from dash to seat, 25 inches.
Width of floor, 37 1-2 inches.
Height of seat from door, 14 1-2 inches.
Measurement of the two seats (each), 17 1-2 x 21 inches.
Seating width at top (outside), 54 inches.

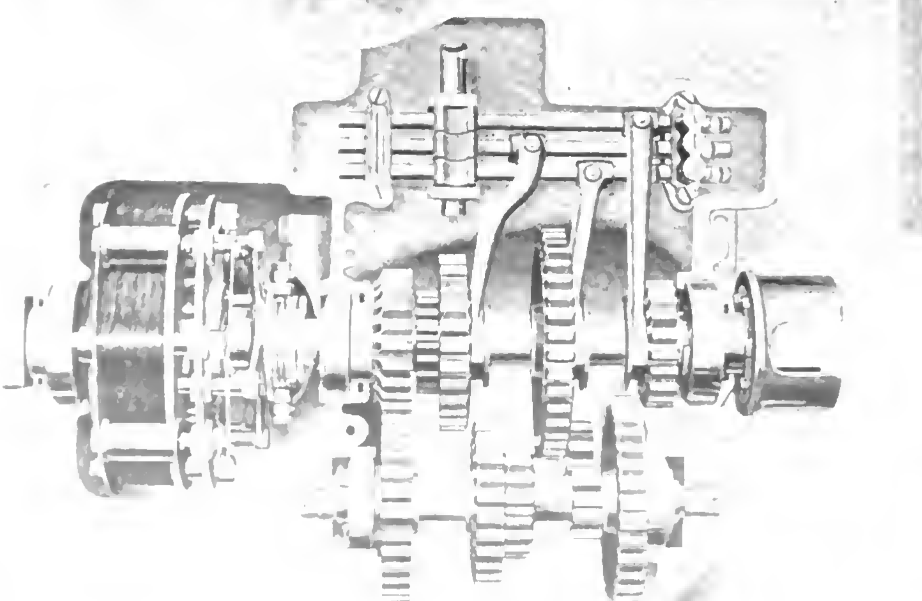
Tonneau Section of the Body:

Distance from front to rear seat, 32 inches.
Width of floor, 37 1-2 inches.
Height of seat from floor, 16 1-2 inches.
Seat measurements, 18 1-2 x 50 1-2 inches.
Seat width at top (outside), 59 1-2 inches.
Width of doors, 20 inches.

(B)—Long half-elliptic rear springs shackled at both ends; 36-inch tires; wooden wheels; front tires being 36 x 4, and rear 36 x 4 1-2 inches, with Goodrich Quick Detachable Rims; tire inflation is accomplished by special means, in connection with the self-starting mechanism, which includes a tube shown at D, and a self-starting cock F which is located on the dash, and fitted with a pressure gauge. A 22-gallon gasoline tank is shown at the rear end of the chassis, and it contains a 3-gallon reserve supply so arranged that it can only be used after the main supply runs out.

(C)—Right side of the six-cylinder motor showing the position of the magneto, well executed work on the manifolds, secure method of installing the high-tension wiring, and other characteristic features.

(G)—Winton carbureter of the single-nozzle type, double throttle, with means for combination operation. Gasoline enters the



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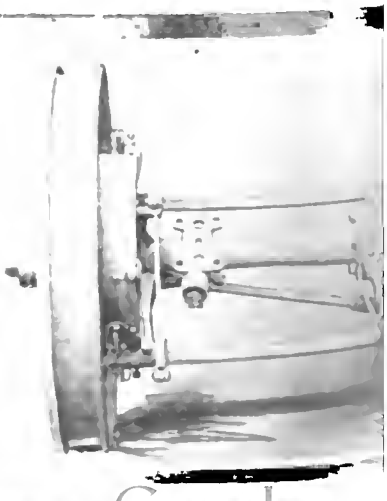
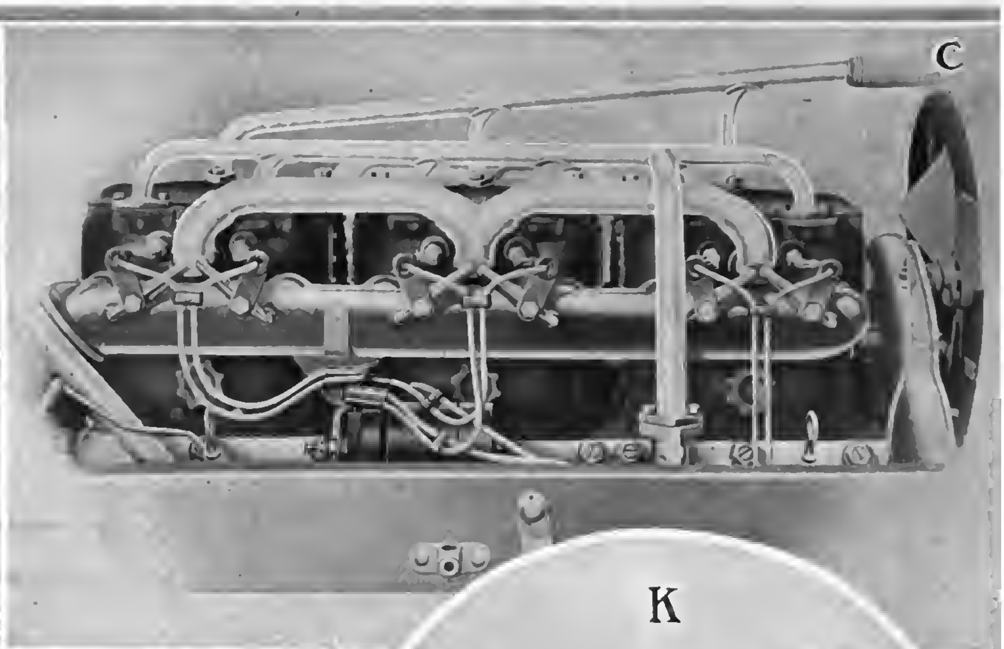
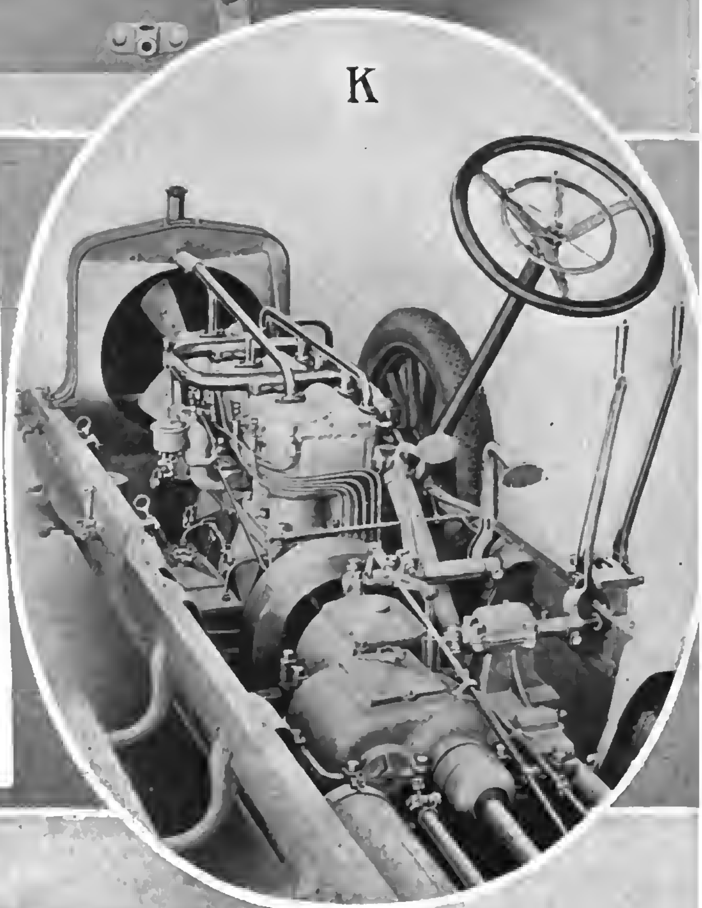


Wintcn 1911 Production, Showing the Touring Car With Body Complete, the Six-cylinder Motor, Winton Carbureter, Start





carbureter to the float chamber, passing through a strainer. A hot-air tube is provided to facilitate cold weather starting, and the carbureter is placed on the side opposite to the valves, thus assuring a homogeneous mixture, the distance being sufficiently long to give the entrained gasoline mixing time. A carbureter primer is fastened on the dash.

(H)—Transmission gear and multiple disc clutch with the cover off, affording a clear view of the relations. The speed table of this gear based on 1000 revolutions per minute of the motor is as follows:

Speed Table in Miles per Hour at 1,000 R.P.M.
36-inch Wheels.

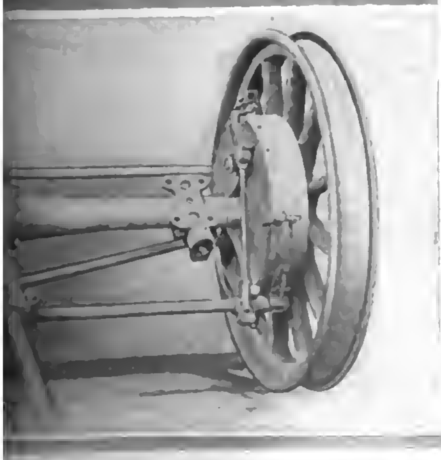
Gears	3.69	3.2	2.94	2.64
1st Speed..........	9.33	10.76	11.73	13.01
2nd Speed..........	20.10	23.20	25.27	28.04
3rd Speed..........	29.00	33.47	36.46	40.46
4th Speed..........	36.48	42.10	45.86	50.89

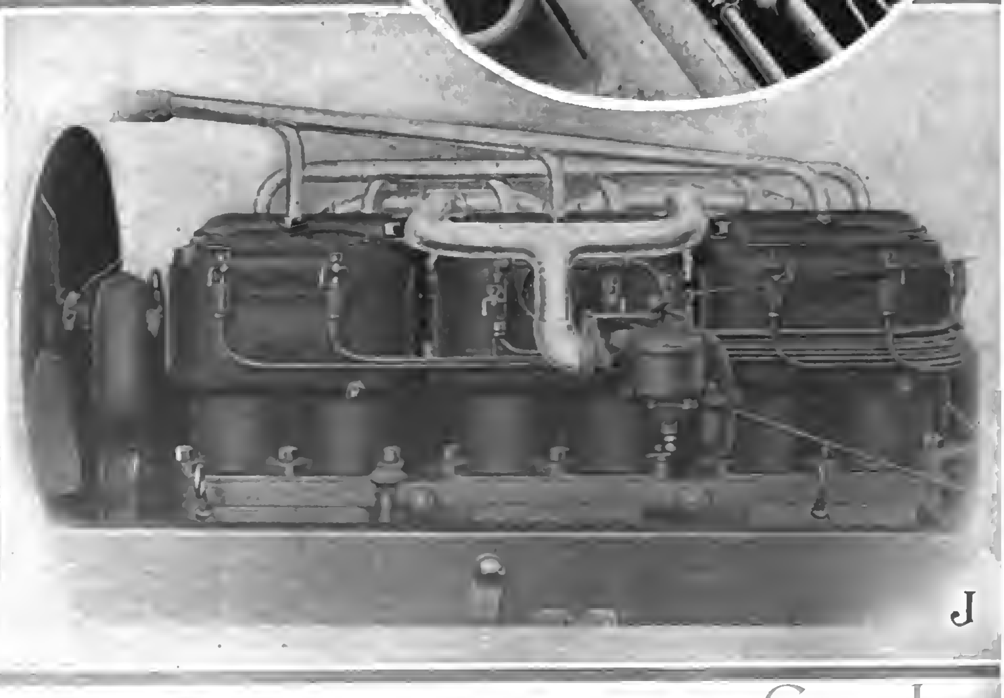
To find the speed at 1500 R.P.M., add one-half.

The multiple disc clutch, which is within the transmission gear housing, is tested to hold 90 horsepower at 1000 revolutions per minute. There are 67 saw-steel friction discs; 33 are attached to the transmission shaft, and 34 to the driving spindles which are attached to the flywheel. The discs revolve in an oil bath.

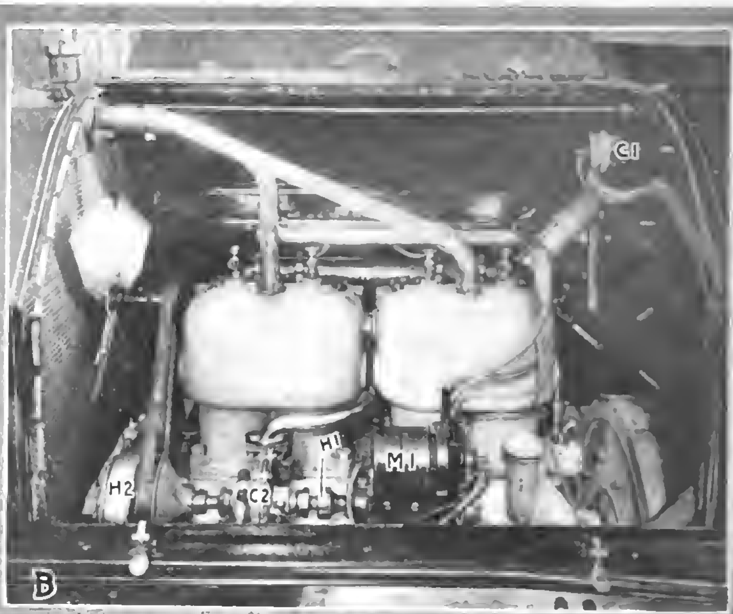
(I)—Live rear axle, showing the method of trussing, anchorage of the torsion rod, universal joint of the propeller shaft, large diameter brake drums closed in for protection against mud accumulations and an external constricting band brake system, in addition to the in-

(*Continued on page* 1194.)





ce, Transmission Gear, Multiple Disc Clutch, Live Rear Axle, Spring Suspension, and a Bird's-eye View of the Power Plant



Carhartt "Thirty-Five" Introduced

AUTOMOBILE ROW, New York, was entertained on June 22 by R. C. Kelsey, who gave a luncheon at the Plaza Hotel, which was attended by the "Old Guard," which represents the metropolitan press, and a notable sprinkling of automobile experts. After the spread the guests were invited to inspect the Carhartt "Thirty-five," which is an automobile of pretention, just from Detroit, and the staff photographer of THE AUTOMOBILE came away with the illustrations as here reproduced, thinking, perhaps, that autoists prefer to see details of a new car, rather than to admire a perspective:

(A) The rear spring suspension is of the three-quarter elliptic type, with a sufficiency of wide plates secured by double U-bolts on a swivel perch. The axle is of the Timken type of the most approved form, with Timken roller bearings throughout, and the unit system of assembly of the differential gear and bevel drive; the brake drum is of large diameter, and the external constricting band shows clearly in the illustration. The wheels are 34 x 4-inch, artillery type, with 118-inch wheel base, and 56-inch tread.

(B) Left side of the Continental motor, which has an A.L.A.M. rating of 28.9 horsepower. It is of the 4-cylinder type, 4-cycle principle, water-cooled, with a bore of 4 1-4 inches, and a stroke of 4 1-2 inches. The magneto M^1 shows; it is of Bosch Dual type, and the auxiliary coil C^1 protrudes through the dash, bringing the wiring to a point of vantage, so that the electrical installation is substantial and get-at-able. The magneto is driven by the same shaft which meshes with the timing gears in the housing H^2; it passes through the centrifugal pump C^2, and an Oldham joint H^1 is placed between the centrifugal pump and the magneto. In othe respects, the motor is shown so clearly in the illustration, considering its well-known qualities, that discussion will be reserved.

(C) The front construction, considering the part that is most interesting to autoists of discrimination, shows an I-section drop forging in one piece from suitable grades of steel; it is of the Timken make, with Timken roller bearings in the hubs, and the Elliott type of knuckle, including a long through knuckle pin, and means for lubrication. The cross and drag rods are of substantial construction, straight line design, with large diameter balls in the universal joints, means for adjusting and locking, as the importance of the situation demands.

(D) Shows the part of the body, which is of the greatest importance from the point of view of operation. One of the side levers is for the emergency brakes, and the other is used in the manipulation of the Brown-Lipe transmission gear system of the three-speed selective type. The steering wheel, of large diameter, is given an agreeable rake, and the relation between the seat, the wheel, the foot pedals, and the spark and throttle levers is that which accords with the most accepted practice.

The side frames are of the Parish & Bingham make, channel section, and throughout the car, which is an assembled product, each unit is of some well-known manufacture as Gemmer steering gear, etc. The body, as shown at the Plaza, was of the touring type, metal and wood construction, seating five passengers; with hand-buffed leather upholstery, and workmanship to match. The general appearance of the car is highly artistic; price $2,250 with top and accessories.

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for the Engineer

It is demanded of lubricating oils, that they shall not attack metals; chemical composition must not be altered by temperature; by using ether as a solvent oils may be examined to advantage; oil of resin is difficult to detect; method of locating resinous oil is given; buncombe in the formulæ used in aeronautical discussions; acetylene is promising in the production of synthetic rubber; comparative tests of cooling by water and by mixture with higher boiling point.

It is demanded of lubricating oils that they shall not attack metals, that their chemical composition shall not be altered by high temperature and above all that they shall not contain oil of resin. For the latter requirement no other reason is given than that perhaps the oil of resin is more volatile than the rest and may contribute to "cracking" as well as increase the total consumption. Its density is however, 938, while the pure mineral oils with which it is found mixed have a specific gravity of only 900 to 925. In practice scarcely any other means are employed for testing lubricating oils than to use a sample of one for a day's journey, to force the speed of the vehicle and to examine in the evening the metallic surfaces and the residues. A chemical test has fewer inconveniences. The lubricating oils usually belong to the paraffine group of petroleum distillates. They are always thick and brown. but of a shade varying with the angle of the light. They get thinner with heat and are finally evaporated into thick fumes, as one may observe by heating a drop on a piece of paper over the flame of a candle. They are easily soluble in ether and this permits a ready examination for foreign corpuscles, and gives a chance for dosing them chemically. Every insoluble ingredient is at least suspicious and everything infusible is harmful. Only graphite, among infusible ingredients, is tolerated on account of its lubrifying properties. But one should be circumspect with regard to graphite, partly because there are gritty and impure brands in the trade, and partly because this substance lends itself to other adulterations. At any event, the adulteration with oil of resin remains always the most difficult to detect, and it is a practical method to this end which is most required. The method proposed rests upon the colored reaction for resin given by Mr. Sans of the Laboratory for Resins at Bordeaux (Annales de chimie analytique, 1909; page 100). The author describes it as follows: "If a very small quantity of resin is added in a test tube containing one or two cubic centimeters of neutral sulphate of methyl, and the tube is slightly heated, there is observed a coloration passing from rose to violet and deep violet and which disappears when the temperature is raised, leaving only a slight brownish shade."

Under similar conditions slight traces of oil of resin give practically the same reaction, without reaching the deep violet, however. If the oil is emulsified in water, the reaction is plain without heating. But if it is dissolved in alcohol, no coloration appears. To apply these properties to a test, one proceeds as follows: Pour 3 to 5 grammes of the suspected oil in a tube, and on top thereof about five times as much of 60 proof alcohol: close with a stopper and heat in a wet-bath to 40 to 50 degrees centigrade, so as to render the oil more fluid, and shake until an emulsion is formed. This is now cooled in water, and fatty globules separate themselves from the medium. By turning the tube gently up and down three or four times, the globules are made to form a single mass, which rises to the top or sinks to the bottom of the liquid, according to the specific gravity of the oil. The whole contents are now thrown on a filter, and the liquid runs off rapidly and is received in a capsule, which is heated in a wet-bath until the alcohol alone has disappeared, and the residue is then allowed to cool. If then, into this water without alcohol, there is dropped sulphate of methyl the appearance of red color shows the presence of oil of resin. The color vanishes rather quickly after the first few drops, but by adding more, up to 2 to 3 cubic centimeters, the color reappears with increased intensity and more lasting. It should be remembered that there will be no reaction with alcohol 90 to 95 proof. Even with the use of 60 proof alcohol it is reduced, and it may not appear if the desiccation of this alcoholic extract is complete. The use of 60 proof alcohol is necessary so as to avoid any dissolution of the paraffine oil, and the preservation of the water in this alcohol, after one-half its volume has been evaporated, is required to get the most sensitive reaction. Synthetic experiments with this method have shown that it will detect an admixture of one per cent. or even less of resin oil to a lubricant.—*Les Sports*, June 8.

"At the present stage of hydrodynamics, direct and quantitative application of theoretic knowledge to aeronautic construction problems is rarely possible. Only qualitative explanations of a general nature and experimentally ascertained figures are in question." In other words, without circumlocution, most formulas relating to flight problems and pretending to give mathematical relations of the forces involved in atmospheric thrusts are as yet buncombe. From an article on the present stage of the "science of aviation," by Diplom-Engineer F. Bendemann in *Zeitschrift des Vereines Deutscher Ingenieure*.

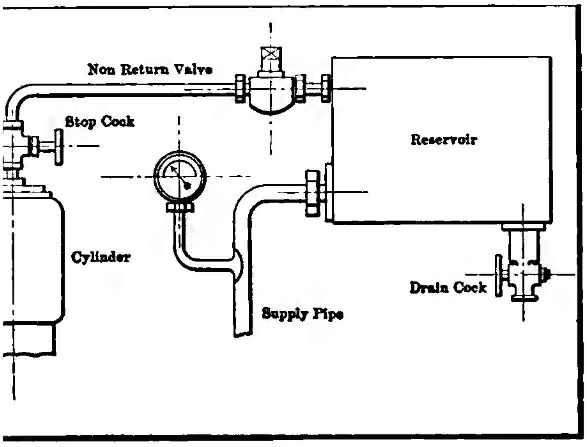
Acetylene is one of the substances promising best results in the production of synthetic rubber, and there is some hope in this fact for the languishing calcium carbide industry.—*Engineering* (London), May 13.

A cooling medium boiling at 170 degrees centigrade instead of 100 degrees, as water, and suitable for use in the water-jackets of automobile engines, has been devised by Mr. Boursin and tried out in a long series of experiments at the Conservatory of Arts and Trades. For example, a motor was first operated cooled to an exterior temperature of 168 degrees by means of Boursin's mixture, and a quarter hour afterwards the same motor was cooled with water. Observations were first taken after one hour of running. The average r.p.m. was 1130, the power 4.22 hp., the gasoline consumed in two hours 3.054 kilograms. The metal radiator maintained a constant temperature of 40 degrees. With water in the jacket, observation was commenced when the water had reached 93 degrees. The chief of the laboratory advanced the ignition two notches. The r.p.m. was 1160, the power 4.25 hp., the consumption of gasoline 3.557 kilograms. With about equal power the gasoline consumption with water cooling had increased 16 per cent. At a renewed trial with the new cooling mixture, 3 millimeters was added to the lift of the exhaust valves, and the gasoline consumption went down to 2.700 kilograms, while the power was somewhat increased. From these tests one may draw some conclusions. The temperature of the exhaust is raised, fewer calories are absorbed by the walls and the efficiency is increased. Hence, to get all the advantages offered by using a cooling medium of high boiling point, reduce the length of the suction stroke while keeping the compression unchanged, and the fuel economy will be improved. Or, if it is desired to increase the power at equal fuel cost, increase the areas of the ports. In fact, ports sufficient for a water-cooled motor are no longer sufficient for a motor working at higher temperatures, whether through air-cooling or use of a cooling medium like Boursin's. In the complete reports of this investigator, a theoretical accounting for the various heat losses under the different conditions is promised.—*La Vie Automobile*, June 11.

Helpful Hints for Those Who Drive

Y an automobilist has wished for a self-starting evice, and has scoured the market in search of one, success. Similarly there are many who desire a of pressure, such as is not supplied with the car. ınt can be supplied by any handy man who can select s and fit them to his car in a proper manner, a contract early any real American would undertake.

ıaterials necessary to make and fit to the car the source ure supply shown in the appended cut are few, consist- . stout tank of perhaps two to three cubic feet capacity. .ion to this, there is needed a stop cock, a non-return drain cock for the tank, a gauge, and the necessary of heavy copper tubing of 1-4 inch or smaller diameter. p cock is screwed into the top of the cylinder, and a ds from there to the tank, located in any suitable and :nt place. Just ahead of the tank is placed the non- valve, to prevent the pressure from escaping back to nder during the suction and other strokes when the is likely to be lower than that in the tank. The drain



Elements of Pressure Storage System of Utility

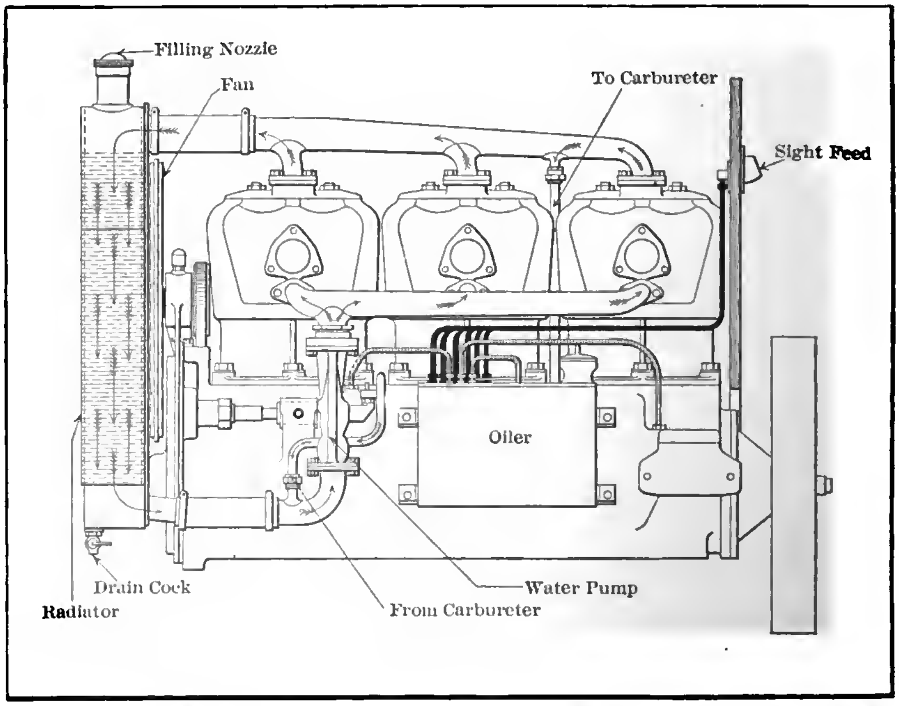
be fitted to one end of the tank, at the lowest point, so as to draw water of condensation.

another point of the tank the gauge is led, and, also, the sup- If the pressure is to be used for tires, for cleaning off dust, or for the horn, the pipe would naturally ward to somewhere near the dash- On the other hand, if the automo- ambitious and wants to fit a start- ce, the supply pipe should lead to a or placed directly upon the dash. pressure gauge, although shown ı the tank, would preferably be ɔn the dash and fastened to it, this nly a matter of piping.

motion takes place when relative ·e lacking in harmonious adjust- The effect of lost motion in any is usually to rack the machine ; long before it would wear out if ıttention were given to the align- ıbrication, and adjustment of its Where there is lost motion there is ınger; excessive wear, noise, and ıcy are its accompaniments; and many a serious accident has been traced directly to neglected lost motion in the steering gear. "Why is the repair shop so very prevalent?" The answer may be, "Chiefly because of lost motion." The life and safety of any bearing decrease as the lost motion increases. Therefore, do not neglect lost motion.

It frequently happens that a horn becomes dented. To restore it to its normal shape it is usually sent to a musical-instrument maker or to the manufacturer of the horn, which is not only expensive but also involves considerable loss of time. By the following method dents can be removed from the "bell" of a horn in the garage or at home. The materials necessary are a length of strong half-inch wire, solder, a blow torch and vise. The wire is bent into a loop of about the size of the dented portion at one end and is then soldered to the dented portion. The wire is then gripped in a vise or wrapped around another piece, to prevent the wire running through the jaws of the vise. The horn is now grasped with both hands, and a series of gentle pulls in the direction of the arrow will bring the bell to its original contour. The solder is then melted with the blow torch, when the wire loop comes away, and the operation is finished, except for polishing.

Amateurs really should learn to take care of the component parts of the water system. The diagram below shows the whole water system of a well-known car, in which the water is filled into the usual filling cap, flows downward and back to a centrifugal pump, is there projected up to the bottoms of the cylinders, whence it carries off the heat, loses in specific gravity, rises and flows out through the upper water pipe to the top of the radiator, where it is cooler, and starts over again. In this system, the two hose pipes at the top and bottom of the radiator should be frequently inspected, and often replaced, this being a very small expense. The gaskets at the junction of the upper and lower pipes with the cylinders, six in number in this case, should also be inspected and replaced frequently, while the small pipe shunt to the carbureter must be taken off and cleaned out at frequent intervals; it easily fills with slime and sediment.



Complete Water System of Thomas Six-Cylinder Car, Showing Where Care Is Needed

Rejuvenating the Old Automobile

By G. J. MERCER.

> Illustrating a modern fore-door type of body as it would appear on a Chalmers "Thirty" touring car, giving all information required by a body maker and showing how the body will appear when completed. In this case the side lever for sliding the gears comes inside of the fore-door on the right-hand side of the car, and the emergency brake lever falls to the outside.

RMING to the shape of the bon- f this car and with a view to ıe most artistic appearance the siderably lower than the dimen- ı obtained in the previous ex- the overhang is given a flare ıking into account at the same ıape of the fore-doors which ith the appearance of the side ıg to the tonneau. Fig. 9 is a n of the effort complete. Fig. ; the structural detail of the framing and fore-door. front elevation and Fig. 12 is a plan of the work ave to be done upon the body in the process of re- the same to include the fore-doors.

ial specified is 16-gauge sheet aluminum over the autoist to utilize the fore-doors in periods of inclement weather and to avoid the couped-in feeling during periods of calm.

Referring to Fig. 11 the dotted lines of the speed-change lever indicate how it must be bent in order that it will pass through an opening of the body to the inside at a point above the quadrant. In this car the quadrant is not only high up but falls to a considerable distance outside of the line of the chassis frame. This necessitates a rather deep cut in the body, and in order to create a somewhat better impression than would otherwise obtain, this cut may be housed over. The throw of the lever is relatively short, which is a fortunate circumstance, since it reduces the dimensions of the housing and makes it possible to consider having the side

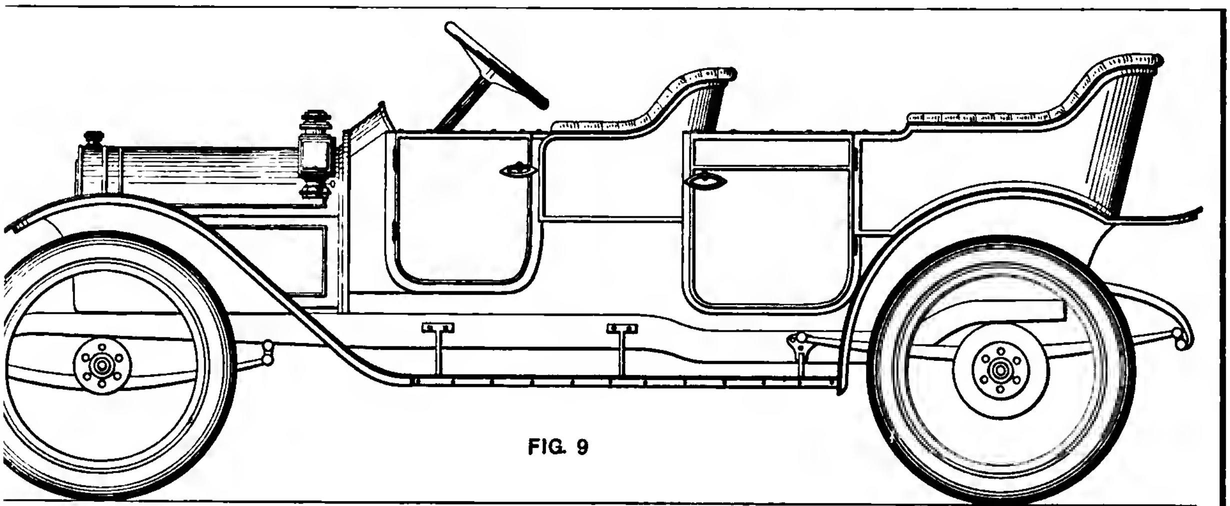


FIG. 9

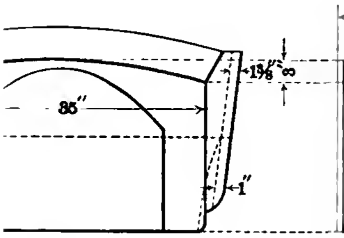


FIG. 11

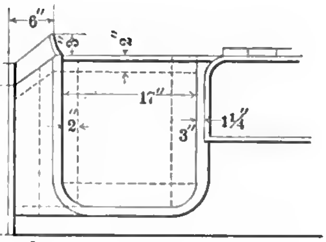


FIG. 10

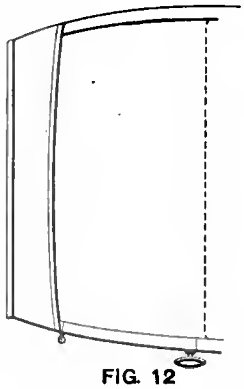


FIG. 12

levation of the rejuvenated body. Fig. 10—Side elevation of the fore-door. Fig. 11—Front elevation. Fig. 12—Plan.

. The pillar to form the doorway as shown U-shaped bent wood piece, framed against the and to the underbody. The pillar is continuous stance up the front of the door, and the metal ooved into the same, rather than to have it ıtside. At the bottom a horizontal framing piece en the pillar and the dash. It is also necessary ter moulding into the pillar, when the latter is underbody. The doors are hinged, and it is ıt they be swung in a substantial manner, al- unity will be offered to select the character of permit of detaching the doors at will; this is ınd it offers the advantage of permitting the lever for the sliding gears fall to the inside. It is a much more convenient arrangement.

Rapid System of Finishing Bodies

Clean surface thoroughly, apply primer, work to smooth finish, sandpaper surface ending with No. O; dust off. On the third day apply opaque color, then ground-work color; when dry apply coat of glaze, rub lightly with a roll of broadcloth dipped in water, and No. OO pulverized pumice stone to kill gloss. Apply coat of elastic rubbing varnish, then rub with pumice stone and water. About the eighth day, apply coat of clear elastic rubbing varnish, slick down with pumice stone and water, wash up and finish with a rich full body varnish.

Vulcanizer Thermometers Frequently Deceive

By JAMES S. MADISON.

THE manufacture of thermometers for use in cases where accuracy and precision are required has reached a high state of development. Thermometers used for purely scientific purposes leave small room for improvement. This is especially true of instruments made by a reliable manufacturer, and afterward standardized and certified by the Reichs Anstalt in Germany, or by the United States Bureau of Standards at Washington. Such thermometers will give the exact temperature through a range of 100° or more, with a variation of only one-tenth of a degree. Because of the care with which they are made, calibrated and tested they are naturally expensive. But the ordinary thermometers, certainly the cheaper varieties, are never accurate and should always be tested before using. The small tube thermometers used in connection with the different forms of vulcanizers should be tested, since many of them are so inaccurate as to lead to disastrous results.

One of my acquaintances recently purchased an electric vulcanizer. He used it to repair cuts in his casings, etc., each time carefully following the directions of the manufacturer, as to the time and temperature of heating. He was particularly cautious not to allow the temperature to go above the danger point, 265°-275°, as stated in the directions for vulcanizing. Several days after he noticed that the casing upon which he had been working was developing an incipient blow-out in three different places. Not only was the rubber tread burned, but the fabric was also burned and had begun to bulge out, and would have blown out in a very short time if the casing had not been removed from the rim. An examination showed that it was ruined.

The thermometer in question and one belonging to the writer were taken to the laboratory of a neighboring college and tested by comparing with a standard thermometer. The test was carried out as follows: The standard and the two vulcanizer thermometers were suspended in a glass beaker nearly filled with cylinder oil. This was supported on a wire gauze over a tripod and heated with an ordinary Bunsen burner. The readings were taken at 250°, 265°, 275° and 280° with the following results:

Standard F°	A F°	B F°	Error A F°	Error B F°
250.	267.0	268.0	+17.0	+18.0
265.	283.5	282.0	+18.5	+17.0
275.	293.0	290.0	+18.0	+15.0
280.	302.0	302.0	+22.0	+22.0

From these figures it is obvious that when the thermometer read 275°, the temperature was at least 18° higher. It is also obvious that one should not rely upon the ordinary thermometer implicitly. It is also important to remember that even if the thermometer be approximately correct, it will not necessarily give a reading of the right temperature of the vulcanizer at the point of contact between it and the tire. In some forms of vulcanizers the thermometer is supported by a shoulder at the extreme edge of the instrument. In view of its distance from the center, and the quantities of heat that are lost by radiation, etc., the temperature actually shown by the readings is, in all probability, lower in every case than the real temperature at the center of the vulcanizer, the usual point of contact between it and the tire. If the thermometer were placed at the center, it would not be at all surprising to find that it would read from 10°-15° higher than it does at the edge.

Importance of Proper Timing Overlooked

WHEN an automobile has been in service for awhile the timing falls away from its correct position a little in the better types of motors, and to a considerable extent in the average of them. Some motors are provided with systems of adjustment so that the re-timing problem is reduced to a minimum, but the autoist who undertakes to time his own motor without understanding the intricacies of the problem has one chance in his favor and 99 against arriving at the right conclusion. Since two-cycle motors cannot be timed after they leave the maker's hands the discussion here will be confined to the four-cycle types of motors, and referring to Fig. 1, which is a diagram of the four-cycles, it will be observed that the wavy line which starts at O, which is the atmospheric line (14.7 pounds per square inch at the sea level), sweeps upward during the expansion stroke, crosses the atmospheric line at the end of that stroke, falls below O during the back pressure period, and if the muffler is of the ejector type rises above the line approaching the end of the exhaust stroke; but when the suction stroke comes on, a depression is generated which represents a loss in the total power summation, which depression usually reaches O at the end of the suction stroke and is followed by the compression stroke, which represents a power loss throughout, varying with the compression. This curve is made without considering the increase in pressure which is due to ignition and expansion, so that the pressure in pounds per square inch, as shown, is that which would obtain were the motor run as a compressor in the absence of the ignition phenomena.

The power which may be taken from a motor will be indicated by the area of the enclosure embraced by the atmospheric line at the bottom and the upward sweeping curve, starting and ending at O on the expansion stroke, plus such portions of the curves of the exhaust, suction and compression cycles as may sweep above the zero line, diminished by the areas represented by the curves which sweep below the line in the exhaust, suction and compression cycles. The great problem under the circumstances lies in so timing the motor

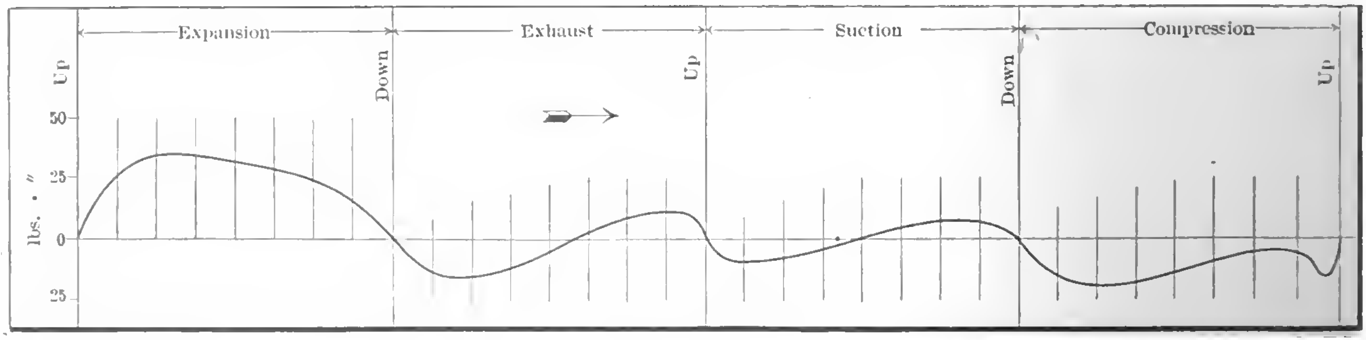


Fig. 1—Curve plotted to show the compressor action of an automobile motor, and the variations of pressure during the 4-cycles

that it will give the greatest possible power value during the expansion stroke and a minimum of the pumping losses during the exhaust, suction and compression strokes.

Fig. 2 shows the markings on the flywheel of a motor, which will enable the autoist to fix in his mind the timing of the valves. as it is referred to in the tabulations here given, and in the table the timing relations are given for several motors, so that the autoist will be enabled to select a timing which will accord with the speed of the particular motor he desires to doctor, taking into account the fact that a high-speed motor should be timed somewhat differently from a motor which runs at a low speed.

SATISFACTORY TIMING FOR GIVEN TYPES OF MOTORS

Name of Motor	Lead of exhaust opening	Lag of inlet closing	Ignition advance	Lag of exhaust closing	Lag of inlet opening	Speed at full power
Charron	41	0	var.	0	1	1,100
Gregoire	53	0	var.	0	5	1,200
Hotchkiss	44	33	var.	10	17	1,300
...ter	40	40	var.	0	0	1,400
Darracq	48	30	21	0	0	1,500
Renault	32	26	33.5	10	23.5	1,600
Sizaire	44	37	var.	0	15	1,700

The motors as here selected give a range of speed from 1,100 to 1,700 revolutions per minute, and the timing, which seems to give the best results in view of the respective speeds. In two of the cases the spark advance is fixed, and the range between the two is very great, considering the speed changes, which goes to show that a wide range is permissible.

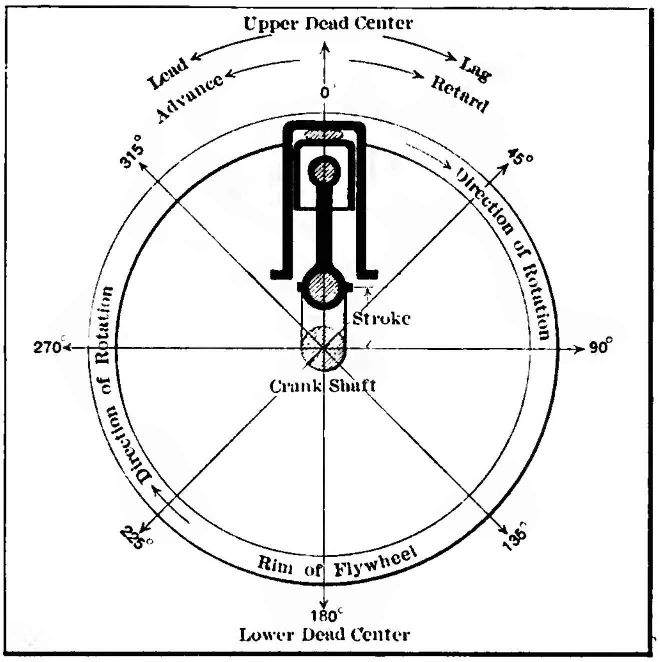


Fig. 2—Showing markings on motor flywheel, enabling autoist to gauge timing of the valves

Some of the Reasons for Frequent Valve Grinding

The aim of this article is to state why valve grinding is necessary, there being two reasons, one of which is due to improperly operating the car, and the other is the result of poor design of the motor. The illustrations are made comparative to help bring out the important points to be made.

POPPET types of valves were adopted for gasoline motors because they afford the requisite qualities, under severe conditions of service, which will permit them to do the work required of them for long periods of time, with little or no attention on the part of the operator, but when they have to be overhauled no great skill is required in the process. The best results come if the valves are properly fashioned, and if the materials employed in their construction are those which will withstand wide variations of temperature and a considerable amount of shock. The material must also be close grained in order that the valve seat will grind to tightness.

Fig. 1 shows a type of cone-seat valve, which is used, perhaps, more than any other type, but in this case the head is attached to the stem with little or no fillet, and the result is that the head and the stem do not hold to their right angle relation after the valve heats up, because the small amount of metal at the junction of the stem with the head is insufficient to serve as a conducting medium for the heat which is picked up by the head but which must be conducted away by the stem. The measuring instruments which are placed alongside of the valves in this figure show a gap at the lower portion of the seat on one side, and at the upper portion at the other when the bases of the instruments are placed firmly against the stem If the two protractors as placed show that the bevels are not at the same angle it is a self-evident fact that with the stem in its guide, if the head is not at right angles, as it will not be when it is as shown in Fig. 1, then the valves cannot be ground to tightness at all. This is frequently the case, and if a little Prussian blue is placed on the valve seat and it is smeared around evenly, it will then be found upon inserting the valve in its guide and giving it a twist that the blue will not remain evenly over the surface but will scrape off at one point of contact. It will not be necessary to use a protractor to locate this difficulty under working conditions, but it may be necessary to replace the type of the valve which has no fillet between the head and the stem, and substitute one of the design as shown in Fig. 2, which has a liberal fillet at the junction of the head with the stem, and which shows no gap when the two protractors are placed so as to show the angle of the bevel as it relates to the stem.

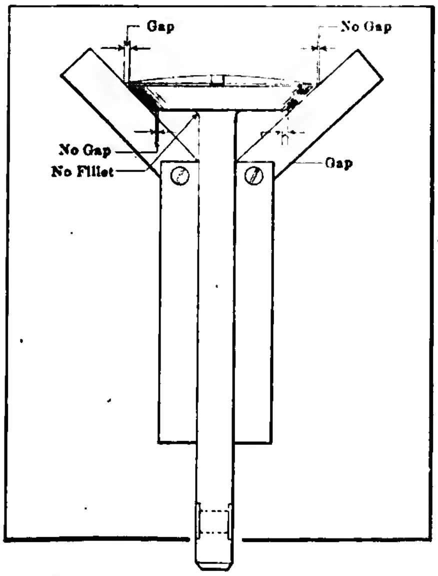


Fig. 1—Cone type of valve without a fillet between the head and the stem which warps when heated.

In some types of motors the valves are provided with flat seats as shown in Figs. 3 and 4. Warping will take place in precisely the same way as before stated, and referring to Fig. 3, it shows how the head will be off of the seat at one point in the diameter when it is on the seat at the other point, if the design does not include a fillet. Fig. 4 shows the flat-seated valve with a liberal fillet and it will be easy to

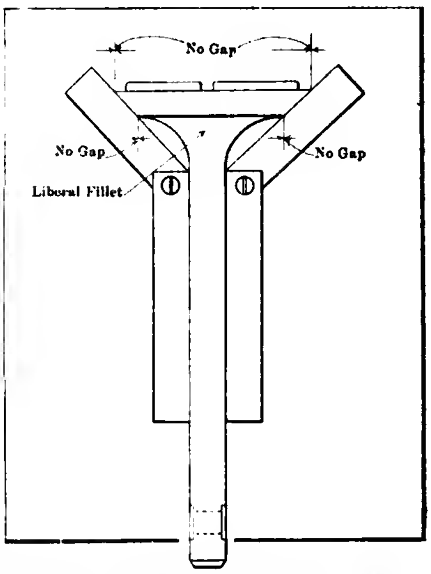


Fig. 2—Cone type of valve with a liberal fillet between head and stem which prevents warping with heat changes

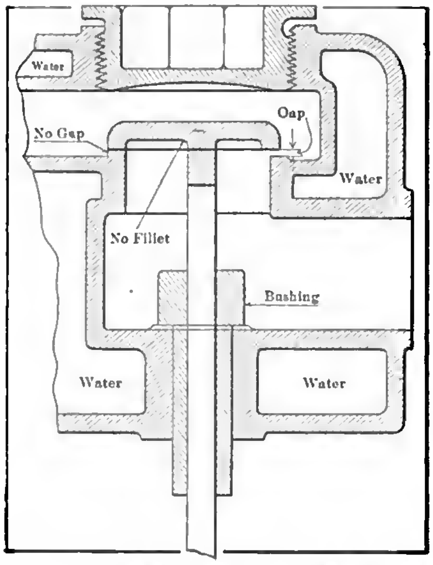


Fig. 3—Flat seat type of valve without a fillet, which warps when heated

understand how the large section of metal at the junction of the stem with the head will serve to conduct the heat from the head through the stem to the bushing or guide, from there through the section of the casting, and finally into the water of the water-jacket. If the stem does not fit quite closely in its guides the air gap resulting will retard the flow of heat from the stem to the water in the water-jacket, and the difference in temperature will be somewhat greater in consequence. Under such conditions, if the fillet is neglected, the chance of maintaining a tight relation of the valve to its seat will be reduced to a minimum.

If, in any given motor, the valves, after they are ground in, do not stay tight for a reasonable length of time it will be a fair assumption that the valves are not properly designed, or that the operator runs the motor on a retarded spark. There may be contributory reason in addition to either of these, but running on a retarded spark, if the valve is properly designed, induces excessive heating and prolongs the time when the red-hot gases are sweeping over the surfaces of the seats so that pitting results and this character of leaky-valve trouble will come independent of the design of the valve, excepting that some kinds of valve metal will stand more abuse than others.

In the selection of metal for valve heads 35 per cent. nickel-steel with a low carbon content serves extremely well, although it is claimed by some designers that this metal is not good to use in the stem, and they, when they use high nickel-steel heads, make the stem of mild steel and rivet one to the other. Another type of metal which was first brought out in Panhard cars and which works with good satisfaction, is a high carbon-steel product with the carbon ranging between 110 and 115 points with other components to match, excepting that the metalloids should be low, and it is probably an advantage to fabricate this steel in relatively small heats by the crucible process.

In addition to these types of valves, some very satisfactory performances are realized by using a cast gray iron head riveted to a mild steel stem. In this type of valve, the mild steel stem has good value from the bearing point of view, and it has been found in practice that cast gray iron not only serves well as the valve seat, but it is equally efficacious from the seat point of view when used as a valve head. Valves of this character are easily ground in, and they have the virtue of serving without pitting, a not uncommon difficulty in valves employing other materials. This pitting question is quite prominent in some of the types of nickel-steel.

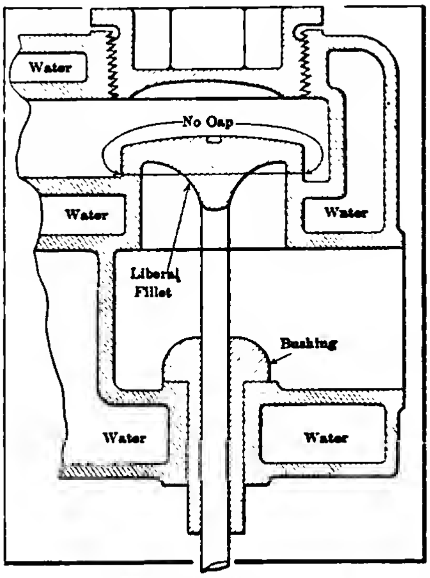


Fig. 4—Flat seat type of valve with a liberal fillet between the head and the stem, which prevents warping under heat changes.

Testing Steel—For Impact, Bending, Etc.

By BERTRAM BLOUNT, W. G. KIRKALDY and Capt. H. RIALL SANKEY.

(Second Installment)

In the present installment is given a list of the representative types of steel tested in accordance with the British standard specifications of each type, together with a short epitome of the respective specifications.

AMONG the makers who supplied various types of steel for testing purposes, as mentioned in the last installment, were the Parkgate Iron & Steel Co., Messrs. David Colville & Sons, Messrs. Taylor Bros. & Co., Messrs. Walter Scott, Messrs. Thos. Firth & Sons, Messrs. Cammell, Laird & Co., the North Eastern Steel Co., Messrs. Dorman, Long & Co., and the Patent Shaft and Axletree Co.

Representative types of steel were chosen, and the following is a complete list, together with a short epitome of the respective British Standard specifications:—

1. Marine Boiler-Plate suitable for shell—British Standard Specification for Structural Steel for Marine Boilers (Report No. 14: Revised March, 1907: breaking stress 28 to 32 tons per square inch, elongation on 8-inch gauge length not less than 20 per cent.
2. Marine Boiler-Plate suitable for combustion chamber—British Standard Specification for Structural Steel for Marine Boilers (Report No. 14: Revised March, 1907): breaking stress 26 to 30 tons per square inch, elongation on 8-inch gauge length not less than 23 per cent.
3. Locomotive Boiler-Plate suitable for portions not exposed to flame—British Standard Specification for Steel for Plates, Angles, etc., and Rivets for Locomotive Boilers (No. 16 of Report No. 24): breaking stress 26 to 32 tons per square inch, elongation on 8-inch gauge length not less than 22 per cent. Not more than 0.05 per cent of sulphur or of phosphorus.
4. Locomotive Boiler-Plate suitable for portions exposed to flame—British Standard Specification for Steel for Plates, Angles, etc., and Rivets for Locomotive Boilers (No. 16 of Report No. 24): same as for item 3.
5. Forging—British Standard Specification for Steel Forgings for Locomotives (No. 8 of Report No. 24): Class B, breaking stress 25 to 32 tons per square inch, elongation on a test-piece 0.798 inch diameter and 3-inch gauge length not less than 27 per cent. with 25 tons per square inch breaking stress, and not less than 20 per cent. with 32 tons breaking stress. The sums of the breaking stress and of the elongation not to be less than 52.
6. Forging—British Standard Specification for Steel Forgings for Locomotives (No. 8 of Report No. 24): Class D, breaking stress 40 to 45 tons per square inch, elongation on a test-piece 0.798 inch diameter and 3-inch gauge length not less than 20 per cent. for 40 tons breaking stress, and not less than 15 per cent. for 45 tons breaking stress. The sums of the breaking stress and elongation not to be less than 60. Elastic limit not less than 50 per cent. of the breaking stress.
7. Locomotive Axle—British Standard Specification for Locomotive Straight Axles (No. 2 of Report No. 24): breaking

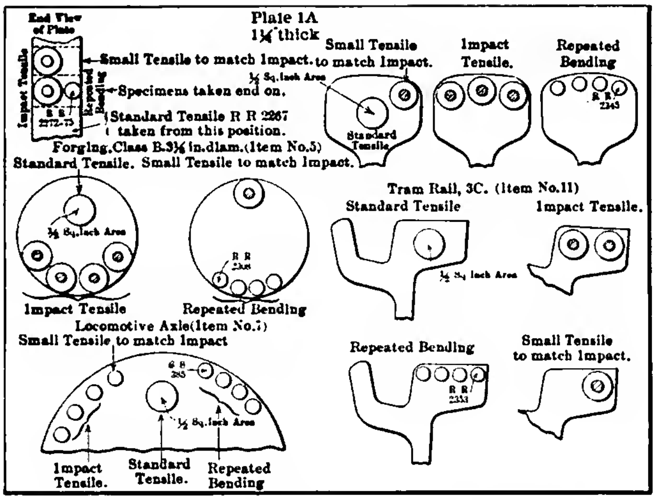


Fig. 1—Sketches showing position of test specimens

stress 35 to 40 tons per square inch, elongation on test-piece 0.798 inch diameter on 3-inch gauge length not less than 25 per cent. with 35 tons breaking stress, and 20 per cent. with 40 tons breaking stress; the sums of breaking stress and elongation not to be less than 60. Elastic limit not less than 50 per cent of the breaking stress. Not more than 0.035 per cent. sulphur or phosphorus.

8. Wagon Axle—British Standard Specification for Carriage and Wagon Axles (No. 3 of Report No. 24): breaking stress 35 to 40 tons per square inch; elongation on test-piece 0.798 inch diameter and 3-inch gauge length not less than 25 per cent. with 35 tons breaking stress and 20 per cent. with 40 tons; the sums of breaking stress and elongation not to be less than 60. Elastic limit not less than 50 per cent. of breaking stress. Not more than 0.035 per cent. sulphur or phosphorus.

9. Bull-Head Rail, 95 lb. section, as supplied to the North Eastern Railway. Basic Bessemer—British Standard Specification and Sections of Bull-Head Railway Rails (Report No. 9; Revised July, 1909): breaking stress not less than 40 and not more than 48 tons per square inch. elongation on test-piece 0.798 inch diameter and 3-inch gauge length not less than 15 per cent.

	Per cent.
Carbon	0.35 to 0.50
Manganese	0.70 to 1.00
Silicon ....not to exceed	0.10
Phosphorus ...... " " "	0.075
Sulphur .... " " "	0.08

10. Bull-head Rail, 90 lb. section, as supplied to Indian Railways. Acid open hearth—British Standard Specification and Sections of Bull-Head Railway Rails (Report No. 9: Revised July, 1909): same as for item 9.

11. Tramway Rail, 95 lb. section—British Standard Specification for Tramway Rails and Fishplates (Report No. 2): breaking stress not less than 40 tons per square inch, elongation on test-piece 0.798 inch diameter and 2-inch gauge length not less than 12 per cent.

	Per cent.
Carbon	0.4 to 0.55
Manganese	0.70 to 1.00
Silicon ....not to exceed	0.10
Phosphorus. ...... " " "	0.08
Sulphur .... " " "	0.08

12. Tire—British Standard Specification for Carriage and Wagon Tires (No. 5 of Report No. 24): Class C, breaking stress 50 to 55 tons per square inch, elongation on test-piece 0.564 inch diameter and 2-inch gauge length not less than 13 per cent. with 50 tons breaking stress, and not less than 11 per cent. with 55 tons. Not more than 0.035 per cent. sulphur or phosphorus.

13. High-tensile nickel-chrome steel for automobile parts.

The location of the various test-pieces was selected with a view of giving the best practical information in respect of the use of each type of steel, and in this matter the long experience of Messrs. Kirkaldy & Son was of the utmost value. Care was taken so as to record and identify each test-piece that its original position and orientation in the sample can be determined. Fig. 1 shows the positions from which sample test-pieces were taken.

Forced Lubrication—Trend in English Practice

By R. K. MORCOM

(Fourth Installment)

THE make-up in the experiment in forced lubrication mentioned in the last installment was by a small scoop pump feeding the proper quantity into the crankcase in the usual way. The oil after use was black in color, and smelt of petrol. Tested for viscosity it gave the curve X (Fig. 21) on a Redwood viscometer. Its flash point, open test, was 214 deg. Fahr. against 435 deg. Fahr. On distillation at 300 deg. Fahr. 1½ per cent. of petrol came over. After distillation the flash point was normal at 435 deg. Fahr. The oil was still dark in color, but appeared to be a satisfactory lubricant. On burning the amount of ash was very little over normal.

On the subject of oil the information of Table A is not very full. The general consensus of opinion is in favor of a high quality mineral oil of high flash point, well maintained viscosity, and low cold test. The viscosity curve of a satisfactory oil called "SSL" is given in Fig. 21. This oil has a flash point of 420 deg. Fahr., and is fluid at low temperatures. It is probably advisable to use a heavier oil in summer than winter.

There are many satisfactory oils on the market, but also unfortunately many bad ones. Most makers will give sound advice as to the oil which suits their make of engine.

It would have been interesting to collect some figures of temperature normal to different engines after a long run, and it might be found that an oil cooler would be advantageous. This is fitted to steam engines for hot climates, or long continuous running, with beneficial results, and is invariably a part of a steam-turbine equipment.

The question of wear has not been considered, as the author has been unable, for obvious reasons, to collect reliable figures on this point. A car originally lubricated on the trough system has certainly run better, and shows less signs of wear, since forced lubrication was fitted; but one instance is not of much value. Many instances, however, of steam engines with forced lubrication could be given in which the wear has been infinitesimal.

An endeavor has been made to touch on the various points necessary to ensure good working of the system, and the conditions which exist. It is easy to meet these conditions, and when met it will be found that the forced lubrication system brings about high mechanical efficiency, quiet running and absence from wear.

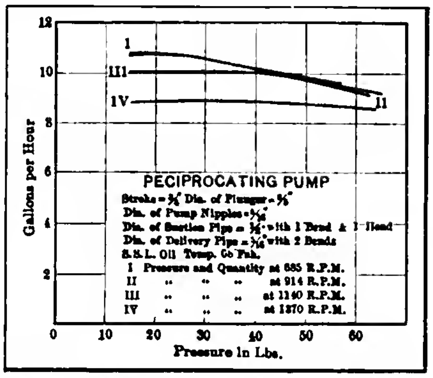


Fig. 17—Capacity of plunger reciprocating pump with oil at 68 deg. Fahr.

Peculiarities of Modern Non-Charring Brake-Linings

TRAINED in the belief that the brakes, to be efficacious, must be so designed that the shoes will press against the drum-face with considerable force in pounds per square inch, it is with much difficulty that men who work on this character of undertaking frequently make the mistake of designing so that the result of their handiwork falls below the possible realization. To be more specific, let it first be stated that the coefficient of friction, as it is usually stated for the several grades of materials, does not afford the true measure of the normal expectation under working conditions.

The coefficient of friction of the several materials, as it is usually determined, represents the multiplier which is obtained by dividing the whole force of friction by the normal pressure; hence, in brief language, the coefficient may be defined as the unit friction due to a normal pressure of one pound, and for the various materials, while it is not constant by any means, even for the same materials rubbing on each other, it may be approximately stated as follows:

APPROXIMATION OF THE COEFFICIENTS OF FRICTION

Friction Materials	Coefficient
Cast iron on oak	0.49
Wrought iron on oak	0.62
Cast iron on cast iron	0.15
Wrought iron on wrought iron	0.14
Brass on iron	0.16
Brass on brass	0.20
Wrought iron on cast iron	0.19
Leather on wood	0.49
Leather on cast iron	0.28
Cast iron on cast iron, greased	0.10
Cork inserts on cast iron	0.35
Cork inserts on cast iron (lubricated)	0.23
Asbestos friction fabric on cast iron	0.25

In the utilization of these coefficients, in the absence of experience, it would be the natural thing to accept materials that would afford the highest coefficient, as, for illustration, wrought iron on oak. Were the oak fireproof, the fact that the radiating surface is limited would make no difference at all, and the result would be extremely good. As it is, however, the oak begins to char at about 550 degrees centigrade, and, in automobile work, the radiating surface is so restricted that this temperature would be realized the first time the automobile so made were to be snubbed down a grade of any moment, and the brakes would soon be reduced to a point where they would cease to serve for the intended purpose.

Speed of Rubbing and Pressure per Unit of Area

In any event, when it is desired to get all there is in a given type of material, care must be exercised to so place the material, with regard to the speed of rubbing and the unit pressure, that the maximum result will be obtained. In this connection, metals follow one law and fiber-like fabrics obey quite another set of conditions. To substitute fabrics then, in place of metal to metal, is to court a different result, and the substitution may be the difference between success and failure.

Very little has been added to the store of real knowledge on this subject for many years; old theories have been verified to be sure, but what is now known has been known for a considerable period. Unfortunately, however, many designers pre-

(Continued on page 1194)

Questions That Arise—General in Scope

How to overcome a leaky combustion chamber——Eliminating rust from wheels——Soap has various virtues besides its cleansing properties——Acids in mineral lubricating oil——The lever system as used in automobile work——To prevent tools from rusting——A good lacquer for bright work on automobiles——How to locate cylinder cracks.

[133]—Would it not be possible to counteract the trouble of this sort by the simple expedient of firing gunpowder when the piston is well down on the stroke, and regulate the quantity of gunpowder so that the pressure will be maintained at the desired level?

There is scarcely any doubt of it.

[134]—Then why not use it; surely, self-starting is much in need?

Just so soon as self-stopping can be guaranteed, then self-starting, using gunpowder, will be an excellent idea; most individuals want to know that they are going to stop as well as to start. Gunpowder, gasoline, an electric ignition system, and a man of no brains, should make a combination that would demand the attention of law makers.

[135]—When a pipe in a combustion chamber of a motor fails to maintain tightness against compression, if grinding in cannot be resorted to, what is the surest way to overcome the trouble?

Cement, if it is made of litharge and glycerine to form a cement-like mass, if it is freshly applied (using pure glycerine), will serve the purpose. This cement is heat and acid-proof and possesses more than the ordinary virtue. It fails when the glycerine is diluted with water, as it frequently is, or if the litharge is adulterated, which is one of the regular occurrences.

[136]—When rims of wheels of the clincher or other types become rusty, what is the best way to eliminate the trouble?

Considering rust as a disease which is likely to spread, even if nearly all of the rust is removed before a new coat of japan is applied, it would seem as if the right principle is the one which would demand the use of iron rust in the mixture to be applied. Anti-rust coatings, then, if they are to be particularly efficacious, will abort the disease. Beeswax has this virtue; it combines with iron rust in such a way as to prevent the further formation of the rust. If the beeswax is applied hot, or if the rim is heated before the beeswax is rubbed over the surface, it will serve as an anti-rust coating, nor will the beeswax attack the fabric or the rubber compound of which tires are made. In the application of the beeswax it is not necessary to remove absolutely all the rust from the rim. All that is necessary is to scrape the rim so that it will present a smooth surface for the tire to contact with.

[137]—Is there any virtue in soap as a lubricant?

Any slippery substance is a lubricant; it may also have the property of etching the surfaces of the bearings. In the discussion of a question of this sort, then, it is necessary to consider the two points, (a) lubricating, and (b) etching properties

[138]—Is soap an etching ingredient?

If it has an acid reaction, yes.

[139]—Is it likely to have an acid reaction?

Yes.

[140]—Why?

Because it is composed of animal fats, saponified.

[141]—How is animal fat saponified?

A certain proportion of animal fat (vegetable oils may also be used) is diluted with water, and potash, or lye, is added, the whole is boiled to a certain consistency. The following are some proportions:

(A) Normal grade of soft soap.

Oil and tallow	45.0 parts
Potash	8.5 parts
Water	46.5 parts
Total	100.0 parts

[142]—What is soap?

It is a chemical compound; it is not oil, fat, potash, nor water. It is made from these.

[143]—What part does soap play in the etching process which is so undesirable for ball or roller bearings?

The fat may be acid in its reaction; it may produce acid by decomposition.

[144]—What is the composition of lubricants which utilize soap?

English railway axle grease:

	Summer.	Winter.
Tallow	504	420
Palm oil	280	280
Sperm oil	22	35
Caustic soda	122	126
Water	1,372	1,524

Proportions are all in pounds, and the quantity of caustic soda present, with water, is that which will saponify.

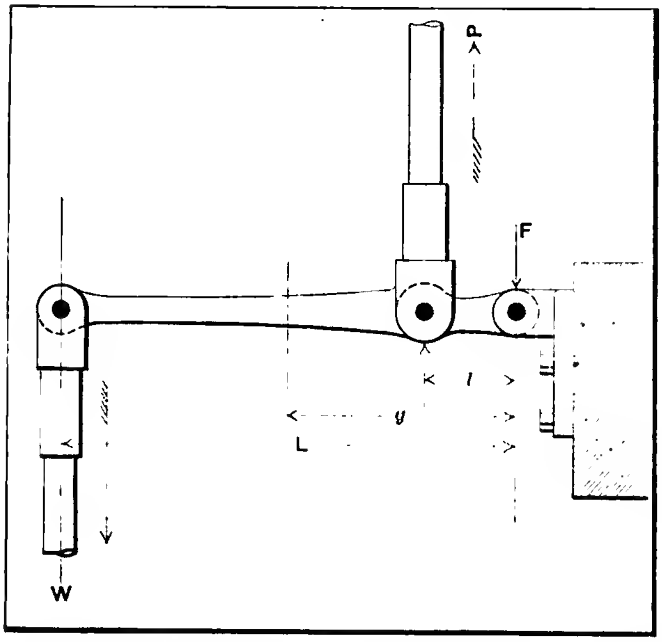


Diagram of lever system frequently used in automobile work

[145]—How is it possible to determine if soap is present in lubricating grease?

The soap is soluble in water.

[146]—How is it possible to tell if there is acid in the lubricant?

Litmus paper offers an excellent means for ascertaining an acid reaction in a solution. Tallow and most animal fats will decompose when exposed to light; if the grease, holding tallow or other acid-producing fats, is carelessly stored or much aged, it is likely to generate sufficient acid to etch the delicate surfaces of ball or roller-bearings.

[147]—Is there any chance of acid being present in mineral lubricating oil?

Yes; in the purifying process, acid may be used. One way to purify lubricating oil is to add a small percentage of oil of vitriol; agitate, and then wash the oil with water, agitating until it is freed of the oil of vitriol; it is well within the range of possibilities that some of the oil of vitril will remain in the cleaned oil when it is siphoned off. After siphoning the oil must be stood over quicklime. An acid test is necessary in order to determine whether or not all the acid has been washed out: if a trace remains, it is scarcely feasible to employ the oil in the process of lubricating ball or roller-bearings.

Computation Method for a System of Levers

[148]—The lever system as here illustrated, being frequently used in automobile work, is generally computed on a basis of no friction: what is the necessary change in the formula if it is desired to include some estimate of the friction elements?

Let

W = the weight or pressure applied in the direction of the arrow at the end of the lever,

L = distance in inches from the fulcrum F to the end of the lever at W,

w = weight of lever in pounds if it lifts vertically, or the equivalent in friction, if it slides horizontally,

g = distance between center of gravity of the lever and the fulcrum in inches,

l = distance in inches between fulcrum and center of pullrod P,

V = weight of pullrod P if it is suspended vertically, or the equivalent friction, if it slides horizontally,

P = pull in pounds exerted on the pullrod P,

When

$$W = \left\{ P - \left[V + \frac{(w \times g)}{l} \right] \right\} \times \frac{l}{L}$$

or,

$$L = \left\{ P - \left[V + \frac{(w \times g)}{l} \right] \right\} \times \frac{l}{W}$$

The center of gravity of the lever may be found by balancing it on a V-track; it may also be determined by calculation.

[149]—How can tools be prevented from rusting?

Melt 1 pound of fresh leaf lard; add 1-2 oz. of camphor; remove the scum that forms, and add graphite to give the desired color and consistency. When the anti-rust paint thus made is cool, apply it to the surfaces of the tools; after cleaning them thoroughly, and when the coat has stood for a period of 24 hours, use a soft linen cloth to polish. This treatment will save the tools for months under the most severe conditions of salt-sea air, and they will always have a presentable appearance.

[150]—To soften the glare of headlights, is there not some way of coating the glass front?

Prepare the glass by first washing it in hot water with plenty of soap; dry thoroughly; dip in a bath made by adding the white of eggs, two to the pint, and filter the egg solution before dipping. When the glass fronts are well coated with the egg solution, lay them by to drain and dry. With the glass ready for the dimming process, it remains to select yellow aniline dye, and after dissolving a small part of it in collodion, it will be ready to apply to the prepared surfaces of the glass. A thin coat is best; apply repeated coats to get the desired dimming effect. The glass will take on a frosted effect; the glare will be softened, and the coat will be waterproof and serve for a long time. The coat may be removed with alcohol.

[151]—What is a good lacquer for bright work, as lamps, rails, etc., on automobiles.

The lacquer prepared as here given will serve very well indeed, but it is necessary to prepare the surfaces to be lacquered if the results are to be satisfactory. For the surfaces, what is wanted is a high polish and absolute freedom from grease. The lacquer may be prepared thus:

Bleached shellac	60 grams
Manila copal, freshly powdered	60 grams
Gum mastic	60 grams
Absolute (grain) alcohol	1 kilogram
Coarsely powdered glass	small quantity
Allowed to stand for (frequently shaking)	14 days
Boracic acid	1 gram

Filter and use, the best plan being to apply repeated thin coats with a camel's hair brush.

Any desired color may be given to the lacquer by adding aniline dyes. A very little of the dye of the color selected will serve for the purpose. Red and blue will form clear solutions; green must be handled cautiously; it may have to be filtered; yellow is a good dye to handle. In applying lacquers it is desirable to go about it in the same way as shellac is applied—thin coats, deftly applied by means of a suitable brush, with very little rubbing; it will become tacky if it is fussed with very long.

Cylinder Casting Proves to Be Unsound

Editor THE AUTOMOBILE:

[2,310]—I have had my motor but a short time, and the other day when it failed to work, I had it taken down, dissembled, and the cylinders examined, and found that one of them was cracked, but on further examination, it was also discovered that a part of the bottom flange was fractured, and a close examination of the fracture showed a defect in the section of the metal which leads me to suspect that it was not a very good casting. What are the expectations with cylinder casings? SUBSCRIBER.

Minneapolis, Minn.

Fig. 2 shows how cylinder castings may be defective, due to design, and almost independent of the quality of the metal used. A is a round section of considerable diameter, and shows a soft core. B shows a hole in the core of the same section, which is about the size necessary to cut away the defective metal. C is a square section, showing how the defective metal bunches at the center and trails away toward the four corners. D shows a rectangular section, and how the metal verges into the defective after a fashion somewhat as shown in C. E presents an angular section, and shows the probable zones of defect. F presents a section without any sharp turns, but with even thicknesses of walls, but no defects. G presents another design which is generally defective, and H shows how defects may be eliminated. In cylinder designing, if large fillets are used where walls verge into each other, defects will abound, or if the flanging at the bottom is very thick, it is likely to be spongy. If the material is not good, or if the foundry work is indifferent, defects may be due to these causes.

Metallic Hose Used for Water Connections

Editor THE AUTOMOBILE:

[2,311]—I have a water system on my car which is bad because there are considerable lengths of rubber hose, and they leak even though they do not rot out. Most of the leaks are at the joints. Is there any way out of this trouble, besides putting in a proper coppersmith's job? J. A. W.

Wichita, Kan.

Fig. 3 shows flexible metallic hose connections on a motor and experience with this material has been very good, not only with the water, but with the exhaust and intake connections as well. The flexible metallic hose can be ordered with makeup connections, and if the measurements are properly taken, the autoist can attach the hose in place with very little trouble to himself. This method is more expensive than garden hose. There are various forms of flexible metallic hose, and one of the most acceptable types is made of copper tubing which is put through a mill and reduced to spiral corrugation form.

Best Way to Cool Valve Stems of a Motor

Editor THE AUTOMOBILE:

[2,312]—I am working on a new design of a motor with a view to turning out a commercial car which will class favorably with the best products along other lines, excepting that I propose to make everything as nearly automatic as possible, and get as far away from the trouble that the driver will have to attend to as I can. In my experience, I have found that valves are a source of quite some trouble, and I think they ought to be properly cooled, and that the valve should be in a separate housing, so that the seat can be examined outside of the motor, but I do not like the overhead type of valve construction, and want to know how to accomplish the same purpose without putting the valves in the head. READER.

Dubuque, Iowa.

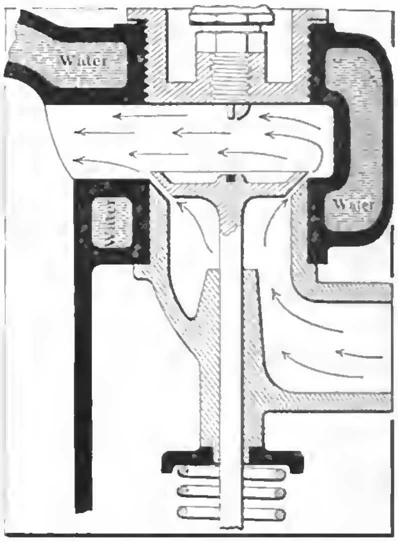


Fig. 1—Design of valve having the advantages of the valve in the head without the location which is objected to

Referring to Fig. 4 it will be observed that the valve and its housing are independent of the cylinder casting, but are inserted in the T-type of cylinder from the underside, but the water-cooling is quite as efficacious as would be true were the seat and its casting integral with the cylinder. The water-jacket extends all around, so that it cools the seat perfectly.

Thermo-Syphon System of Water Cooling

Editor THE AUTOMOBILE:

[2,313]—If a large water pump is necessary in some types of automobiles for circulating the cooling water, how is it possible to get good results without a pump? I understand that quite a number of automobiles are run on the thermo-syphon system, and that there is no pump employed in this case. M. C. K.

Richmond, Va.

The illustration, Fig. 4, shows a thermo-syphon system in which no pump is employed, and the water circulates in the direction as shown by the arrows. While it is common talk to the effect that this system works by natural circulation, the fact remains that steam is generated at the hottest zone over the combustion chamber, and this steam, coming off of the surface in a slug, rushes away through the course of least resistance, and acts very much as the plunger of the pump. It has the potential force of the energy stored in it, and is perfectly capable of doing mechanical work in substantially the same way that the plunger of a pump drives water before it, or creates a depression into which water runs. In addition to the mechanical effect of the slugs of steam driven off during each power stroke, there is the natural difference in temperature between the water over the hot zones and that in the rest of the cooling system, and to some extent this difference is responsible for the circulation; this alone, however, would act sluggishly.

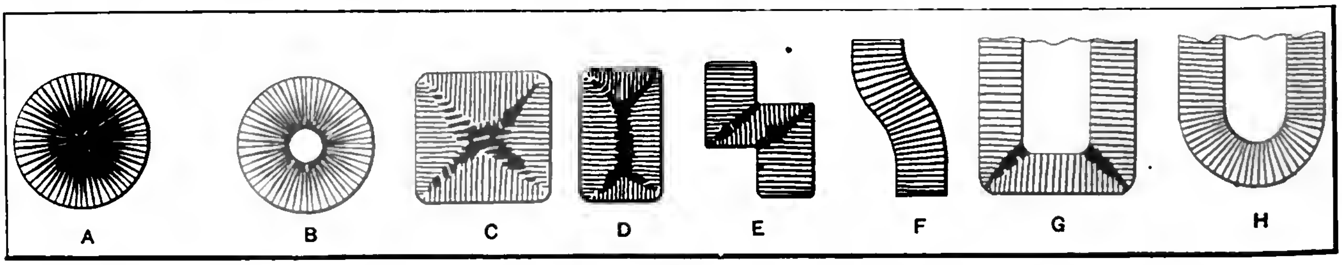


Fig. 2—Sections of cast gray iron showing how defects will be found at the cores of the thickest sections in each example

One or Two Small Details About Motors

Editor THE AUTOMOBILE:

[2,314]—Kindly answer the following questions through the columns of your paper:

1. What is the formula used in ascertaining the proper spring tension of an automatic inlet valve of a 4-cycle motor?
2. Would it be advisable to change the timing valve, when auxiliary exhaust ports are used on a 4-cycle motor?
3. What is the timing of a Franklin motor?
4. What is the best brake lining to use against a bronze shoe?

S. E. N.

Cedarhurst, N. J.

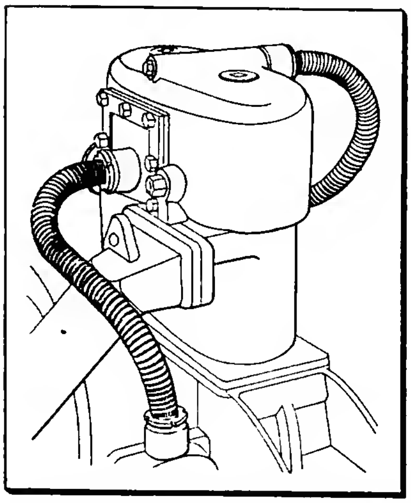


Fig. 3—Flexible metallic hose may be used in place of garden hose to good advantage—it costs more.

1. There is no formula which will be of any use in determining the tension of the spring of an automatic valve of a four-cycle motor; it depends upon the design of the motor, and a manograph should be used to ascertain the volumetric efficiency of the motor, also the greatest suction depression, and the spring should be strong enough to sustain against this depression.

2. Not if the timing is proper, independent of the auxiliary valve.

3. Direct an inquiry to the Franklin Company.

4. You have your choice between cork inserts and asbestos fabrics, either of which work independent of all possible temperature changes.

The Larger Tire Will Sustain More

Editor THE AUTOMOBILE:

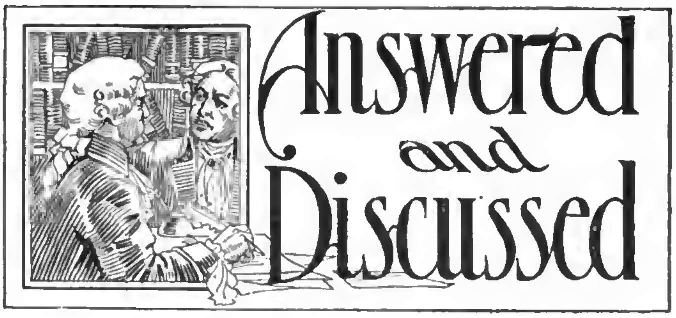
[2,315]—Permit me to ask you through your inquiry column the following question:

Why is a 4-inch tire on a 34-inch wheel base more desirable (if it is) than a 3 1-2 inch, leaving out the question of easier riding and less wear to machinery? On a 2500-pound car, 112-inch wheelbase, which size tire will cost the user less in the long run, and why?

Booneville, Miss. L. D. RINEHART.

The life of a tire, other things being equal, is proportional to the square of the section diameter. The square of 4 is 16 and the square of 3.5 is 12.25. The life of the 4-inch tire from this point of view will be as 16 is to 12.25 comparing it with a 3 1-2-inch tire.

The second question cannot be answered with the data afforded. To begin with, the best result will come from tires if they are properly inflated; in the second place, they will die of old age any way, and they will do useful work during their period of life if the opportunity is afforded. The service you can get out of a tire then, depends upon whether or not it is used continuously. Likewise, a dozen other considerations come into the accounting, but the smallest size tire that should be used on any automobile is that which will stay almost round when it is inflated up to the normal pressure, notwithstanding the weight which is put upon it. If the tire is not big enough it cannot be inflated to roundness at all.



Having Trouble Timing the Magneto

Editor THE AUTOMOBILE:

[2,316]—I am a subscriber to your valuable paper. Will you kindly answer the following questions through your columns:

I have a 4-cylinder car equipped with a Remy Magneto, and after starting the car, and then stopping it, by means of throwing the switch off, the engine will reverse and turn over several times, and there is knocking when this happens. Can you advise me what the trouble is?

Also can you advise me why my radiator should get to the boiling point and the water steam out of it, after driving 15 to 20 miles on high speed? I keep my spark advanced as much as I can, and use as little gasoline as possible. L. F. P.

Pittsburg, Pa.

The following is a communication from the Remy Electric Company in relation to this case:

Your communication of May 26th, outlining questions from some of your subscribers is received. In the first question, we would say in answer thereto, that the chances are that the magneto is not properly timed with the motor. We do not see how, if the switch is cut out, the engine can continue to run, even though backward. The cylinders must be dirty and full of carbon, which causes continued ignition. We would suggest that your subscriber first assures himself that the cylinders are clean, and that ignition is not caused by something other than the ignition apparatus. Next, be sure that the instrument is timed properly. The contact spring should leave the contact screw just as the piston passes over top center of the working stroke. An adjustment here of perhaps 10 degrees can be made by moving the contact screw in and out. The little line on the brass distributor should be exactly opposite one of the pegs, and the contact screw should leave the contact spring at the same time.

The fact that the engine pounds would indicate too early timing, which in itself would cause the engine to reverse, but we do not see how the engine can continue to run when the switch has been shut off, unless from some other cause than the ignition apparatus.

Your radiator, if it is large enough for its intended purpose gets hot and steams because you run the motor on a retarded spark, or as the Remy Company states, the magneto is not properly timed.

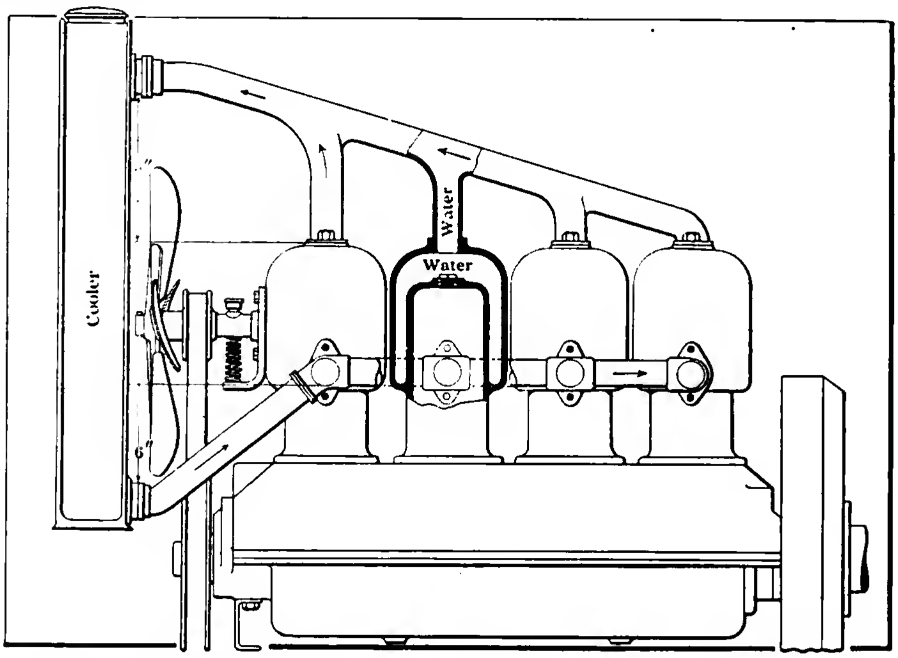


Fig. 4—Thermo-syphon system of cooling in which the steam generated acts as piston

Studies Involving Refinements of Gasoline Equipment

Points out that the filler cap for the gasoline tank should be made so that it will hold pressure. That gasoline will not flow through a fine wire mesh if it is wetted by water first. A water basin is shown to have advantages. Means for clearing the gasoline piping of scum and other obstructions, shown

WHEN a $5,000 automobile is prevented from running, due to the presence of a disorder which could be cured by five cents' worth of labor at the proper time, the man who pays for the automobile is afforded an opportunity to do a little hard thinking, but the maker who neglects to indulge in the cost of the additional labor required will find himself in a position where his many friends will generously disagree with him.

It is scarcely to be supposed that an automobile with a plugged-up gasoline pipe, if it reaches the purchaser in that condition, was ever tested by the maker to find out whether it was any good or not. In a case of this sort, the purchaser is bound to reach the conclusion that the maker is not very much interested in the quality of the automobile. Strange as it may seem, the maker of this generic type is frightfully particular that the quality of the money he exacts must deliver a musical ring. Is it not a reasonable demand of the purchaser that the maker be a little particular about the finishing and tuning up of the automobile? True, it runs into dollars to find all the little faults and correct them.

Referring to the type of gasoline tanks which are held under pressure, Fig. 1 presents a relatively large diameter filler, with a leather packing ring which is spread over a considerable area, and which is held in place by the large diameter of the washer, and the fact that it inserts as shown at I1 and I2. The filler cap has a coarse thread, and a lead at the point marked L1, so that when it is placed in the position to be screwed on it will sleeve over for the distance of at least one thread, thus providing a position finder and avoiding the difficulty which is usually experienced in the act of threading on a cap.

This filler cap is of such large diameter that it will almost screw down to pressure tightness without having to use a

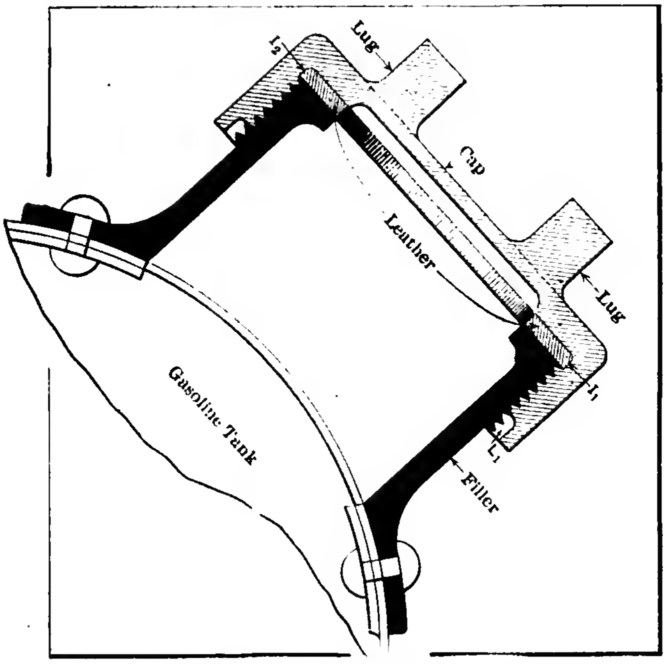


Fig. 1—Large-diameter filler, with leather packing ring

spanner wrench or any other device. Should the leather become defective or crusty, thus making it necessary to apply extra pressure in order to realize gas tightness, the lugs as shown project upward for a distance of 5-8 of an inch, so that a tire tool or any other handy length of material may be utilized to screw up the cap until it becomes tight. The leather packing does not have to be of any very special grade of material; calfskin is all right, cowhide will do; a thickness of 1-8 of an inch will give it the desired stability.

The filler cap screws down over the filler casting for a considerable distance, and the casting should be long enough to bring the filler orifice out in the clear, so that a funnel may be inserted in the orifice without having the diameter of the funnel scrape against the body finish. There is no reason why the filler casting should not neck out for any distance. In some types of automobiles this casting is even 24 inches long. Where the casting flanges to the copper of the tank, it should have a considerable bearing, and it should also be peened to the shape which will conform with the curvature of the shell of the tank. A reinforcement piece might well be placed around the orifice of the shell of the tank, so that the riveting for the filler casting will be more secure, but riveting alone should not be relied upon to make a tight joint. All the surfaces should be tinned over before the parts are assembled, and the joints should be sweated in order to complete the undertaking on a basis which will insure tightness under pressure.

Filters Are No Protection Against Water

The majority of men who run automobiles are imbued with the idea that a chamois-skin filter will prevent water from entering the gasoline tank, but they think they know that it will let gasoline go by. The open door from the chamois-skin point of view depends upon whether the chamois skin is first wetted with water or gasoline. If water is first applied, then water will go through, but if gasoline is first applied, then gasoline will go through. To further indicate the cantankerousness of a piece of chamois skin, it is only necessary to say that if it is wetted on one part by water, and over the balance of the surface by gasoline, a stream of water will flow through the part which is wetted by water, and a stream of gasoline will flow through the part which is wetted by gasoline.

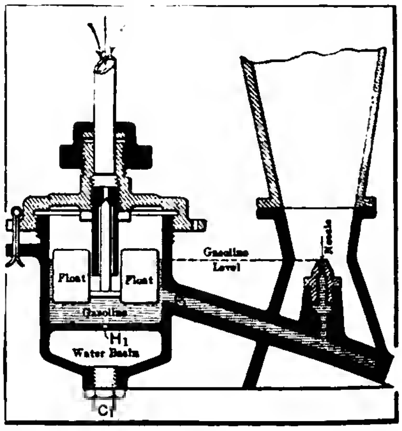


Fig. 2—Section of float bowl, with separate water basin.

What is true of chamois skin is equally true of a fine mesh sieve; contrary to the usual expectation, a sieve wetted with gasoline is just as good a protection against the flow of water as the protection afforded by a chamois skin. The very fact that a sieve first wetted with gasoline bars the flow of water, constitutes the reason why a sieve used in the bottom of the float bowl of a carbureter will prevent water from flowing out through the drain cock, even though it will let gasoline flow through up to the limit of its mesh capacity. The types of carbureters which are so made that sieves are placed to prevent the water from flowing out soon become water-logged, and the poor autoist who does not know enough to throw the sieve away is benumbed with the extent of the trouble which comes from the accumulating water, and if he goes to a repair shop which has a director who believes in the efficiency of a sieve, as a means for separating the water from the gasoline, he will come away without learning anything about his real trouble, and he may labor under the further disadvantage of believing that the trouble is elsewhere, which will prevent him from pursuing the right course for the purpose of eliminating the real trouble. Fig. 2 shows a section of a float bowl in a carbureter with a separate water basin at the bottom, and a hole, H1, in the separating wall which should be big enough to let a drop of water through. The gasoline passageway, P1, from the float bowl to the nozzle should have its orifice at the float bowl far enough above the bottom of the float chamber to prevent the drops of water from floating into the passageway impelled by the current of gasoline, which is set up by displacement in proportion as gasoline is sucked out of the nozzle. The drops of water which find their way into the float bowl under the conditions as shown will fall down into the water basin, where they will remain until the basin is filled with water, unless the autoist opens the drain cock C1 at sufficiently frequent intervals to drain the water accumulations out. There are many types of carbureters which belong to the float-feed family, and in point of general principle they are all very much alike. They all regulate the flow of gasoline, for instance, through the force which is represented by the buoyancy of the float.

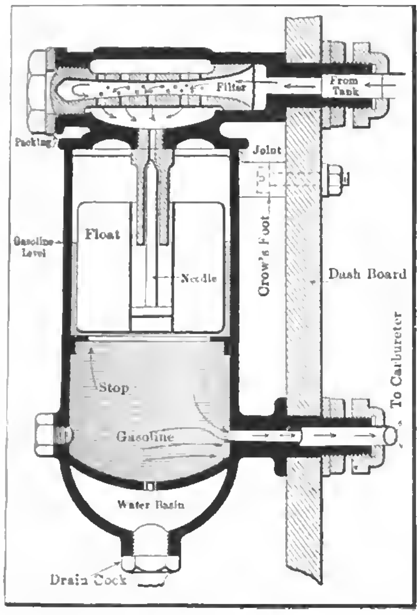


Fig. 3—Auxiliary dashboard tank, with filter

The needle valve is forced up against its seat by this manifestation of buoyancy when the bowl is filled up to the level which is on a hydraulic grade with the top of the nozzle in the depression chamber. The float may be made of copper, which should be light in weight, and relatively small, but if it is not properly made it may spring a leak, in which event gasoline will run into the float, and its buoyancy will be destroyed. Under such circumstances the float will not lift as the gasoline runs in and the carbureter will flood because the needle will not be pressed against its seat at the proper time, and the level of the gasoline in the float bowl will then be above the top of the nozzle in the depression chamber.

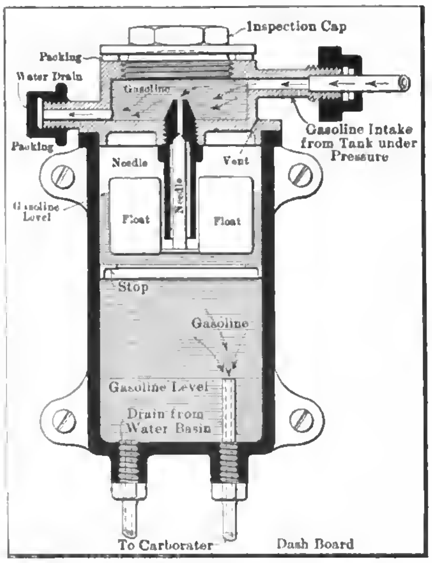


Fig. 4—A promising form of filterless dashboard tank

In order to repair this difficulty it will be necessary to remove the float from the chamber, enlarge the puncture so that it will be big enough to let the gasoline out, apply a little heat to drive off the vapor, and then solder up the hole, but in the act of soldering care must be exercised to permit air to enter to fill the space; otherwise a vacuum will obtain within the float, in which event the thin walls will fall in because the pressure on the exterior surface, which is 14.7 pounds per square inch, will exceed the pressure on the interior surface by the difference between the pressure of the atmosphere and the pressure of the vacuum within.

In some cases, floats lose a part of their buoyancy, as when the material is porous, and the result is that they sink to a lower level, so that the gasoline in the nozzle falls below the surface, and the mixture resulting is in a "starved" state. There are two ways of overcoming a difficulty such as this, one of which is to substitute a good float for the loggy one, and the other way lies in having a means of adjustment which will either permit of raising the height of the needle stem with respect to the float, or lowering the position of the seat for the needle with respect to the same, as shown in Fig. 2. There are divers mechanical ways of accomplishing this function, but it must be said that the cure is oftentimes worse than the disease, due to the fact that the adjustments when made by the means provided, will not stay made. Before administering his medicine it will pay the "doctor" to first thoroughly diagnose the case.

(*Continued on page* 1196.)

Some Ill-Advised Methods to Employ in Driving

Showing how the careless driver can materially decrease the life of his tires by attempting short turns with a long-wheel-base car. Inexpert work with the slide lever is very wearing on the gears, as is clumsy cranking on the anatomy of the operator.

TURNING around in a relatively narrow street, if the wheel base of the automobile is long, is likely to result in the situation which is shown in Fig. 1, another view of which is given in Fig. 2. The tire of the outer front wheel is brought into abrupt contact with the edge of the curb, and even if the fibre does withstand the shock for a time, it is more likely than not to be so weakened that the life of the tire will be much shortened. It is quite impossible to expect that the average automobile is capable of being turned around in a narrow street. Attempts have been made to render this possible; taxicabs, for illustration, are so designed that in view of a relatively short wheel base they may be turned around in a circle of approximately 35 feet in diameter. This means that the wheel base must be substantially 100 inches, and the locked position of the canted wheels must be about 36 degrees.

Obviously, to realize the ability to turn the car around in a narrow street, it is necessary to sacrifice some other important qualities, as a long wheel base; but the owner of a long-wheel-base automobile, who elects to take advantage of the qualities residing therein, offers wide opportunity for a high cost of tire maintenance if he fails to operate the long-wheel-base car in accordance with its characteristics. In a word, a long-wheel-base automobile in the hands of a short-wheel-base driver evolves the situations as presented in Figs. 1 and 2.

The relative advantages of the various types of transmission gears, as selective, progressive, three-speed, four-speed, etc., are common subjects for discussion, but nearly all the edifying talks on the subject fail to take into account the results which come from lack of deftness, or if the driver is timid. Fig. 3 shows how the clumsy learner fumbles the slide lever in the process of shifting gears; he fails to take into account the fact that the

Fig. 1—Outer wheel of the automobile strikes the curb in the process of turning the car around, injuring the fabric beyond repair

Fig. 2—Another view of the same automobile taken to show how the sharp edge of the curb eats its way into the tread of the tire

two relating members must be traveling at substantially the same speed before there is any use in trying to engage them; he might just as well understand that if two gears are to be meshed with each other, they must travel at precisely the same speed before the operation can be performed. There is really very little to learn about sliding gears, excepting to remember that the speeds must be identical, and then to be able to realize when this condition is present, and to understand that promptness is the one remaining virtue. When the meshing gears are operating at substantially the same speed, a deft movement of the lever will permit of engagement without even a click, but the clumsy clashing of gears results in the chipping of the teeth, and a character of depreciation which cannot be repaired.

The learner who is afraid of a back kick is the one who is most likely to get it; his very timidity results in his forgetting that he failed to retard the spark before cranking the motor. It is understood, of course, that the spark should be retarded so that ignition will take place after the piston comes up on the compression stroke, dwells at the end of the stroke for a time, and then recedes in the act of making the power stroke. If the spark is retarded five degrees, the piston will be across the dwell point, and will be sufficiently on its return stroke, so that if the mixture is ignited the force will be effective, and positively in the desired direction. If the autoist disregards the retarding of the spark, and then laboriously pulls the crank, using both hands, as shown in Fig. 4, he is making every point in favor of a resounding back kick, which should, according to the law of probability, make him eligible for a trip to a near-by hospital, and he will get off easy if he has nothing worse to complain of than a broken arm.

The danger attending a back kick is much accentuated in the types of motors which have a high compression. The rate of flame travel increases with compression, and unless enough energy is stored in the flywheel in the act of cranking to overcome expansive forces which retard the piston in its upward travel, this character of difficulty is especially likely to creep in as the product of high compression, and a lazy method of cranking. The right way to crank a motor is to positively retard the spark, and to crank smartly, so that enough energy will be stored in the flywheel during the earlier proportion of the compression stroke that the final effort will be with relative ease, due to the fact that the energy stored in the flywheel will be given up.

Fig. 3—A fumbling learner who does not know that gears to be meshed must be brought to the same speed and shifting deftly done

Fig. 4—Hugging the starting crank, waiting for a back kick, with the prospects of not having to wait very long

High Potential Test on Porcelain Spark Plugs

Tests were made in order to ascertain the dielectric strength of the porcelain used under the conditions fixed in spark plug. The conditions were: (a) with spark gap insulated; (b) without insulation between spark gap terminals.

IGNITION work is now regarded as of such great importance that autoists are justified in giving its details the most searching scrutiny. It is self-evident that the motor will be valueless if the ignition system fails to work, and it stands to reason that the part which is subjected to the highest strain should be of the greatest strength. It has taken a long time even for designers to reach the conclusion that the dielectric strain in the porcelain insulation of the spark plug is in many respects even more severe than the result due to combined torsion and bending in the crankshaft of the motor. A blow is struck when a high potential wave is impressed on the porcelain of the spark plug insulation, just as effectively as would be true of such a blow were it the direct result of contact with a falling weight or were it hit with a hammer.

When a magneto is used as the source of electrical energy, it is so contrived that it builds up its voltage, increasing until the resistance of the spark gap in the spark plug is broken down, and if this is true, the higher the resistance of the spark gap, the higher will be the voltage of the magneto. High resistance in the spark gap is brought about by increasing the length of the same, but if the porcelain fails in point of dielectric strength the length of the spark gap may be regarded as in excess of that allowable.

Considering these circumstances, it is safe to reach the con-:lusion that the ability of the magneto, all other things con-idered, is absolutely limited by the performance of the spark lug. This is not to say that the magneto is to be condemned f a spark plug proves to be unruly, but it does indicate that here can be no higher voltage delivered by the magneto than hat which will break down the gap in the spark plug, or if e porcelain is weaker than that indicated by the voltage which erces the gap, then the porcelain holds in its make-up the niting factor.

A considerable number of tests, which were made for the rpose of determining the performance of porcelain as used in ark plugs in ignition work, would seem to indicate that the electric strength of porcelain is sufficiently high for every ictical purpose. The tests invariably show that when the celain fails to sustain, the trouble is due to arcing over her than to the breaking down of the section of the same. is arcing over difficulty depends upon the character of the face, its condition, and the distance between the electrodes.

Method of Conducting the Spark Plug Tests

every case, the high potential tests on the spark plugs e made by applying an alternating voltage between the term-stem and the shell; first with insulating material between terminal of the spark gap proper, and second, without the lating material in the spark gap. The first test is made etermine the breakdown voltage of the porcelain insulator. second test shows the breakdown voltage of the spark gap. e voltages are applied at a low value, raised gradually, and effect noted. The approximate time which elapses between irst application of the voltage and the instant of arcing is ally about ten seconds.

e transformers used have a capacity (maximum) of three olt-amperes, with a normal ratio of 6,000 to 100, which eans of suitable mechanisms may be changed to 4,000 , in which event the output is normal at 3,000 kilovolt-es. The voltage is measured across the low tension cir-connection with the ratio of transformation. The source rrent is a sixty-cycle circuit, the voltage wave-form is ally a sine curve, and the voltages given in the statement s are what is known as "effective"; in other words, they are square root of mean square values.

Some Practical Results Obtained

T'st No.	V'l't'ge Applied	Remarks
XX	17,400	Arced over upper and lower surfaces
X	5,220	Arced from terminals to shell
AX	2,700	Arced from terminal to shell

The above tests were taken at random from spark plugs of different designs, and they show the wide variation which is due, not so much to the character of the material used in the porcelain, or the method of its manufacture, as to the distance between the electrodes as it influences arcing over the surface.

None of the preceding tests show the voltage which is possible across the spark gap, when the porcelain is so placed in its housing that arcing across its surface between terminals is aborted. When the porcelain is properly protected so that it is in a position to do the work for which it is intended, then the air gap voltage ranges all the way from 16,000, which proved to be the puncture point for the particular porcelain which was tested, down to 1,640 volts, which was limited by the poor way in which the insulation was used, so that instead of building up a higher voltage, arcing across from metal to metal over the surface of the porcelain took place.

In every test made so far at the Electrical Testing Laboratories at Eightieth street and East End avenue, New York City, according to a statement which was made to the Editor of THE AUTOMOBILE, care was exercised to have the porcelain surfaces perfectly clean and dry, and to note the relative humidity during test, room temperature prevailing, and such other data as would be likely to have bearing upon the subject. It seems, from the experience thus far afforded, that the average spark plug fails, not because the porcelain is inferior, but for the reason that it is not advantageously placed in the metal portions of the spark plug.

It is a source of some regret that the investigations thus far conducted do not include tests which will show the effect of service on the porcelain as used in spark plugs. There are no test data available for spark plugs which are discolored in service, and the question naturally arises as to the effect of discoloration, also of temperature and time. As one of the great questions which will have to be disposed of before the automobile may be regarded as well on the road to standardization, this spark plug situation will have to be investigated, and when a sufficient volume of data is available, it will be a nice undertaking for some board of competent jurisdiction to sort out the things that are for, and the factors that are against, the best obtainable result, and reduce the desirable portions to an intelligible standard.

If it is possible to realize 16,000 volts in the air gap without piercing the insulation in some one case, then it is accepting less than the obtainable result to put up with anything below this figure. If a spark of great energy is necessary under the conditions which obtain with automobile motors, it follows that in addition to a magneto which is capable of furnishing the electrical energy, a system of spark plugs must be employed which will stand up under the work and excite the magneto up to its maximum safe limit.

High Tension Cable Insulation Tests

It has been found that the heat which abounds around motors is high enough to affect the insulation resistance of the high tension cable unless it is so made as to take this issue into account. Good cable, as selected for ignition work, tests up to about 27,000 volts before breakdown—high enough to serve very well, especially if the spark plug becomes the limiting factor.

Columbus Automobile Club: A Success


Music Room with Oriental Decorations


Well Appointed Lounging Room


View of Secretary's Office

Chas C Jaynes 2nd V Pres


Perin B Monypeny



Charles E Firestone President


Herbert A Mason Treas


Norman O Aeby 1st V Pres

COLUMBUS, O., June 27.—Although the Columbus Automobile Club is not yet three years old it has achieved a notable reputation for push, efficiency and civic pride. It exerts a great influence in motor circles in the Middle West and to its efforts is due, in appreciable measure, the good feeling toward automobile owners which is shown in Columbus and vicinity by the general public.

The club was organized early in 1908 by a small band of enthusiasts who saw the need for a closer organization of motorists in this section. The club began to grow from the moment of its birth until to-day it holds an enviable position among Ohio automobile clubs.

The first officers of the club were: Max Morehouse, president; Perin B. Monypeny, first vice-president; Dennis Kelly, second vice-president; Herman Hoster, secretary, and E. M. Schoenborn, treasurer. The first form of organization was that of the usual association where the officers generally do all the work and assume all the responsibility.

After prospering for about a year with that style of organization the constitution and by-laws were radically changed and the present style of organization was brought into being. The club is now organized after the prevailing plan of automobile clubs, with a board of governors, having full authority to look after its welfare.

The present officers of the club are: Charles E. Firestone, president; Norman O. Aeby, first vice-president; Charles C. James, second vice-president; Arthur M. Crumrine, secretary, and Herbert A. Mason, treasurer. These officers, with the exception of the secretary and augmented by Perin B. Monypeny, Nelson J. Ruggles, William M. Frisbie, N. J. Hanly and the Rev. J. H. Dodshon, constitute the board of governors.

One of the first steps taken by the club was to establish headquarters in the Northern Hotel building, near the corner of High and Goodale streets. The club rooms are located on the ground floor and have been fitted up in excellent taste by the house committee. As shown in the accompanying pictures, the rooms have spacious lounging and smoking apartments, a private meeting room, a secretary's office, cut off from the main room by a railing, and a reading room.

Tasty tapestries and draperies have been used to beautify the retreat and lounging room, which is fitted up with various colored electric lights. Servants are in attendance at all hours to look after the needs of the club members and their guests.

With the change of the constitution and by-laws Secretary Crumrine has originated a plan of holding a social session every Monday evening. The members readily accepted the idea and every Monday night sees a large number in attendance. A "Dutch lunch" is served and varied attractions are provided for the amusement and instruction of the members. Upon those occasions music is one of the features and singing and dancing often follow. This plan has done much to foster enthusiasm in the club and has proved quite a help toward the enrollment of dozens of motorists in the organization.

But it is not in social matters that the club has taken a foremost position. Through its legislative committee it has kept a close watch on laws and prospective laws and during the session of the Ohio General Assembly of 1910, which has just adjourned, it was through its efforts that no change was made in the present Ohio automobile law. The club co-operates with the automobile clubs of Cincinnati, Cleveland, Dayton and other Ohio cities in looking after legislative matters. The club has united with the Ohio State Automobile Association, which has grown into a strong and efficient organization, to further the interests of the 35,000 automobile owners in the Buckeye State.

The club has erected danger and road signs over all the leading highways in the central part of the State. It has co-operated with clubs of Zanesville, Dayton, Springfield, Chillicothe, Marion and other cities, to place legible road signs all over the State of Ohio, thus aiding the tourist who may be traveling strange highways.

The club has gone on record time and again against the reckless driver and the scorcher. Always ready to uphold the law, it has become popular in a community where the feeling several years ago was intense against the autoist. The club frowns upon the man who jeopardizes the status of the 2,500 autoists in Franklin county, by disregarding the speed laws and the traffic regulations of the city. Yet, on the other hand, the club is always ready to defend its members who may be accused unjustly of reckless driving.

The Columbus Motor Show, held during Christmas week, 1909, under the auspices of the Columbus Automobile Club, was an unqualified success. While the attendance was not as large as was expected, still, judging from the number of cars exhibited and the enthusiasm displayed, no show was more of a success. The club proposes to make it an annual event and committees will soon be named to make the preliminary arrangements.

The annual Orphans' Day has become a feature of the activities of the club. In 1909 about 1,800 deserving children were given an outing at the grounds of the Columbus Country Club and not a mishap marred the occasion. The 1910 Orphans' Day at Big Darby Park, 13 miles west of the city, June 22, was a marked success. About 300 motor cars were used to haul at least 2,000 children to and from the park. A luncheon was served and numerous amusements provided.

When the club turned its efforts to securing better roads for Franklin County and Central Ohio, the roads of this section were known throughout the State as the worst in Ohio. That condition has been improved materially in the short time the club has been in existence and the roads of Central Ohio favorably compare with those of other parts of the State. There is still considerable to be done in that direction and the club has pledged itself not to cease working until the roads are in a perfect condition.

The recovery of stolen automobiles is a point that should not be overlooked in giving a résumé of the activities of the club. Co-operating with the police department and the State automobile department, the Columbus Automobile Club has been instrumental in recovering quite a number of stolen cars. The culprits have also been punished through the efforts of the club.

A stenographer, to take letters from the members, has been one of the things that has made the club popular among busy men. Other conveniences, such as telephone service, messenger service, etc., are provided.

From the small beginning the organization has grown to a membership of about 660. There are several classes of membership, including active, honorary and associate. A large proportion of those enrolled belong to the active list.

One of the best services the club has done for Ohio motorists was the fight against the principle of municipalities enforcing licensing ordinances. An ordinance of that character was on the books of Columbus and the club filed an injunction suit to prevent the city auditor from collecting the city tax fees. After fighting through the lower courts the club was rewarded with victory in the Ohio Supreme Court, which held that no municipality had authority to enforce an ordinance providing for licensing or registering motor vehicles. This decision relieved the thousands of auto owners in Ohio from a double fee for registration of their cars in addition to the usual practice of assessing them as personal property.

In fact, the club aims to carry out the objects of the organization, which are stated in the constitution to be as follows: "The promotion of a social organization or club composed in whole or in part of persons owning automobiles for personal or private use. To afford a means of recording the experiences of members and of others using automobiles. To promote original investigation in the development of motor carriages. To co-operate in securing rational legislation and the formation of proper rules and regulations governing the use of automobiles in city and country, and to protect the interests of owners and users of automobiles against unjust and unreasonable legislation, and to maintain the lawful rights and privileges of owners and users of all forms of self-propelled vehicles, whenever and wherever such rights and privileges are menaced. The encouragement and development in this country of the automobile. To promote and encourage in all ways the construction and maintenance of good roads and the improvement of the existing highways, and generally to maintain a social club devoted to the automobile and its vogue. To encourage the erection of road and distance signs at cross-roads and dangerous places. To promote the sport of automobiling whenever and wherever it can."

The chairmen of the various standing committees are: Membership, Herman Hoster; Legislative, William M. Frisbie: Show and Contest, Perin B. Monypeny; Good Roads and Road Signs, Herbert A. Mason; Auditing, O. H. Perry; House and Entertainment, Nelson J. Ruggles, and Publicity, Charles C. Janes.

Coming Events in the Automobiling World

7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

28-Feb. 4, '11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Pleasure Cars and Accessories Exclusively.

6-Feb. 11, '11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

1-4..........Indianapolis. Ind., Track Meet. Cobe Trophy Race—Speedway Track, Chicago Auto. Club.

July 1-10.........Los Angeles, Cal., Road Carnival of Licensed Dealers.

July 2-4..........Los Angeles, Cal., Speedway Meet.

July 2-4..........Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.

July 4............Auburn, N. Y., Hill Climb of Automobile Club of Auburn.

July 4............Cheyenne, Wyo., Track Meet of Cheyenne Motor Club.

July 4............Dallas, Tex., Track Meet of Dallas A. C.

July 4............St. Paul, Track Meet of Minnesota State Automobile Association.

July 8-9..........Grand Circuit Meet, Churchill Downs, Louisville, Ky.

July 9............Hill Climb, Morison, Col.

July 9............Plainfield, N. J., Hill Climb of Plainfield Automobile Club.

July, Middle of...Richfield Springs, N. Y., Hill Climb.

July 28-30........Detroit, Mich., Summer Meeting Society of Automobile Engineers.

THE AUTOMOBILE

Vol. XXII Thursday, June 30, 1910 No. 26

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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Long Distance Telephone - - - - - - - - - - - 2046 Bryant, New York

SUBSCRIPTION RATES

United States and Mexico - - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Union, including Canada - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

AMONG the great problems which make up the economic situation, the position of the farmer is the first to be taken into account, and anything that will keep the farmer's son from coming into town, thus adding to an already congested situation, will be a step in the right direction. But if the farmer's son is wanted in the field, it is not too much to surmise that a set of conditions must be induced and maintained, the character of which will be in keeping with the grown-up ideas which now pass current among rural women folks. That the automobile is the best bait that was ever offered for the purpose of bringing harmony into these relations is now an established fact.

* * *

TWENTY-FIVE gallons of gasoline, even assuming that it is enough of a storehouse of energy to furnish the force which will drive an automobile for 250 miles, will run out sooner or later, and the bottom of the tank frequently "lights up" with the unfortunate autoist three miles from the nearest place of replenishing. The trouble is that the gasoline is bound to run out no matter how big the tank, and the last drops depart as silently as the first gurgle out of the tank. There is one remedy which is applied from time to time; it takes on the form of an auxiliary gasoline tank, which is placed on the dash or elsewhere. The trouble with the remedy lies in the fact that the poor autoist does not know when the main tank is empty, nor is he advised when the auxiliary tank is being drawn upon, so that the only difference between the original trouble and that which comes with the auxiliary tank is in a gallon of gasoline. If some means could be provided which would tell the autoist when the main tank is empty, he would have sense enough to shape his course for a new supply within a distance which could be covered by the force of the fuel within the auxiliary tank.

* * *

LUBRICATION is being examined with a critical eye. One phase of it is occupying the attention of the readers of THE AUTOMOBILE at the present time—force lubrication being the subject. It is a great misfortune, the fact that every author in describing a system lays so much stress upon it that all other systems are cast in a shadow. The life of an automobile is absolutely dependent upon the efficacy of the lubricating system. It is also a fair statement that a bearing which will not thrive under ordinary conditions will survive under conditions of force lubrication.

* * *

ANY system of lubrication which depends upon force, otherwise than that due to gravity, works when the mechanism is in working order.

* * *

THE force of gravity is working all the time.

* * *

ELIMINATING the gravitational consideration, the mechanism which is placed to serve as the conveyor for lubricant will be just as detrimental an obstruction as a wad of waste when the mechanism gets out of dorder.

* * *

DOUBLE ignition systems are used on automobiles at considerable expense in order that the autoist will still have something to rely upon when one system becomes deranged. Is it not more to the point to have a double lubricating system?

* * *

WHEN the ignition system becomes deranged, the motor simply shuts down; but when the lubricant fails, the bearings of the motor are destroyed.

* * *

FORCE feed lubrication, because it offers certain advantages, should have the attention of designers; but it should not be so designed that it will thwart the force of gravity and deprive the autoist of a natural and reliable auxiliary system of lubrication.

* * *

IN the selection of material for use in the construction of automobiles, the laboratory method of arriving at conclusions is relied upon to produce dependable results. It is shown in an article on testing steel how some of the results obtained carry with them a considerable measure of misfortune in that they cast doubt upon good materials, and fail to sufficiently lay bare the defects in the other kind. It would be good practice to rely upon the steel fabricator unchecked, in the face of a system of testing which falsifies.

TELLING the embryo autoist how to avoid mistakes is a very pleasant pastime; he probably enjoys the situation quite as much as anyone. But how are we to tell the experienced autoist how to judge distance? Napoleon never measured the ability of a cannoneer on the meter-stick of bravery; it mattered very little as to the courage of the gunner; he would not be allowed to run away even if he wanted to. The real gauge for ability was in the eye of the man; if he could say how far it was from the mouth of the cannon to the mark to be hit he was a first-class gunner. It is this peculiar ability which is needed in the autoist who persists in forging ahead, even when a situation is complicated so that he has to dodge a brewery wagon on the right hand, and take a chance on running over a fruit vendor on the left.

* * *

STANDARDIZATION is a condition which is said to reside in every automobile made, but the article on spark plugs this week is at wide variance with a dictionary interpretation of the word—there must be some mistake.

* * *

IN the foreign exchange there is quite a concise article bearing upon the question of the analysis of lubricating oil. It shows how to detect the presence of resinous oil in the mass, and besides offering this aid, it tells a negative story—resinous products, which are anything but good lubricants, must have been present in the oils which came to the notice of the author; otherwise he would not busy himself telling about how to locate them.

* * *

FORE-DOOR types of automobile bodies are much in vogue, and they offer many attractions. Should they become over-prevalent, other types of bodies will pass out of style. The series of articles, which are now being run in the pages of THE AUTOMOBILE, tell how old bodies may be recast, at small cost. The plan which is being consummated is one which makes it possible to use the old body in the new work, so that the whole cost is confined to that of the addition of the fore-doors, together with a new dash.

* * *

AUTOMOBILE clubs, of which there are upwards of one hundred in first-class working order scattered through the country, are doing such excellent work that it is to be hoped that they will grow and prosper. We sometimes wonder if a lone autoist with a proper grouch, and no way to dispose of it to advantage, remembers that he becomes a thousand strong in the simple process of registering himself as a private in the ranks of a live club. Admission to a club does not carry with it the right to dominate the whole situation. A good club citizen ought to be satisfied by having himself spread out a thousand-fold.

* * *

VALVES, when they are tight, and properly timed, perform their functions precisely; but the autoist who may have discovered that a very minute leak around the spark plug, where it is screwed into the cylinder, will prevent a motor from performing, should have no difficulty in realizing what it means if the valves are in a leaky condition. When a man buys an automobile, he should select the kind which is so made that he will be able to grind in the valves; but when he fails to take advantage of facilities afforded, he will have himself to blame if he has to struggle up every "two-penny" hill on low gear.

* * *

THERE is something of a furor which dims the valorous performances of many of the automobiles which are entered at the various meets, due to the "stock-car" requirements as they are set forth in the rules which were promulgated by the "Contest Board." Of course, those who enter protests are fully alive to one of the requirements in law—"The seeker for justice must come into Court with clean hands." Blackstone is just as good for the plaintiff in front of the "Contest Board" as it is for the plaintiff in a Court of Equity. In the meantime, it would not be too much to expect were the "Contest Board" to furnish finger bowls for such of the plaintiffs as may have occasion to use them.

* * *

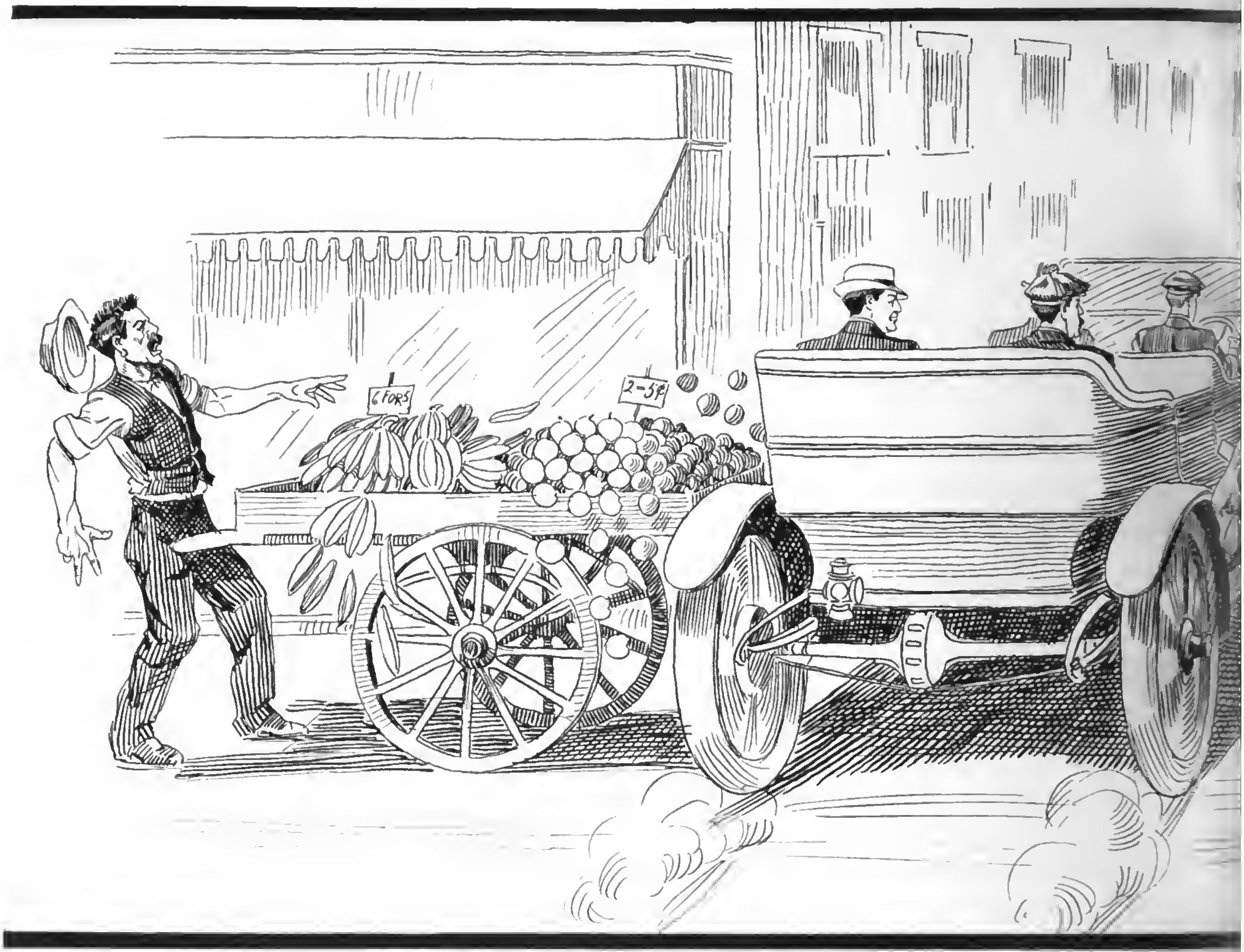
WHISPERINGS coming from the Glidden Tour direction are quite a little out of tune. That the situation is not entirely satisfactory to the makers of automobiles which are entered is the gist of the plaint. It would have been of incalculable advantage to the makers who are supporting this effort had they taken the matter in hand originally, rather than to leave the decision as to the itinerary of the tour to the third party. It is all very well to talk about good roads, and the invasion of new territory, but there must be enough users of roads in any given district to make it worth while to expend the amount of money it costs to make them. Every road builder knows that the elements have a more deteriorating influence than that which comes from traffic. Obviously, a well-built road on the Maricopa Desert would be worn out by the eroding influence of sand-storms, rather than through traffic. The Glidden path is not nearly so isolated from traffic as the desert mentioned, but it is not believed that there is enough traffic along this route to support a road-building campaign in a large way, in which event we fail to see how the Glidden Tour will better the situation. The tax-payers in Texas will scarcely "shell out" for roads simply because the Glidden Tour went by.

* * *

CARBON REMOVER is probably efficacious; there are various compounds which serve as fluxes, and it is a relatively simple matter to so mix a compound that it will combine with carbon to form carbonic acid. so that the carbon, which in crust formation is unwieldy and sticks to the walls of the cylinders, becomes an element in the carbonic acid gas product and floats away with the exhaust. Some of these fluxes are too highly active to be utilized as carbon removers, because they will not only reduce the carbon in the crust formation, but when they shall have completed this task they will then attack the carbon in the polished surfaces of the cylinder walls.

* * *

GASOLINE, if it is fed into the cylinder in excess, "cracks" in the presence of the heat due to combustion with an insufficiency of oxygen, which is the condition that must abound when the gasoline is in excess. To prevent the formation of carbon, avoid the richness of mixture which produces "cracked" gasoline.



SEEN IN NEW YORK—JUDGING DISTANCE IS JUST AS MUCH OF A PROBLEM FOR THE EXPERIENCED

Dull Week in Detroit Brings Out Three or Four Companies

DETROIT, June 27—The Evans Motor Car Company is being formed by R. H. Evans, ex-president of the Zenith City Telephone Company, of Duluth and Superior, to build a commercial wagon of, perhaps, 1,000 pounds capacity. Mr. Evans has secured the Marine City Iron Works plant at Marine City, Mich., for his plant, but will have his main offices in this city.

At Flint, the L. A. W. Aeroplane Company has been formed, and has the construction of its first machine well under way. This will be a biplane and will carry the L. A. W. rotating engine, made at Providence, R. I. The steering device was designed by W. L. Marr, designer of the Buick machine, who will be connected with the company, as will, also, Z. D. Boning, formerly associated with Count Zeppelin in Germany.

In the Bauer Steel Body Company, organized here last week, the accessory field gains a prominent member. This concern will build, not only steel bodies for commercial and pleasure cars, but also radiators, and other steel parts. The capital stock is $20,000, all paid in. The stockholders and officers are: Charles W. Roseberg, president; M. C. Bauer, vice-president and superintendent; Milton C. Hirschfield, secretary and treasurer. The factory will be located at Warren avenue and Fifteenth street, and will open for active operations July 1.

The Champion Ignition Company, of Flint, has increased its capital stock from $60,000 to $100,000.

The Lincoln National Bank has made application to the United States Comptroller for a charter. The bank is to have a capital of $500,000 and a surplus of $100,000. Many prominent and well-known members of the trade are interested, among whom are: Frank Briscoe, president Briscoe Mfg. Co.; E. S. George, proprietor Standard Auto Company; E. A. Skae, president Gommer Mfg. Co., manufacturing steering gears, etc.; Homer Warren, president Warren Motor Company, etc.

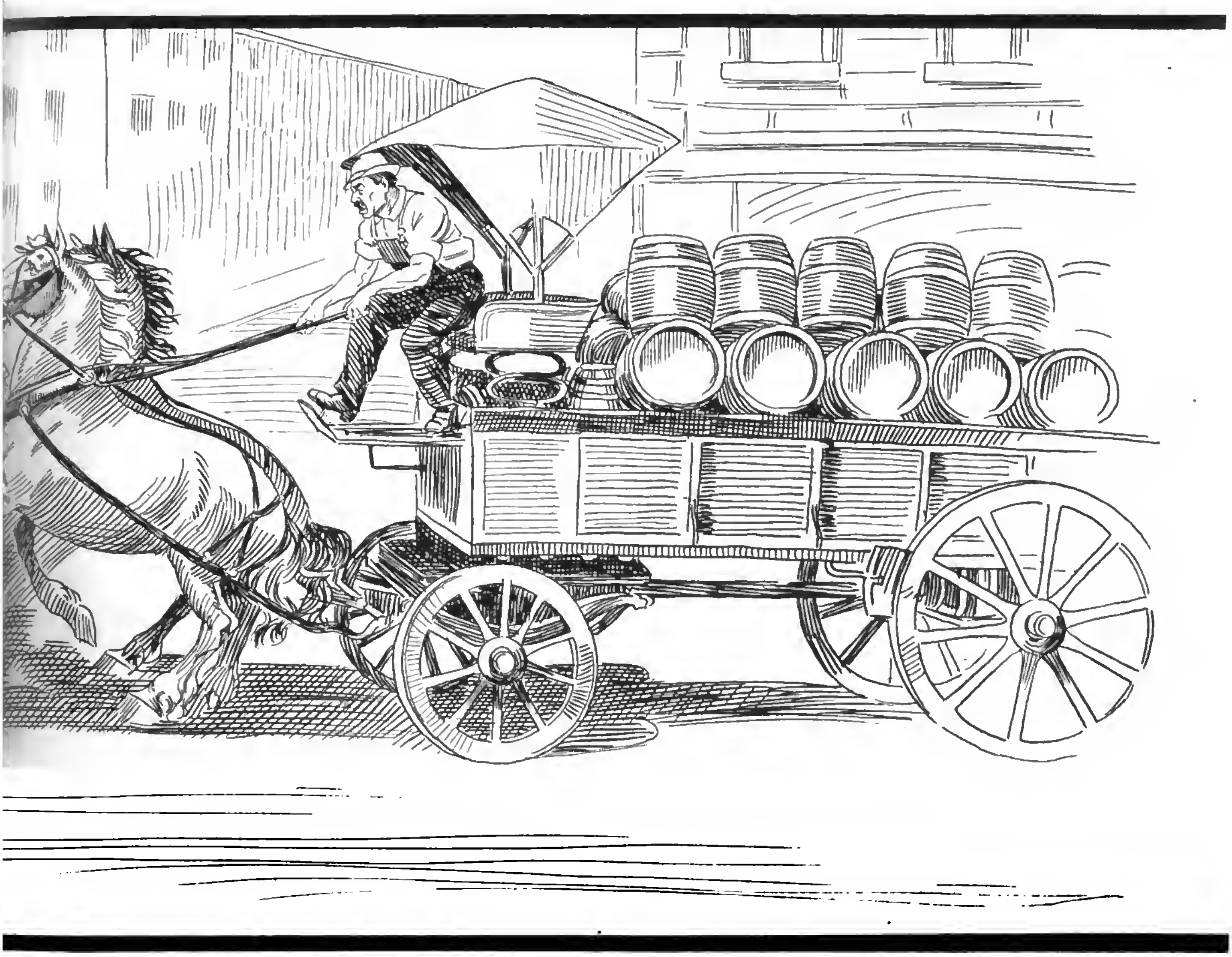
The town of Dearborn is also to have a new bank, incorporated as the Dearborn State Bank. The new concern has purchased the assets of the D. P. Lapham private bank.

The factory of the Sibley Motor Car Company, out at the West End, has been finished and the company is now moving in. This is a large one-story structure, located at Solvay and Mackie avenues. The company is placing on the market a four-cylinder runabout, known as the Sibley 20, to sell at $900.

Sixty-eight thousand dollars is the valuation placed on the new factory of the Regal Motor Car Company, in the building permit.

This unprecedented amount of building and the consequent expansion of the various factories has kept the help problem more to the fore than never before. Good workmen are becoming scarce, despite what other trades characterize as ruinous wages.

Third on the list of Detroit's municipal fire wagons is the machine which has just been accepted and placed in service at



AUTOIST AS LEARNING TO DRIVE IS TO THE BEGINNER—LEARN TO JUDGE DISTANCE

Hose Company Number One, Wayne and Larned streets. This, like its successful predecessors, is a combined chemical and hose wagon.

Great preparations are being made to entertain the Elks, during their convention here the week of July 11. A big automobile reception has been planned for July 15, which the committee in charge is attempting to make the largest automobile affair ever held, both in point of number of cars in line, and in superiority of decorations. To add incentive to the latter, the following prizes have been announced: Sweepstakes prize, silver cup, gold lined, 30 inches high for the best decorated car in the parade; ladies' prize, iced tea set, silver tray and complete cut glass outfit, for the best decorated car driven by a lady; gasoline pleasure cars, first prize, chest of silver; second prize, silver punch bowl; third prize, complete automobile picnic hamper; electric pleasure cars, first, chest of silver; second, cut-glass punch bowl; third, cut-glass water set; comic division, first, Tiffany electric lamp; second, gold scarf pin and cuff link set; third, four gold-plated spark plugs; commercial division, first, gold-lined silver cup 25 inches high; second, gold-lined silver cup, 22 inches high; third. gold-lined silver cup, 18 inches high. Only one of these prizes can be won by any one car. In addition, the Hudson Motor Car Company has offered prizes totaling $50 in value for the best decorated Hudson cars in line, and it is expected that other car makers will follow suit.

Saturday saw the return home of the Regal Plugger, after traveling some 22,000 miles. The car was welcomed by a truck containing a brass band, and a cavalcade of nearly 100 Regal cars and many others. This car, bedecked with labels from all over the United States, has been placed on exhibition in the local sales agency on Woodward avenue.

Another new company entered the local field yesterday, when the Walker Motor Company incorporated with $150,000 capital. The principal stockholders are: G. S. Grantlung, John E. Armstrong, and Thomas E. Morehead.

The latest addition to the industry here is the Bower Roller Bearing Company, of Dayton, O., which is to give up its Ohio home. For this purpose, the company has reincorporated under Michigan laws with a capital of $250,0000. The officers are: R. F. Bower, president; C. H. Heller, secretary.

The E-M-F Company has purchased a tract of land, comprising a total of five acres in Pontiac, fronting on Grove, Baldwin and Howard streets, and lying along the Pontiac, Oxford & Northern Railroad, adjoining the property of the Monroe Mfg. Co., in which the E-M-F Company owns a controlling interest. On this land a large body-building plant to employ 1,000 men will be erected, work starting this month. The present wooden buildings of the Monroe company will be torn down and replaced by brick structures, which will be strictly fireproof. When the new buildings are completed the top department, now housed in the old phaeton building on Willow street, will be removed to the new plant.

From the same city, Pontiac, comes the announcement of the formal transfer of the Welch Motor Car Company, with its plant, good will, and all assets, to the General Motors Company. While it has been generally understood that the Welch company was one of the General Motors components, the formal transfer has just been made.

S. A. E. Plans Important Summer Meeting

Detroit, June 27—The summer meeting of the Society of Automobile Engineers will be held in Detroit, July 28-30. As a result of the active campaign that is being made, this society is occupying an important position in the automobile industry. The July meeting will be the largest and most interesting in the history of the organization, owing to the feeling throughout the membership that under energetic administration, much of the work which should be undertaken by the S. A. E. will be carried to a successful conclusion.

The local Detroit committee on the meeting is constituted as follows: Howard E. Coffin (ex officio), H. W. Alden, chairman, George W. Dunham, Russell Huff, H. M. Leland, F. E. Watts, E. T. Birdsall, A. P. Brush, F. H. Floyd, G. M. Holley and G. E. Merryweather. Various sub-committees are made up of members of this committee.

The program for the different sessions of the convention has been framed as follows:

Thursday, July 28—Morning, business session; afternoon, reading and discussion of professional papers; evening, society dinner, and reading and discussion of professional papers.

Friday, July 29—Morning, visits to manufacturing plants; afternoon, lunch on a yacht, and reading and discussion of professional papers; evening, visit to Light House Inn, participated in by the ladies attending convention.

Saturday, July 30—Morning, reading and discussion of professional papers; afternoon, visit to new Michigan Central Railroad tunnel.

The proposed list of Detroit manufacturing plants to be visited includes the following: Cadillac Motor Car Company, Packard Motor Car Company, E. M. F. Company, Chalmers Motor Company, Burroughs Adding Machine Company, Aluminum Castings Company, Gear Grinding Company, Detroit Steel Products Company, Timken-Detroit Axle Company.

"Little Glidden" Has Thirty-eight Entries

Minneapolis, June 27—Dates for the second annual endurance run for the Minnesota State Automobile Association's prizes are set definitely as July 22 to 27.

The first day's run will be from St. Paul to Mankato, 168.2 miles; the second day's, Mankato to Sioux Falls, 172.2 miles; the third day's, to Redwood Falls, 168.8 miles, and the fourth day's to Minneapolis, 154 miles; total, 658.2 miles.

Officials selected are as follows: Dr. C. E. Dutton, Minneapolis, referee; C. H. Harrington, St. Paul, pilot; W. E. Roby, Minneapolis, chief observer; L. A. Wood, St. Paul, chief checker; Frank M. Joyce, Minneapolis, superintendent of non-contestants; C. F. Philip, St. Paul, superintendent of arrangements; Howard Kahn, St. Paul, publicity agent.

Grand Circuit Meet at Louisville

Louisville, June 27—America's Grand Circuit of auto races will be opened in Louisville Friday and Saturday, July 8 and 9, at Churchill Downs. Manufacturers and star drivers as well as the sport-loving public are showing the liveliest interest in the details of the coming meet, which will be under the management of Homer C. George and W. H. Wellman. The circuit includes: Cincinnati, Columbus, Detroit, Pittsburg, Washington, Baltimore, Providence and Boston.

The local program provides eight races daily ranging from five to twenty miles. Along with the professional events are local races, one at five miles for the Louisville championship and the other a five-mile handicap. In these events only local cars and driven by residents of the city will be allowed to start. Handsome trophies are offered. On the second day a race will be run open to all cars in Kentucky, Ohio and Indiana to give amateurs from those States an opportunity to meet the local flyers.

Offers Blue Book as Prize

Syracuse, N. Y., June 27—At a meeting of the Automobile Club of Syracuse, held Thursday, twenty-three new members were elected, giving a total of 530. The ambition of the officers now is to raise this total to 700 before January 1, and they are confident that it will be done. The weeks preceding the State Fair auto races are expected to be fruitful ones.

The club has offered prizes to the members bringing in the most recruits. For the best record in any month there will be awarded a copy of the 1910 Blue Book.

Brooklyn Dealers Plan Run

Announcement is made by the members of the Brooklyn Motor Vehicle Dealers' Association that they are to hold a two-day reliability contest on Long Island during the latter part of July. The contest will be in the form of a tour, approximately averaging 200 miles for each day. It is not intended to be a pleasure tour but a strenuous test. Aside from the contesting division there will be a tourist section, in which contestants will compete in secret time. Fifteen entries are assured, although entry blanks have not as yet been issued.

More Prizes in Cobe Trophy Race

The Bosch Magneto Company announces that it will award cash prizes amounting to $600 to the first three cars in the Cobe Trophy race to be held July 4 on the Indianapolis Speedway. The purse will be divided, $300 to the winner; $200 to the second, and $100 to the third. The proviso and only condition imposed is that the cars so rewarded shall be fitted with the Bosch Magneto.

EXAMPLES OF RAILROAD TRACK WORK INDULGED IN BY PARTICIPANTS IN THE GLIDDEN TOUR, AT TERRAL.

German Air Line, with Through Sleeper

Travel by schedule through the air will be instituted in the near future when the liner Deutschland, of the German Airship Navigation Company, commences its regular runs from Dusseldorf, through the Rhine Valley. The airship, a rigid dirigible 482 feet long by 48 feet beam, which was formerly known as Zeppelin VII, has already made her final trial trip over the 300-mile route. The trip was made at about the speed scheduled for the regular trips. Conditions were ideal throughout the undertaking, but as the summer season in Germany usually contains only a few bad days, the weather enjoyed is not considered unusual.

The meteorological records show that only 43 days in each year may be regarded as stormy in Germany, and almost all of these occur in the winter. The Deutschland is intended to make the 300-mile trip in less than nine hours. The ship is equipped to carry twenty passengers and sleeping and eating accommodations for that number have been made on board. An elevation of 400 feet will be maintained during the flights. Powerful wireless instruments have been installed on the air cruiser. The passenger tariff, which has been issued to the German public, ranges from $25 for the shortest trip between stations to $125 for the full route from Dusseldorf to Friedrichshafen.

Changes in Bay State Motor Law

Boston, June 27—The members of the Massachusetts Legislature have packed up their things and gone home, and as a legacy have left a few changes in the motor law, which some of them believe are meritorious. They wiped out the section requiring chauffeurs to carry badges. They allowed figures used on the rear of motor cars to be elevated 48 inches from the ground instead of 36. They enacted a reciprocity clause, so that now it matters not how many days another State allows Massachusetts' motorists to use its roads, the visitor from outside has only ten days in any one calendar year to operate in the Bay State, while those States that have restrictions will find their motorists restricted to less than that number, to correspond to the days allowed others in the State they come from.

Another piece of legislation was the changing of the clause relative to sounding the horn at crossroads. The motorists were in favor of abolishing this restriction, which has caused hundreds of needless arrests. However, the legislators provided that out in the country on passing a corner where the view was not obstructed the horns need not be blown. But in the cities it provides that they still be blown, but that no bell, horn or other device for signalling, shall be so sounded as to make a harsh, objectionable or unreasonable noise. Nor shall any driver permit an unreasonable amount of smoke to escape, or make any unnecessary noise. The changes go into effect July 10.

Maryland Motor Law in Effect July 1

Baltimore, Md., June 27—All the provisions of the Swann Motor Vehicle Law, recently passed by the Maryland Legislature, will go into effect Friday. All chauffeurs' licenses and certificates of registration under the old law will have to be exchanged for operators' licenses. All the motor-car records heretofore kept by the Secretary of State will be turned over to Commissioner of Motor Vehicles John E. George. The following fees must be paid for licenses:

Class A—Six dollars per annum for each motor vehicle with a rating of 20 horsepower, or less; $12 for one with a rating of more than 20 and under 40, and $18 for one with a rating of more than 40 horsepower.

Class B—Three dollars a year for each certificate of registration of a motor vehicle used only for transportation of merchandise.

Class C—One dollar and eighty cents a year for each certificate of registration for a motorcycle.

Class D—Twenty-four dollars a year for each certificate assigning a general distinguishing number or marks to a manufacturer or dealer in motor vehicles other than motorcycles.

The rate of speed shall not exceed 12 miles an hour in the thickly settled or business section of cities, etc.; 18 miles in the outlying districts or more than 25 miles in the open country.

Only such horns for warning signals can be used as are operated by hand pressure.

Munsey Pathfinder Making Progress

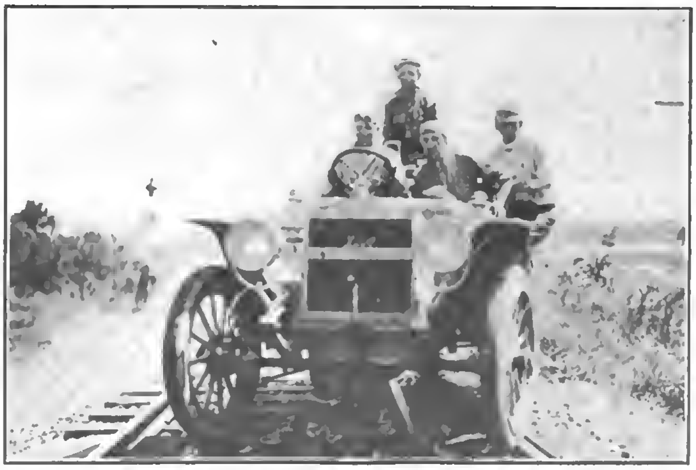
Bretton Woods, N. H., June 27—The E-M-F Pathfinder, which is laying out the route for the Munsey historic tour, reached this place Saturday.

The car is doing well. Tom Skeggs, who drove it in laying out the "Little Glidden" route this year, is at the wheel. The other members of the party are F. J. Byrne, Harry Ward and E. G. Lynch, of Lazarnick's staff.

During the coming week the pathfinders will lay out the route from Bretton Woods to Burlington, crossing Lake Champlain and continuing down to Lake George, Saratoga, Binghamton and Cooperstown, N. Y.

South Bend Club Elects Officers

South Bend, Ind., June 27—The South Bend Automobile Club elected officers at a meeting held at the Oliver Hotel Friday evening. The following were chosen: Walter Hager, president: Arthur L. Hubbard, vice-president; Jacob Woolverton, treasurer, and A. H. Cushing, secretary. The officers will co-operate with a board of governors to administer the affairs of the club. The board is composed of L. P. Hardy, Edwin Witwer and Dr. George V. Neinstedt.



OKLA. IN THE ABSENCE OF PASSABLE ROADS, SHOWING THE PREMIER, CHALMERS, MOLINE, AND MAXWELL

Knox Wins Feature Events on Port Jeff Hill

(*Continued from page* 1162)

classifications did better in their cylinder displacement efforts than under the price code. The summary:

No.	Car.	Owner.	Driver.	Time.
Event 1—Gasoline stock cars, $800 or under—				
10	Hupmobile	E. R. Bellman	D. M. Bellman	1.10:07
59	Hupmobile	H. J. Kochler	A. C. Dam	1.12:22
41	Hupmobile	H. J. Kochler	E. B. Libbey	1.15:09
Event 2—Gasoline stock cars, $801 to $1,200—				
48	Ford	Bishop McCormick	W. Blair	44:57
30	Oakland	Oakland Motor Co.	H. A. Baure	47:35
26	Ford	Bishop McCormick & Bishop	C. M. Bishop	53:76
19	Buick	Buick Motor Co.	Chas. Jones	53:80
Event 3—Gasoline stock cars, $1,201 to $1,600—				
37	Correja	J. N. Boyle	J. Taylor	36:24
18	Buick	Buick Motor Co.	Chas. Jones	43:62
40	Everitt	H. J. Kochler	A. C. Dam	47:75
5	Jackson	Jas. H. Dyett	Richard Dyett	1.13:54
Event 4—Gasoline stock cars, $1,601 to $2,000—				
17	Buick	Buick Motor Co.	Phil Hines	31:36
51	Marion	R. H. Storte	H. Cassidy	43:39
31	Oakland	Oakland M. C. Co.	H. A. Baure	43:49
12	Buick	W. H. Nafis	W. H. Nafis	44:45
27	Cutting	R. C. Vandeventer	R. C. Vandeventer	45:20
Event 5—Gasoline stock cars, $2,001 to $3,000—				
3	Knox	Gerard & Hall	Fred Belcher	30:46
7	National	C. M. Rutherford	C. M. Rutherford	32:91
28	Chalmers	Sammis & Downer	Schenck Bergen	35:10
50	Chalmers	C. H. Page	Joe Bell	35:56
6	Palmer-Singer	Chas. S. Rice	Chas. S. Rice	45:44
Event 6—Gasoline stock cars, $3,001 to $4,000—				
43	Matheson	Matheson M. C. Co.	J. A. Turner	35:93
55	Thomas	J. L. Gunther	W. M. Jones	47:13
Event 7—Gasoline stock cars, $4,000 and over—				
42	Houpt-Rockwell	H. S. Houpt M. Co.	Stanley Martin	33:95
9	Zust	D. H. Gaines	Jules Devigne	36:00
49	Stearns	Kingsley Swan	Kingsley Swan	36:42
38	Knox	Gerard & Hall	T. Wright	37:25
Event 8—Free-for-all—				
11	Fiat	E. W. Arnold	Ralph De Palma	20:48
14	Fiat	C. S. Bragg	C. S. Brass	21:30
3	Knox	Gerald & Hall	Fred Belcher	27:61
33	Columbia	C. R. Lee	J. R. Kirkpatrick	29:30
50	Chalmers	Carl H. Page	J. Bell	30:08
44	Knox	Mrs. J. N. Cuneo	L. A. Disbrow	30:64
7	National	C. M. Rutherford	C. M. Rutherford	30:80
9	Zust	D. H. Gaines	Jules Devigne	32:97
49	Stearns	Kingsley Swan	Kingsley Swan	37:91
22	The Only Car	The Only Car Co.	W. D. Sloat	40:29
Event 8A—161-300 cubic inches—				
24	Pope-Hartford	Pope-Hartford A. Co.	G. Wilson	32:32
37	Correja	J. M. Boyle	Jos. Taylor	32:44
25	Pope-Hartford	Pope-Hartford A. Co.	E. Jenkins	33:04
21	S. P. O.	F. J. Horton	F. J. Horton	33:98
32	S. P. O.	Henry S. Lake	John Jonhasg	35:33
18	Buick	Buick Motor Co.	Charles Jones	27:91
56	Lancia	Mrs. J. A. Ferguson	A. Ferguson	40:85
2	Knox	F. E. Ruland	F. E. Ruland	56:56
57	Corbin	H. B. Tucker	H .B. Tucker	1.14:27
Event 9—Stock chassis, 301-450 cubic inches—				
8	Knox	Gerard & Hall	Fred Belcher	28:60
51	Chalmers	Carl H. Page	J. Bell	30:31
7	National	C. M. Rutherford	C. M. Rutherford	31:35
60	Berkshire	Berkshire Auto Co.	F. Wilson	32:56
46	Zust	Am. Zust Mfg. Co.	V. P. Pisani	32:66
49	Stearns	Kingsley Swan	Kingsley Swan	33:76
28	Chalmers	Sammis & Downer	Schenck Bergen	33:84
20	Velie	R. C. Vandeventer	R. C. Vandeventer	38:92
Event 10—451-600 cubic inches—				
44	Knox	Mrs. J. N. Cuneo	L. A. Disbrow	31:09
9	Zust	D. H. Gaines	Jules Devigne	32:14
Event 12—Amateurs, class B cars, $1,201 to $2,000—				
20	Velie	R. C. Vandeventer	R. C. Vandeventer	39:55
5	Jackson	J. H. Dyett	Richard Dyett	1.05.24
Event 13—Amateurs, class C cars, $2,000 and over—				
7	National	C. M. Rutherford	C. M. Rutherford	31:84
29	National	C. G. Goddard	W. Smith	36:35
50	Chalmers	C. Foster	C. Foster	37:22
56	Lancia	Mrs. J. A. Ferguson	A. Ferguson	39:62
16	Knox	E. B. Hawkins	E. B. Hawkins	1.36:58
Event 14—Amateurs, cars owned in Port Jefferson—				
34	Knox	W. J. Fallon	W. J. Fallon	56:69
5	Jackson	J. H. Dyett	Richard Dyett	1.02:72
Event 15—Amateurs, L. I. A. C. and Crescent A. C.—				
49	Stearns	Kingsley Swan	Kingsley Swan	36:93
35	Buick	H. A. Trimm	H. A. Trimm	53:21

Getting Ready for Galveston Races

GALVESTON, TEX., June 13—Automobilists from all over Texas, and from the North and East as well, are looking forward to the races to be held on Galveston beach, August 3, 4 and 5, as the motor car event of the summer in this State. The president of the Texas State Automobile Association, J. W. Munn, of Galveston, who is also the director for the beach races here, is now making a pathfinding tour of the State, stirring up interest and securing as large an entry list as possible. Encouraging reports from him are being received in Galveston. He has visited Houston, San Antonio, and Austin, and will go to Dallas, Waco, Fort Worth, and Beaumont before he returns.

The events and prizes for the three days are as follows:

First Day, Aug. 3

Event No. 1: Class B, division 2-B, twenty miles; entrance, $10; prizes, first $100, second $25.

Event No. 2: Class B, division 4-B, thirty miles; entrance, $10; prizes, first $150, second $50.

Event No. 3: Class B, division 3-B, twenty miles; entrance $10; prizes, first $100, second $25.

Event No. 4: Class D, free-for-all, fifty miles; entrsnce, $15; prizes, first $200; second $50, third $25.

Second Day, Aug. 4.

Event No. 5: Class B, division 5-B, twenty miles; entrance, $10; prizes, first $150, second $50.

Event No. 6: Class B, division 2-B, ten miles; entrance, $5; prizes, first $75, second $25.

Event No. 7: Class E, special one mile flying start for beach record; entrance $5; each entrant allowed two trials; prize $100.

Event No. 8: Class B, division 3-B, ten miles; entrance, $5; prizes, first $75, second $25.

Event No. 9: Class B, division 4-B, ten miles; entrance $5; prizes, first $75, second $25.

Third Day, Aug. 5.

Event No. 10: Class D, free-for-all, 200 miles; entrance $25; prizes, first $500, second $100, third $50; for best time first 50 miles $100, for best time first 100 miles $150.

The course is to be a five-mile straightaway and return for all races except the 200-mile event, which will be run over the ten-mile course. The course will be roped off for quite a distance, and police patrol will be provided to see that spectators do not get in the way of the racers. A paddock is to be constructed to protect the cars from any rain or bad weather. The beach, which under normal conditions is about 100 feet wide, is in excellent condition this summer, and some fast records are expected.

Capt. Munn, of Galveston, has entered his 40-horsepower National; S. H. Weis, of San Antonio, an 80-horsepower Chadwick; G. A. C. Halff, of San Antonio, a 60-horsepower Stoddard-Dayton, to be driven by Dehymel. Many other entries are looked for within the next few weeks. Entries may be made until July 28. The races will be run under the rules and by the sanction of the A. A. A.

Central Ohio Automobile Items

COLUMBUS, O., June 27—The Ohio General Assembly adjourned recently without amending the Ohio automobile law in the least particular. It was through the efforts of Secretary of State Carmi A. Thompson, Attorney-General U. G. Denman and State Registrar of Automobiles Fred H. Caley that no changes were made in the law.

The Automobile Club of Stark County (Ohio) is arranging for a club run to start July 9 to extend as far as Detroit. It is planned to touch Akron, Cleveland, Toledo, Sandusky and other cities in the run. Eight cars have already been pledged and other entries are expected to be in later.

First Day of St. Louis Run Shows Sixteen Clean Scores

ST. LOUIS, June 30—The three-day reliability run for the St. Louis *Star* trophy, under the auspices of the St. Louis Automobile Manufacturers and Dealers' Association, started Tuesday morning with 29 contestants in the lists. The Buick pilot car, loaded with confetti, left St. Louis Star square at 5 A. M., and an hour later the first of the contestants was sent away, the others following at 1-minute intervals in their order.

The first day's run took the contestants from St. Louis through St Charles, Wentzville, Harvester, Cottlesville, Darden, Flint, Moscow Mills, Troy, Eolia, Clarksville, Louisiana, New London and Hannibal, a distance of 141.1 miles.

The second day's run was from Hannibal through Palmyra, Monroe, Hunnewell, Shelbina, Clarence, Macon, Excello, Jacksonville, Moberly and to Mexico, distance, 143.3 miles. The third day's run will end at St. Louis, the tour passing through Wellsville, Montgomery, Jonesburg, Warrenton, Truesdale, Middleton, Wright City, Forestel, Wentzville, Darden, Cottlesville, Harvester and St. Charles.

The officials of the run are: Referee, J. D. Perry Lewis of the Halsey Automobile Company; starter, Robert E. Lee; pilot, W. R. Crusoe. The checkers at controls are Samuel Breadon, Charles E. Mitchell, and H. W. Blodgett. The contest committee, Frank R. Tate, John H. Phillips and C. E. Mitchell.

At the conclusion of the tour, Thursday evening, the cars finishing will be driven to the official garage, where the final inspections will be made. The *Star* trophy, a handsome cup, will be awarded to the car which shall have finished with the most nearly perfect score. Should two or more cars tie for the highest score, the contest committee will arrange a special run for final decision, over the same or a harder course.

In addition to the touring car and runabout classes, the contestants are listed in four divisions—Cars valued at $3,500 or over, second, at $2,001 to $3,499; third, at $1,001 to $2,000; fourth, at $1,000 and under. A 15-mile schedule is observed for cars of the first division; 14-mile for second division; 13-mile third; and 12-mile fourth. The first day's score follows:

No. Car	Entrant	Driver	Score
1—Overland	C. E. Goldthwale	C. E. Goldthwale	1,000
2—Moon	Eli Collutte	R. Weinbert	971
3—Buick	Frank De Laney	C. H. Blake	1,000
4—Maxwell	Val. Heinrich	G. H. Houghton	998
5—Oldsmobile	B. K. Olin	John Grenninger	Dis.
6—Mitchell	C. M. Barnard	Marcus Wolff	990
7—Oldsmobile	W. B. Fewell	T. A. Goodman	1,000
8—Cadillac	W. F. Bagnell	W. F. Bagnell	1,000
9—Moon	E. J. Moon	Ed. Moore	975
10—Rambler	Will Smythe	J. H. Ramsden	Dis.
1—Dorris	J. T. Rumble	Ed. Gadsey	1,000
12—Moon	Mathew Blavalt	Ed. Gillespy	998
13—Columbia	E. E. Ernest	J. C. Graham	1,000
14—Buick	James Ladd	Charles Berkley	1,000
15—Everitt	A. J. Whittaker	Frank Morris	994
16—Mitchell	J. H. Little	W. F. Young	993
17—Ford	H. L. Bagley	Dr. H. A. Upshaw	1,000
18—Pope-Hartford	Walter Saigeon	Fred Schmidt	999
19—Haynes	Carl Williams	Carl Williams	1000
20—National	C. Merz	H. S. Reed	1,000
21—Interstate	H. M. Paine	H. M. Paine	1,000
22—Buick	N. C. Tuxbury	H. Paul	1,000
23—Stearns	J. M. Dunwoodie	J. M. Dunwoodie	1,000
24—Hupmobile	Roy Anselm	J. A. Hutchinson	975
25—Dorris	J. E. Baker	K. Funsten	1,000
26—Marmon	Ed. Holthaus	Ed. Holthaus	977
27—Amplex	H. L. Schure	H. L. Schure	1,000
28—Moline	W. von Steiger	J. E. Foland	1,000
29—Stearns	D. B. Brownback	D. B. Brownback	994
30—Haynes	A. A. Franklin	A. A. Franklin	886

In addition to the pilot car and the contestants, there is a Dorris car for the officials and a Standard Six for representatives of the press.

Live Problems Discussed at A. L. A. M. Meeting

At a well-attended meeting of the Association of Licensed Automobile Manufacturers, yesterday, it was reported that the final hearing on the interlocutory decree before Judge Hough in the Ford and Panhard cases has been definitely fixed for the morning of July 19. The testimony on both sides in the supplemental bills and answers has been closed, and now only awaits the hearing of the application for the entry of decrees.

Aside from routine business, there was a general discussion of trade conditions, which showed a continuance of the healthy demand for motor cars, that are now such an essential part of American life, and particularly a strong demand for freight-carrying cars. Reports and figures of the manufacturers indicated very clearly the reason why bankers and railroad men have been decrying the buying and using of automobiles, as the motor-car builders say that many people are buying motor cars now instead of putting their money into Wall Street stocks with their usual uncertainty.

The executive committee of the association held its meeting on Tuesday, while there was also a meeting of the directors of Association Patents Company, at which Alfred Reeves was elected secretary and treasurer in the place of Coker F. Clarkson, who resigned to become secretary of the Society of Automobile Engineers.

President Clifton presided, and among those in attendance at the board meeting were: James Joyce, American Locomotive Company; John S. Clarke, Autocar Company; G. A. Lambert, Buckeye Manufacturing Company; C. C. Hildebrand, Chalmers Motor Company; H. W. Nuckols, Columbia Motor Car Company; M. S. Hart, Corbin Motor Vehicle Corporation; R. M. Brownson, E-M-F Company; G. H. Stilwell, H. H. Franklin Manufacturing Company; Elwood Haynes, Haynes Automobile Company; F. O. Bezner, Hudson Motor Car Company; G. A. Matthews, Jackson Automobile Company; A. N. [illegible], Knox Automobile Company; S. T. Davis, Jr., Locomobile Company of America; S. Regar, Lozier Motor Company; Horace DeLisser, Maxwell-Briscoe Motor Company; Wm. T. White, Mercer Automobile Company; Wm. E. Metzger, Metzger Motor Car Company; A. C. Newby, National Motor Vehicle Company; C. C. Hanch, Nordyke & Marmon Company; C. R. Hatheway, Oakland Motor Car Company; L. H. Kittredge, Peerless Motor Car Company; Charles Clifton, Pierce-Arrow Motor Car Company; George Pope, Pope Manufacturing Company; R. M. Owen, Reo Motor Car Company; Geo. J. Dunham, Royal Tourist Car Company; G. E. Mitchell, Alden Sampson Manufacturing Company; R. H. Salmons, Selden Motor Vehicle Company; R. F. York, F. B. Stearns Company; E. L. Thomas, E. R. Thomas Motor Company; Windsor T. White, Waltham Manufacturing Company; Geo. W. Bennett, Willys-Overland Company; Thos. Henderson, Winton Motor Carriage Company, and Alfred Reeves, general manager.

Seventeen Starters in Denver Post Run

CHEYENNE, WYO., June 28—Seven perfect scores were made in the first of the five days' reliability contest promoted by the Denver *Post*, which started this morning from Denver. The Renault, Studebaker, E-M-F, Jackson, Buick, Rambler and Haynes were in this category, while those penalized included: Reo, 3; Flanders, 103; Hupmobile, 19; Regal, 10; Brush, 8; Gleason, 111; No. 15, Page, 18; No. 16, Page, 13; Firestone-Columbus, 49; Apperson, 10. The Gleason was assessed 100 points for careless driving. To-night it was raining hard, and it is indicated that the run to-morrow back to Denver, a distance of 115 miles, will be a tough one. Thursday the run goes from Denver to LaJunta, 181 miles, and Friday from LaJunta to Hugo, 200 miles. Saturday the cars return from Hugo to Denver, 208 miles.

Winton Continues Sixes for 1911

(*Continued from page* 1167)

ternal expanding brakes. In addition to the torsion rod as shown, there are radius rods extending from the extremities of the axle to the chassis frame.

(J)—Left hand side of the six-cylinder motor showing the carbureter in place, and how the intake manifold extends from the carbureter orifice up and over the cylinders, terminating in Winton design of distributing manifolds, so arranged as to deliver an equal weight of mixture to the respective cylinders. The piping of the self-starting system may be plainly seen in this view, and priming cocks are so placed that they are accessible. The carbureter is above the line of the chassis frame, so that it is accessible.

(K)—View of the power plant, looking down from a position at the left and rear of the chassis, showing the method of suspending the motor, the relations of the parts, notably the control system, also the foot pedals for the clutch and brakes, and the equalizer, by means of which the brakes on the two wheels act in unison. The side levers here come into view, and the mechanism which is employed in the selector system is in a dust-proof housing at the right side of the transmission gear case. The offset at the narrowing point of the chassis frame is laterally supported, and the foot boards are attached to pressed steel brackets.

Choices Given to Patrons for 1911

The choices which will be given the Winton patrons for 1911 are as follows:

Car complete with touring, runabout, or toy-tonneau body, $3,000; the torpedo body will be furnished at $250 more, and the car complete, with a limousine body, will be $4,250; with a landaulette body $4,500; the chassis without body will go for $2,750; and the touring body separately is listed at $500, which is also the price of the runabout and toy tonneau body; a separate limousine body may be had for $1,500, and the landaulette at $1,750. One of the Winton ideas for this year is to offer the chassis with two bodies, and if the purchaser elects to take a limousine and touring body, the price will be $4,500, or, if the selection is a landaulette and touring body, the price will be $4,750; the touring body, however, seats five, and if a seven-passenger touring body is ordered instead, it will be at an extra of $250. The equipment, which is listed as regular, includes two gas head lamps, two oil side lamps, and one oil tail lamp, gas tank or generator, horn, and full set of tools. A locker is provided under each seat, but the front seat locker is of the drawer type, and is partitioned to accommodate the tools. The color options are royal purple, blue, green, gray, maroon, and red. The finish is up to the customary Winton standard, which includes layer upon layer of the finest paint and varnishes, sufficiently to obtain the highest possible carriage excellence. This, together with the straight line style of design of body work, accounts for the particular distinctiveness which draws attention to Winton automobiles on the road.

Peculiarities of Modern Non-Charring Brake Linings

(*Continued from page* 1176)

fer to take chances rather than to give the subject, in the light of a concrete application, the real attention it deserves, with the result that brakes, for illustration, are not always the success that they would have users believe.

The Renne experiments, dating back to 1829, still offer information to the designer who has to deal with unlubricated friction, as when brakes are being designed. The conclusions then reached, which have not been disproven since that time, may be restated as follows:

(A)—The law of solid friction differs with the character of the rubbing bodies.

(B)—With wood, metal, and stone, within limits of abrasion, friction varies only with pressure, being independent of extent of surface, time of contact and velocity of rubbing.

(C)—With fibrous materials, friction is increased by increased extent of surface, and by time of contact, but is diminished by pressure and speed.

(D)—The limit of abrasion is determined by the hardness of the softer of the two rubbing materials.

(E)—Friction is greatest with the soft and least with the hard materials.

It is the condition (C) that is most interesting at the present time, owing to the use of brake linings of asbestos, which are much used, or cork inserts, which follow the same law. The first conclusion to reach is: if a set of brakes of the metal to metal sort will not give satisfaction, it is a positive crime to place fibrous materials under identically the same conditions, which limit surface, increase pressure per unit of area, and accomplish all the other crimes of designing which lead up the narrow alley-way to the goal called failure.

The law says that the fibrous linings will do the best work, (a) with increased extent of surface, (b) by time of contact, but the law also states, (c) ability decreases with pressure, and, (d) with speed of rubbing.

Considering the laws which govern when fibrous materials are employed, what is wanted is:

(A) The greatest possible surface of the linings.

(B) The maximum time of contact.

How is this to be accomplished? Readily, provided the brakes are designed with a large surface, and are placed on the road wheels of the automobile. It must be remembered that as the wheels (on which the brakes are placed) run slower, the time of contact will be longer.

Cork inserts work with excellent satisfaction when the brake surface is somewhat over 500 square inches on a car which weighs upward of 3,600 pounds.

It would seem as if it will be within the range of possibilities to fix the conditions under which brakes are to work, naming the several conditions as, pressure per square inch for the several available materials, speed of rubbing, which regulates the diameters of drums, taking into account the location and spindle speed which follows.

Glancing at the laws which seem to hold, it is rendered apparent that the same character of materials should not be used at all points, under widely varying conditions. If the speed of rubbing is high, and the pressure per square inch is augmented to exceed that which is good practice for fibrous material and cork, it remains to be seen whether or not the brakes will be quite satisfactory.

For metal to metal, it is important to note that the coefficient of friction decreases with speed; the law is as follows:

"The coefficient of unlubricated friction decreases materially with velocity, is very much greater with minute velocities of O +, falls very rapidly with minute increases of such velocities, and continues to fall with decreasing rapidity with higher velocities up to a certain point, following closely the law which obtains with lubricated friction."—*Wellington.*

As an indication of the rate of decrease of the coefficient of friction of metal to metal, all that the occasion demands for the moment, is to quote an account of the adhesion of steel tires sliding on steel rails. An account is given as follows (Westinghouse & Galton):

Speed in miles per hour....	10	15	25	38	45	50
Coefficient of friction......	0.11	0.087	0.080	0.051	0.047	0.040

These speeds are all within the practice as it obtains in brake-shoe work, and granting that geographical location will scarcely alter the coefficient of friction, it is readily seen that the brakes are least capable just when they were the most in demand.

Harris' Cadillac Wins Delaware Sealed Time Run

WILMINGTON, DEL., June 27—Coleman B. Harris, in a 30-horsepower Cadillac touring car, was the winner of the sealed time run of the Delaware Automobile Association, from Wilmington to Oxford, Pa., and return, a distance of 72.6 miles, which took place last Saturday. His time was 4 hours and 14 minutes, while the sealed time was 4 hours and 19 minutes. Mr. Harris had the least number of penalizations. By winning the run Mr. Harris will receive a handsome silver loving cup, offered by the association.

Courtland E. Pierson, in a 30-horsepower E-M-F touring car, was second, and John B. Bird, in a 20-horsepower White steamer, was third, but their time was not learned, the run committee of the association, which computed the time, declining to give out any information on the subject, regarding the details, except as to the winner.

While the number of contestants was not large, only eleven entrants starting, it was full of interest, from the fact that the weather was ideal, but also because of several muddy places in the road, in Pennsylvania, there were some unpleasant incidents to record. All got through the bad places, however, without mishap, and none had any trouble in following the route, which was indicated by confetti distributed by Bissel C. Crommon and Charles G. Guyer in the pilot car, which started an hour in advance of the beginning of the run. The start was made from the court house in this city, at 11 o'clock, the cars checking out in the order given in the table below.

There were four checking stations, which were unknown to the entrants. They were as follows: London Grove, A. K. Barker: Oxford, William Stanier; Avondale, Thomas T. Weldin; Lamope, John B. Martin. All of the entrants finished except J. Danforth Bush, who took a run off the course, for the purpose of visiting Elkton, Md. The run was under the management of a committee comprising A. B. Hazard, chairman; Charles G. Guyer and William Stanier. The entrants finished in the following order:

Checking Out the Cars, A. B. Hazard, Chairman of Run Committee

No.	Name of Car	H. P.	Entrant	Driver	Time
1	White Steamer	20	John B. Bird	John B. Bird	4.24
8	Cadillac	30	Coleman B. Harris	Coleman B. Harris	4.14
7	E-M-F	30	C. E. Pierson	C. E. Pierson	4.25
9	Maxwell	12	C. G. Cann	C. G. Cann	4.25½
5	Stanley Steamer	20	T. C. Marshall	T. C. Marshall	4.30
2	Peerless	38	E. M. Pennypacker	E. M. Pennypacker	4.36
6	Stoddard-Dayton	40	Dr. J. C. Fahey	Frank Chadwick	4.36
11	Stevens-Duryea	24	John R. Wilson	John R. Wilson	4.36½
10	Apperson	30	H. D. Ross	A. M. Otteen	4.41½
4	Stevens-Duryea	24	Wm. C. Corey	Wm. C. Corey	4.55
3	Courier	22½	J. Danforth Bush	J. Danforth Bush	Did not finish

Delaware Achieves Reciprocity

WILMINGTON, DEL., June 27—Automobilists in Delaware now enjoy reciprocal relations with Maryland as well as with Pennsylvania.

This is welcome news to owners of cars in this State, in view of the fact that it is now possible to go to either Philadelphia or Baltimore, or any places in Maryland or Pennsylvania, with Delaware State licenses.

Cars Assembling for the Start at Court House, Wilmington

After considering the subject for three years, the Water Witch Fire Company of this city has given contracts for two automobile fire engines, which are to be delivered the latter part of October or the early part of November.

Virginia Automobile News

RICHMOND, VA., June 27—A test is now being made of methods of laying the dust of the city streets, and the process of the Cincinnati Good Roads Company is being tried. The driveways of several of the city parks are being sprinkled with asphalt oil, and the results are expected to prove highly satisfactory. In case these thoroughfares are free from dust as the result of the oil, the thoroughfares of the city, especially the main ones, will be treated and kept in a dustless condition. This move has been agitated for many months by autoists of Richmond, and Councilman Don Levy has fought for it for over two years, but with indifferent success. Now the prospects are bright for the success of the movement.

The license for the first automobile ever built in Richmond was issued to J. A. Grassberger on Friday, and the machine is now in evidence on the city streets. It is a four-seated roadster, of 18 horsepower. The machine was manufactured as an experiment, and it is stated that a regular automobile factory will be started here by an organized company soon, though definite steps have not yet been taken.

To Wind Up Electric Vehicle Company

Judge Joseph Cross, of the United States Circuit Court of the New Jersey district has issued a rule on the creditors and stockholders of the Electric Vehicle Company to show cause, June 27, why the report of the receivers should not be accepted and its recommendations as to distribution of moneys, granted. The receivers have $22,892 in hand. The chief clause of the report is a petition that the sale of the Electric Vehicle Company's business to the Columbia Motor Car Company be ratified, confirmed and approved.

Studies Involving Refinements of Gasoline Equipment

(*Continued from page* 1181)

When a motor stops and the ignition system proves to be in good order it is not so difficult to deal with the problem if the interruption is permanent. It then becomes necessary to find out (a) if there is any gasoline in the tank, (b) if the quality of gasoline present is good enough to use, (c) if the carbureter is so adjusted that the gasoline is in the right proportion, (d) if the flow of gasoline from tank to carbureter is stopped.

It is not at all difficult to find out if there is gasoline in the tank. Take the filler cap off, and put a measuring stick in through the orifice and upon withdrawing the same note the height of the wetted surface. If the carbureter floods it is of course a sign that the flow of gasoline is not properly regulated by the needle valve as it is controlled by the float. The first thing to do under such conditions is to note if the needle-valve seat needs tightening; if it does, it is then necessary to find out if the buoyancy of the float is normal. The excess of gasoline must be stopped, no matter to which of these causes it is due, before the mixture can be relied upon to conform to the demands of the motor.

If the gasoline flow is insufficient it will be due to one of the causes above named, and if it is found that there is a quantity of suitable gasoline in the tank, but that it does not flow to the carbureter, it is a self-evident fact that an obstruction in the passageway at some point will be at the foundation of the trouble. In dealing with a new automobile it is always well to look for obstructions which may come in the form of a drop of solder, which frequently flows from the joints which are being sweated, to some restricted lodging point, as the orifice through which the gasoline enters. By taking the system apart and blowing through each member the one having the obstruction will be discovered. Referring to Fig. 3 which is of an auxiliary tank on the dash, which receives its gasoline under pressure from the tank, it will be observed that the gasoline enters from the tank to the filter, passes through the same, and then to the float chamber or main portion of the tank, under the control of a needle valve, which is lifted through the buoyancy of a float. The filter is so contrived that it may be screwed out, examined, and cleaned if necessary. This operation should be performed at reasonably frequent intervals, and a water basin should be provided in the bottom of the tank so that the accumulation of water, some of which obtains in gasoline, may be drained off as the exigencies of service would demand.

Fig. 4 is a much more promising design of an auxiliary tank for the dashboard, because it is so made as to eliminate the necessity of using a wire filter, which is bound to be more or less of an obstruction, although in this case means are afforded for draining off the water as it accumulates without running the risk of having the water serve as a plug for the gasoline passageways. In this design the gasoline raises up and then passes in through the orifice which leads to the needle-valve seat, and the water, if any is entrained, will lie on the bottom of the well until it is drained off through the water drain. A large inspection cap is provided at the top; it has a leather packing, which makes it easy to screw the cap to tightness, even by hand pressure, although a large hexagon head is available in case wrench tightness becomes necessary. At the bottom of the tank, where the gasoline flows out, there is a standpipe which affords a sufficient water basin by means of the differences in levels, so that clear gasoline will flow through the carbureter and the water will lie in the basin until it is released by opening the drain cock. One of the ideas in presenting this design was to indicate the desirability of making things accessible.

Hughes Signs Anti-Joy-Ride Law

Albany, June 27—Governor Hughes has signed the Toombs bill amending the penal law so as to enlarge the scope of the anti-joy riding law of 1909. The former law provides that "Any chauffeur, or other person, who, without the consent of the owner, shall take, or cause to be taken, from a garage, stable, or other building or place, an automobile or motor vehicle, and operate or drive, or cause the same to be operated or driven, for his own profit, use or purpose, steals the same and is guilty of larceny, and shall be punished accordingly."

The law was found to have loopholes which lawyers found for the clients' benefit and this year it was amended by inserting after the words "shall take," the words "use, operate or remove"; and, again, after the words "or cause to be taken" the additional words, "used, operated or removed"; and then again there is inserted after "place," the words "or from any place or locality on a private or public highway, park, parkway, street, lot, field, inclosure, or space." All of which expands the scope of the law intended to stop the unauthorized use of automobiles by chauffeurs and others.

Miss Phillips, one of the Overland crew, toting a block to repair a broken spring

Motoring Activities in Wisconsin Field

Milwaukee, June 27—Eighteen cars have been entered in the first annual tour of the Wisconsin State Automobile Association for the Milwaukee *Sentinel* trophy, starting from Milwaukee on Monday morning, July 18, and finishing in that city on Friday evening, July 22. Chairman George A. West of the Contest Board expects another eighteen entries, and believes now that more than twenty-five cars will start.

The entries now on file are: Rambler Garage Company of Milwaukee, branch of Thos. B. Jeffery Co., Kenosha, Wis., two cars; Badger Motor Car Company, Columbus, Wis., two cars; The Kisselkar Company, branch of Kissel Motor Car Company, Hartford, Wis., three cars; Buick Motor Company, Flint, Mich. (Milwaukee branch), three cars; Bates-Odenbrett Automobile Company, Overland; Curtis Automobile Company, Reo; Jonas Automobile Company, Cadillac; Johnson Service Company, Milwaukee, Johnson; Franklin Auto & Supply Company, Franklin; Studebaker Automobile Company (Milwaukee branch), one car, and others, if present indications count for anything.

The 1911 pro-

Miss Scott, the other fair Overlander, blocking up the broken spring

Parry, No. 105, nearing Bowling Green, Ky., in the Glidden Tour

duction of Thomas B. Jeffery Company, Kenosha, Wis., will be 2,500 cars, according to announcement just made at the Rambler works. The number is practically the same as in 1910, and the news may cause some surprise.

Thomas B. Jeffery Company was incorporated last week with a capital stock of $3,000,000. Officers are about to be elected by the company.

Eugene O. Edwards, of LaCrosse, Wis., has invented a new type of gasoline motor. The power is obtained by a revolving motion in the cylinder, instead of the conventional piston stroke, and the ports are in the top of the cylinder. The core of the cylinder forms the water-cooling system, the revolving power wheels being outside of this core. The engine is now being tried out in a gasoline launch. The present motor is in the one-cylinder form, but any number of cylinders up to six can be added without rearrangement.

The National Gauge & Register Company, of Minneapolis, Minn., has moved its plant to LaCrosse, Wis., being the first concern to be attracted to LaCrosse by the new industrial association. The company manufactures eight motor-car accessories and specialties, the invention of Edmond E. Hans, vice-president.

The Mitchell-Lewis Motor Company, of Racine, Wis., will build 2,000 more cars for 1910 delivery than originally intended. About thirty-five cars are being turned out every day and the plant will run all summer.

Future Puzzle for St. Peter

Charles Wells, of the photographing firm of Spooner & Wells. has a reputation for self-contained dignity, moderation and temperance and among the things he particularly abhors is profanity in any form. But, notwithstanding his views and reputation, he came mighty close to the line while he was helping to repair one of the tires of the big Peerless machine in which he was a passenger during the endurance run of the New Jersey Automobile and Motor Club.

The "blow-out" occurred near the new country club house, and Mr. Wells had succeeded in inserting a tire iron between the rim and the shoe and was preparing to give it a yank. Something "beat him to it" and with a grunt the shoe slipped back while the iron, twisting from his grasp, struck him on the thumb with a crack that sounded like a "foul-tip."

The dignified photographer writhed in pain while the crew of the Peerless gathered around him sympathetically.

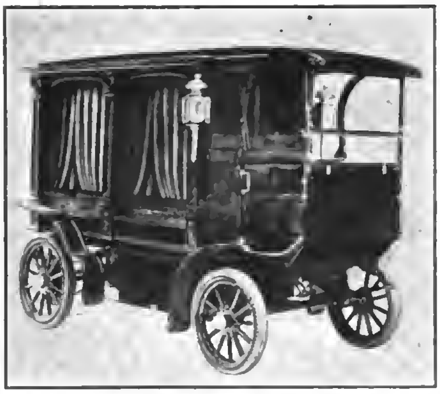
Mr. Wells, with agony distorting his face, shook the injured thumb woefully and to the intense surprise of the crew exclaimed: "Bob jam the jam thing to jell."

After the pain had subsided he triumphantly pointed to the fact that he had used no profane word even under the trying circumstances.

Road Commission Tests Highways

Starting June 28 from Rochester, the New York State Highway Commission, which has been at work for a year in perfecting an organization and in starting road improvements in a practical way, began a two-day tour of Monroe, Wayne, Ontario, Livingston, Alleghany, Wyoming, Genesee and Orleans counties as guests of the Automobile Club of Rochester.

The commission, its deputies, county superintendents and fieldmen, assembled in Rochester for its semi-annual conference Tuesday. The delegates numbered about 200, and the trip over the roads seemed almost as large as a big endurance run, as far as the number of cars engaged is concerned. The trip was undertaken as a road test and demonstration of the value of the work of the commission so far as it has progressed.



The Waverley Electric Hearse—A new and Silent Funeral Car

One of the features of the tour was the use of an unique road map constructed during a preliminary trip over the route, which contained comments on every portion of the road, with criticisms as to construction, material and engineering.

Each evening was devoted to meetings, conferences and entertainments, and the final session was held at Charlotte after the trip had been completed. A general discussion of conditions as revealed on the tour was the feature of the last meeting.

Plainfield Club's Second Climb

Johnston's Drive on Watchung Mountain will be the scene of the second annual hill climb of the Plainfield (N. J.) Automobile Club, Saturday, July 9. A program of eight interesting events has been arranged. Five of them are under "B" classification, according to piston displacement; one is for small cars selling under $800; another is a free-for-all of the widest latitude, and the final race is for New Jersey residents, cars to be driven by amateurs.

The hill is 3,996 feet in length and rises 300.5 ft. with a good imitation of a hairpin turn. The average grade is 7.52 per cent. and the going is of a character to test the capabilities of the best cars on the market.

Cups and medals will be awarded, respectively, to the first and second in each of the events, except for the small car event, in which there is only one prize offered. The entry box will remain open until midnight of July 4. W. R. Townsend, Plainfield, N. J., is secretary of the club.

Nashville News of the Automobile

NASHVILLE, July 27—The newly organized automobile club at Nashville has completed plans for its initial run on July 4 and about thirty cars have entered, with prospects that twice that number will take part. The route goes through Shelbyville, Fayetteville, Petersburg, Lewisburg, Culleeka, Columbia, Franklin. and back to Nashville, a distance of 130 miles.

Robert Rhea left Nashville on June 20 in his E. M. F. thirty for a trip of 2,000 miles. Accompanied by Edward Walsh, he is on his way to Colorado Springs, via St. Louis and Kansas City.

Through the influence of Nashville autoists a considerable amount of oiling of roads is being done around Nashville. Several of the leading pikes have been oiled for several miles. The Harding road has just been prepared for six miles.

Nashville and Memphis automobilists have taken up in a vigorous way a project for a great public road or boulevard from Nashville to Memphis, a distance of about 283 miles. The only way the trip can be made now is over the route followed by the Glidden tour through North Alabama. Of the 283 miles, 123 miles is already good road and 26 miles is being built, leaving 134 miles to be arranged for.

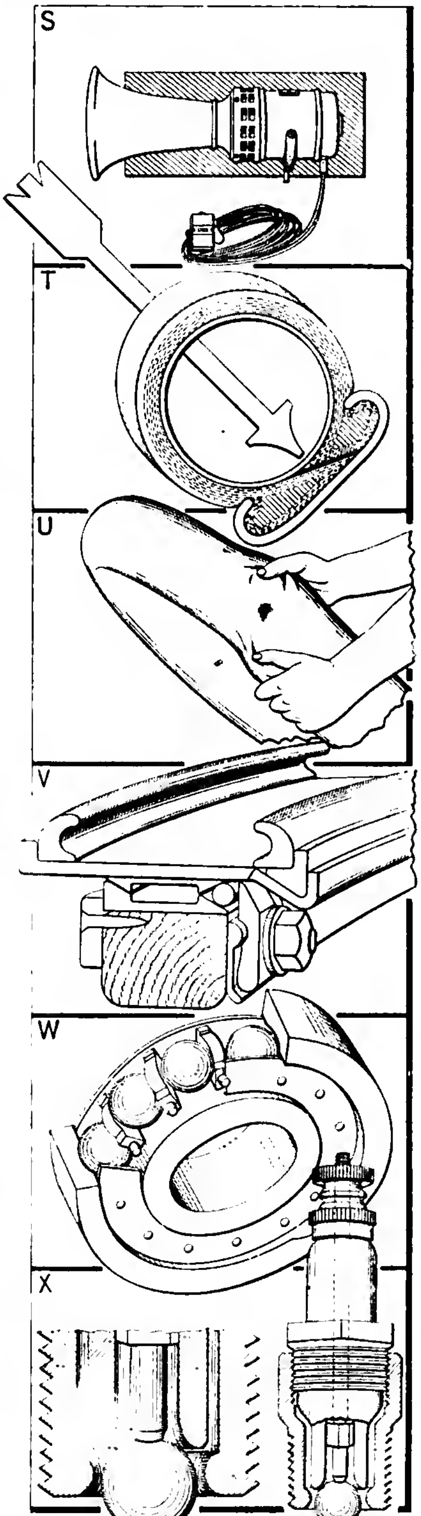
Seen in the Show Window

IN the SirenO (S), which is manufactured by the company of the same name, with offices at 1508 Taylor Building, New York City, the automobile public has a warning signal which, while powerful and far-reaching, in accord with the demands of present-day traffic conditions on street and road, is yet of a sufficient mellifluous and pleasing note as not to jar the sensibilities of the delicately nurtured. It may be had in eight styles and sizes, suitable for the smallest runabout or the largest touring car.

TIRES are conceded to be the most valuable portion of the make-up of the automobile. Tire trouble means time loss. Any device which will minimize these deficiencies should be welcomed. The Stein Laplock Tire (T), which is made by the Stein Double-Cushion Tire Company, of Akron, Ohio, has many points of excellence, which should recommend it to the motorist. Among them are the facts that the laplock scheme does away with the use of bolts or lugs, and that the solid base precludes pinching, chafing or rotting. The gain in durability and mileage, which is one advantage of a perfectly round inner tube, is apparent, besides which this tire is so made that all the air-space is beyond the line of the rim. Besides a distributing branch at 1864 Broadway, New York City, the company is represented by agents in all the larger cities of the country.

TO permanently repair a blow-out or puncture in the tube or casing of a tire in a quarter of an hour, without heating or vulcanizing, and at the cost of but ten cents, means progress. Yet that is the claim advanced for Tire-Doh (U), which has been placed upon the market by the Atlas Auto Supply Company, 26 East Adams street, Chicago, Ill. The process is simple: Clean around the puncture with gasoline, apply some of the cement, allowing it to dry 5 to 10 minutes, then knead a little of the "doh" into the hole and around the edges. The outfit consists of a can of the "doh," one of the cement and one inside casing patch for serious blowouts.

MANY an automobilist who contemplates a different tire equipment for his car frequently abandons the idea when he finds that the tire which he prefers will not fit the rims. This difficulty seems to have been met by the Universal Rim (V), manufactured by the United Rim Company, of Akron, Ohio. This rim has been so named because it will fit all makes of tires, and carries with it the demonstrable feature in its simplest and best form. A car furnished with these rims may be shod with any of the well-known tires, without the extra expense and inconvenience of changing any part of the rim equipment.



S—The Powerful "SirenO" Auto Signal

T—Boltless and Lugless Stein Laplock Tire

U—"Tire-Doh," a Handy Quick Repair Material

V—Universal Rim, Adapted to Any Make of Tire

W—The Schafer Anti-Friction Radial Ball Bearing

X—Ball Multi-Spark Plug, Claimed to be Sootless

EASE of running is a desideratum in the make-up of a car which is not lost sight of by either maker or purchaser. Ball bearings are a means to this end, and not a few American makers, after a thorough search for the best, have adopted the Schafer Radial Bearings (W), of which Barthel, Daly & Miller, 42 Broadway, New York City, are sole importers. The friction, with the use of these bearings, has been estimated to be less than one-eighth of one per cent. of the total load carried. Unlike plain journals, the friction at starting is no higher than when running. Each bearing is handled on a complete unit that never need be taken apart and whose parts mutually retain one another.

THE spark plug problem, which is now being given an unusual amount of scrutiny, is being solved by widely varying methods, and the Multi Type (X) is one which is attracting the notice of users, due to the form of the central electrode, which terminates in a sphere, and affords a plurality of paths for the spark, so that if carbon collects at some one point the spark diverts, finding a new path between cleaner surfaces, and it is claimed for this type of plug that it will not soot up. It is made by the Ball Multi-Spark Plug Company, 917 Hennepin avenue, Minneapolis, Minn.

MANY autoists prefer to spend their vacation up in the mountains, or at some point remote from the congested centers, and one way of accomplishing all there is to be had by way of enjoyment, and the recuperation of jaded nerves, is to take the automobile along and pitch the camp in the woods. A couple of portable buildings, one to serve as the habitation and the other as a garage, renders the camp immune from the ills of a week of rainy weather, affords a wind and weatherproof house to live in, and a locked-up place for the automobile against the machinations of the occasional rover, who, like the magpie, has a penchant for everything that shines, if it is not too heavy to give him a quota of labor in the process of carrying the booty away. The Springfield Portable House Company, 412 Allen street, Springfield, Mass., offers a wide variety of portable houses from which to select the types which will accord with the requirements of the respective adventurers. The portable building idea is not a great tax upon the pocketbook of the autoist.

SPECIAL NOTICES

Advertisements inserted under this heading at 20 cents per line; about 7 words make a line. Remittance should accompany copy. Replies forwarded if postage is furnished.

Cars for Sale

A BARGAIN—Must sacrifice my 1910 Simplo runabout for cash; run 150 miles; guaranteed. Henry Christensen, Clifton, Ill.

AMERICAN ROADSTER, price cheap, in A-1 condition; bargain for some one. Address G. J. V., Box 1312, Providence, R. I.

A NEW 1909 Palmer & Singer Landaulet, cost $3,700; fully equipped; 30 horse; $2,000 for quick sale. Sherwood, 186 William St., New York.

A NEW DEMOT CAR, the ideal runabout; top; wind shield; all accessories; cost over $650; sell reasonable. Address, "Demonstration," care The Automobile.

A FEW BARGAINS left which we will close out immediately: 1909 Pope-Hartford; 1907 Pierce-Arrow 28-32; 1907 Oldsmobile; 1907 Winton touring car; 1906 Pierce-Arrow with delivery body; 1907 Mitchell runabout; also some seven-passenger cars, just the thing for livery. E. R. Thomas Motor Co., 1200 Niagara St., Buffalo, N. Y.

APPERSON JACKRABBIT—55 h.p.; list price $4,250; purchased April, 1908; driven less than 6,000 miles; absolutely A-1 condition excepting rear tires; four bucket seats with extra rumble seat. Great bargain for driver who wants car of unquestioned mechanical superiority, easy control and great speed. Can be seen at 248 Upper Mountain Ave., Upper Montclair, N. J. Will accept $1,500 spot cash—no less. No agents. Address "A. H. Lamborn," 106 Wall St., New York.

AUTOCAR, 5-passenger, 4-cylinder touring car; '07 model, new top, painting and overhauling; price $750, or will exchange for smaller car, Stanley Steamer preferred. John Robinson, Mt. Sterling, Ky.

AUTOMOBILE BARGAIN—Must sell at once, 4-cylinder, 5-passenger, 30-horse-power; like new; no dealers. Address P. O. Box 10, Lodi, N. J.

AUTOMOBILE BUS—An excellent machine for hotel work or short hauls; seats 14 people; solid rubber tires; car new last July and is in perfect condition; $1600 buys it or will trade for touring car. W. E. Barbour, Greensburg, Pa.

AUTOMOBILE BARGAINS!! Special!—We recommend the following cars now on our sales floors and ready for immediate delivery as especially good opportunities for any buyer desiring to secure a fine high-grade used car of standard make at a strikingly low price. Peerless 1909 touring, Matheson 6-cyl. brand new, Pierce 6-cyl. touring, Packard 1908 close coupled, Oldsmobile 5 passenger, Chalmers 40 H. P. roadster, Buick type 10 double rumble, Regal touring, Autocar, Ford, Reo. Automobiles Bought, Sold and Exchanged. We are the largest dealers in the world—new and second-hand cars. No matter what car you are looking for we are sure to have it at the price you want to pay. Examine our large stock, over 300 cars to select from. Fine values at any price from $150 up. Send for our Bargain Bulletin. All cars on our sales floors are in finest condition, guaranteed to be exactly as represented. Times Square Auto Co., 5 Big Houses: New York, 215-17 West 48th Street; Philadelphia, 238-40 N. Broad St.; Chicago, 1332-4 Michigan Ave.; St. Louis, Cor. Pine and 18th Sts.; Kansas City, 1701-3 Main St.

AUTOMOBILES BOUGHT AND SOLD. Twentieth Century Automobile Co. 244-250 W. 49th St., New York.

A 7-PASSENGER Welch touring car, also one White Steamer runabout; both in perfect condition. Beckwith Bros., 119 Lafayette St., Schenectady, N. Y.

A 60-HORSEPOWER, 7-passenger Thomas touring car, 1908 model; fully equipped. Has just been overhauled and repainted. The New Departure Mfg. Co., Bristol, Conn.

A 1910 PALMER-SINGER, 6-60, 5-passenger, perfect shape; cost $4,100; highest cash offer. A. L. Sheridan, La Fayette, Ind.

A 1909 BRUSH Runabout for sale. Fine condition. Run as a demonstrating car seven months. Fully equipped, top, lamps, etc. Reason for selling, must buy 1910 demonstrator. Andrew G. Orear, Room 9, Elvira Bldg., Columbia, Mo.

BUICK, 1909, toy tonneau. Model 10; top; perfect; no dealers. Dr. Boynton, Mt. Vernon, N. Y.

BUICK 1909, Model 10; toy tonneau, top, speedometer, extra tire, chains, etc.; run only 2100 miles; $800 cash. W. L. Gray, care Garage, 360 Cumberland St., Brooklyn, N. Y.

CHEAP, 1904 Winton 2-cylinder, 24 H. P., roadster body, 32x4-in. wheels; needs but little repair; any reasonable offer above $175.00 takes it. Cheap: 1 set solid tire wheels, 32-in. x 2½-in. tires, $50.00; also 1 detachable tonneau body, all painted ready for upholstering, $10.00; 1 set 28x3½-in. Goodrich casings, new, slightly shopworn, $20.00 for the pair. E. E. Ritter, Milton, Pa.

DOLSON 40 H. P., five-passenger; just overhauled; sell or exchange for roadster. W. J. Weber, 12 Warren St., New York.

FIRST REASONABLE OFFER takes four-cylinder Peerless touring car; top and full equipment; 137-inch wheel base; just repainted and overhauled. G. H. Curtiss, Hammondsport, N. Y.

FIVE-PASSENGER 1907 Autocar, in good running order. Apply F. L. Tripp, Central Village, Mass.

FOR QUICK SALE—I offer at a low price my 5-passenger Stevens-Duryea touring car, fully equipped; looks and runs like new. Write me for photo and detailed description. M., 105 Chestnut St., Mt. Carmel, Ill.

FOR SALE—1909 6-cylinder Chadwick, rebuilt and painted; practically equal to new; low price. W. N. Wilbur, 237 N. Third St., Philadelphia, Pa.

FORD ROADSTER, top, lamps, etc.; rumble seat; perfect condition; $425. 63 Willet St., Jamaica, L. I., N. Y.

GLIDE '08, 45-hp., 7-passenger. Guarantee perfect; thoroughly overhauled; fully equipped. Cost $3,000. Take $750. L. Cooke, 25 Broad St., N. Y.

HUPMOBILE 1910, perfect condition. Low price to quick buyer. Frederick Smith, 1777 Broadway, New York.

I HAVE A TOURING CAR which I wish to dispose of, and will sacrifice for $450. Full description upon request. C. Franz, 615 West 115th St., New York City.

LOCOMOBILE Steam Runabout, good order. Price, $90. Wm. D. Goold, Albany, N. Y.

MARTINI seven-passenger touring; cost $8,400 to import; has traveled 11,000 miles; freshly overhauled; no dealers. Geo. Loomis, Long Island Automobile Club, Brooklyn, N. Y.

MAXWELL '08, 30-h.p. touring, newly painted, nicely equipped, going cheap for cash. Lewis Schantz, 10 Van Wagenen Ave., Jersey City, N. J.

MAXWELL SEATS, Double rumble or Surrey, for Model "Q"............$45.00
Single Rumble 22.50
Double Rumble, or Surrey, for Model "AA" 35.00
Single Rumble 30.00
Absolutely guaranteed to fit perfectly and to match finish and upholstery of car. Complete line of automobile accessories and specialties. Gibbes Mach. Co. Columbia, S. C.

MITCHELL—4-Cyl., 35 H.P., four-passenger roadster; good as new; fully equipped; will sell for one-third cash; balance monthly; full information and photograph on request. Geo. L. Forrest, 88 LaSalle St., Chicago.

MORA 1910 TORPEDO—Specially constructed aluminum body; tufted upholstering; practically new; just limbered up. Finest equipment, including demountable rims, $60 windshield, $60 speedometer, Gabriel horn, Sireno, mohair top, Prest-O-Lite tank, etc. Cost complete, $3,100. To close estate, will consider reasonable offer. Address Box 6, care The Automobile.

MUST SELL my seven-passenger White Steamer; fully equipped and guaranteed to be in perfect condition; would trade for good real estate. What have you? 106 Bank St., Ishpeming, Mich.

MUST BE SOLD—Berg touring car; in first-class order. Jas. A. Whitcher, Essex Falls, N. J.

NEW 1910 FOUR-CYLINDER REO touring car for sale, $1,150. Used only a short time as a demonstrator. Bright as new. In perfect condition. Not a scratch on it. Top, automatic windshield, Prest-O-Lite, trunk rack, tools and speedometer. This car is hardly worn smooth yet. Henley Eversole, Newman, Ill.

ONE 1909 STODDARD-DAYTON 45 H.P., with baby tonneau body; recently overhauled and newly painted. Car in excellent condition. Box 5012, care The Automobile.

ONE WHITE STEAMER, 4-passenger runabout, 1908 model; good as new. The New Departure Mfg. Co., Bristol, Conn.

ONE 1910 Model D Franklin, fully equippped; cost $3,000; guaranteed by maker till 1911; run less than 800 miles; $1,700. Apply to Edward A. Dauer, 167-9 Pine St., Providence, R. I.

PEERLESS 5-passenger, excellent condition; equipped with Firestone demountable rims, two extra rims, two extra casings never used, three new tubes, Klaxon horn, electric light, gas tank, speedometer, Eiseman magneto battery, mohair leather bound seat covers and dust hood; an elegant car; any one purchasing it will be highly pleased; any judge of automobile values will say it is worth the money—$1,500. Can be seen at garage, 5461 Lake Ave., Chicago. C. J. Prentiss.

PENNSYLVANIA, 1910, Toy Tonneau, fully equipped, Quimby body, perfect condition; cost, $2,700; sell for $1,750 net. Carl Helmetag, 1011 Chestnut St., Philadelphia, Pa.

PIERCE-ARROW "Big Six" 65 h.p., '08, 7-passenger, fully equipped, top, glass front, Gabriel horn, Warner clock and speedometer, Prest-O-Lite tank, air tank, extra tires and tubes, seat covers, and traveling bag; a bargain at $2750. Jas. F. Patton, 4609 Euclid Ave., Cleveland, O.

POPE-TOLEDO, 4-cylinder large car, complete, in first-class shape; all extras; price, $700; will exchange. L. M. Bames, 131 Main St., New Britain, Conn.

PREMIER THIRTY, Five-passenger touring car; top, windshield, Warner Speedometer; Prest-O-Lite tank, two extra casings; run only 6,000 miles, perfect condition; cash price, $1250. C. L. Woodbury, Burlington, Vt.

PRIVATE GENTLEMAN will sell reasonably 50-h.p. Roadster; good as new; new speedometer, cost $60; two tires, 34 x 4 tubes. Box 1513, care The Automobile.

RAMBLER, 22-horsepower, 5-passenger touring car, in fine running order. G. H. Wagner, Hastings-on-Hudson, N. Y.

REAL AUTOMOBILE VALUES—As selling prices depend upon expenses, we are in a position to offer the greatest value in New York; two blocks from Broadway means $30,000 annually saved in rent. Another strong feature is that we sell direct for owners, charging them 5 per cent. commission. This saves you the liberal profit demanded by dealers. Over 250 slightly used automobiles to select from. Prices $150 to $4,000. Nearly every make represented in the great stock here. Call or send for weekly bargain list. Manhattan Storage Co., 334-340 West 44th st., New York City.

REBUILT AMERICAN 3-ton truck, new Hartford tires; will do the work of a new one; bargain. Address "Rare Chance," care The Automobile.

REO, two-cylinder cars, all styles, all models, all prices; overhauled, repainted; strictly up to date; one of our specialties. C. & G. Auto Company, 62 West 43d St., New York.

RUNABOUT, fully overhauled; seats two or four; rare bargain, $150; one four-cyl. Ford runabout, $250; one single-cylinder buggy, $150; one two-cylinder Queens, $200; one four-cylinder Haynes, $700. F. J. English, Garage, 60th St. and New Utrecht Ave., Brooklyn, N. Y.

SEVEN-PASSENGER body, good condition with five-bow folding top; never been folded; with curtains never used. Ask for description and price. G. F. Ellis, Macon, Ga.

SEVEN-SEATED Stoddard-Dayton. Condition like new. J. F. Kellogg, Avon, N. Y.

STANLEY Model EX Car, first-class condition; new boilers, tires OK.; low price. Inquire O. & S. Mfg. Co., West Main St., Plainville, Conn.

TWO new modern thirty-passenger electric sightseeing cars with terraced seats and canopy top. Low price to quick buyer. Address "Electri," care The Automobile.

ROMAN AUTOMOBILE CO.
1740-42 Market St., Philadelphia, Pa.
1315 H. St., N. W., Washington, D. C.
High-grade, late model cars at remarkably low prices.

Specials at Philadelphia:

1910 Marion Roadster, very speedy.
1910 Buick Touring, brand new.
1909 Premier "40" Touring, like new.
1909 Mitchell "40" Touring, 7-passenger.
1909 Maxwell "30" Touring.
1909 Cadillac and Chalmers Roadsters.
1909 Baker Electric.

Washington Specials:

1910 Ford Roadster, double rumble seat.
Oldsmobile Touring, like new.
1908 Pope Toledo Touring, fine shape.
Cadillac Touring, fine condition.
Buick, Maxwell and Ford Runabouts, late models, $250 up.
150 others from $75 to $3,000.
Call or write for Bargain Sheets.

USED CAR BARGAINS. Among others we offer the following rare opportunities in standard makes of cars overhauled, remodeled, refinished and brought up to date.

Overland 1909, six-cyl. baby tonneau	$1,200
Thomas 1907 "60," seven-passenger..	1,200
Oldsmobile 1907 "40," double rumble roadster	850
De Dietrich 1906 "24," five-passenger or would make fine commercial car	850
Haynes 1908 "40" chassis, complete	750
Dolson 1907 "35," five-passenger......	550
Reo 1909, "22" roadster, four-passenger	575
Reo 1909, "10" runabout, two, four..	325
Reo 1907, "22" five-passenger........	450
Reo 1906, "22" five-passenger........	350

Used Car Department.
C. & G. Auto Company, Inc., 62 West 43d St., New York City, N. Y.

WANT TO BUY, SELL or exchange a car? The C. & G. Auto Company, of New York City, for yours! Look 'em up.

WAVERLY Electric Coupé, run two years; recently overhauled; new batteries; tires in good condition; original cost $2,100. Will sell for $650 cash. G. S. Eaton, 121 So. 7th St., Terre Haute, Ind.

WHITE STEAMER, 1906, five passenger, full equipment, excellent condition, many extras, tires good, $575. Demonstration and instruction by owner, 1675 50th St., Brooklyn, N. Y.

$250 WILL buy French runabout, guaranteed to be in perfect condition. Geo. W. Mathison, 256 E. Madison St., Chicago, Ill.

$1200 —Must sell my $4200 full seven-passenger Model G White Steamer, with Model K improvements; complete equipment and in perfect condition; top, curtains, dust cape, brass-mounted folding windshield, Warner speedometer, clock, five lamps and Presto tank, shock absorbers, trunk and carrier, extra rear shoe, case and rack, four extra inner tubes, extra pilot light, vaporizer and tools. Ready to go anywhere as is. This is a genuine bargain. Will send photo on request. Money refunded if not as represented. H. W. Shonnard, 17 Washington St., East Orange, N. J.

1908 MITCHELL Runabout, first-class order; good tires; $600. "C. K.," care The Automobile.

1908 —5-PASSENGER American $4,000 car for $1,000; '09 Model F 30 Chalmers-Detroit, double rumble roadster, $300 extras, $1,050. W. M. Lee, Athol, Mass.

1909 CHALMERS 30 Roadster, used but little, in fine condition. Cost, with equipment, $1,800. Price, $1,100. "M. M.," care The Automobile.

1910 WHITE gasoline automobile, in fine condition. Hanswirth, 164 Main St., East Orange, N. J.

1910 CHALMERS "30," Model "K," 4-cylinder touring car for sale; top, windshield and full equipment of best grade; Warner autometer, 2 new extra casings; color blue; run 1,100 miles; perfect condition; tires, 2 good, 2 fair; only reason for selling, have purchased Chalmers "40." Price $1,200. Photo and particulars or demonstration. J. Lonergan, 806 Chestnut St., St. Louis, Mo.

1910 SIX-CYLINDER, 60-h.p. Premier, 7-passenger touring car; run only 1,000 miles; completely equipped and in perfect condition; cost $3,750; will accept first check for $2,500. Chicago Motor Car Co., Michigan Ave. & 24th St., Chicago, Ill.

Cars Wanted

A RUNABOUT machine wanted by an architect and builder, in exchange for services in either line. "Builder," Room 30, 118 Market St., Newark, N. J.

AUTOMOBILES that have been damaged or wrecked will be purchased by me. Gilmer, 146 West 56th St., New York City.

DESIRABLE free and clear Jersey lots to exchange for high-grade five or seven-passenger touring car; prime condition. Room 1756, 50 Church St., New York City.

EXCHANGE a farm near market for five-passenger automobile of late model; remainder on easy terms if desired. Write for particulars. B. G. Palmer, Medway, N. Y.

FOR EXCHANGE—Will exchange U. S. Patent for automobile. Inventor has not funds to have same manufactured. If interested, address D. W. Cherry, Donalsonville, Ga.

FOR SALE or exchange for automobile, tension device for wool dresser spools, patented. 6 Fairview St., Keene, N. H.

FOR TRADE—Stock in the Colorado Industrial Exposition Association for automobile; roadster preferred. Address Box 227, Denver, Colo.

FOR UP-TO-DATE, good order touring car I will give 20,000 shares non-assessable gold mining stock that is liable to be worth within 18 months $1.00 per share. C. J. Greene, Nowata, Okla.

I HAVE good paying real estate in Newark and suburbs; will exchange for good make automobiles not older than 1907. Particulars, Post Office Box 441, Newark, N. J.

I WILL GIVE lot of land, 5c. fare, or house in Winthrop, for touring car. S. A. Cash, 1462 Washington St., Boston, Mass.

I WANT good touring car, carry my family of seven; will exchange my interest in real estate in Boston, valued $3,500; pays me 10 per cent. A. T. Gibson, 35 Court St., Boston, Mass.

SECOND-HAND AUTOMOBILE wanted; will exchange $1,000 interest prosperous wholesale business on State St. Geo. G. Power, 252 Dudley St., Roxbury, Mass.

TWO free and clear Jersey lots worth $350 for runabout. Will add cash. Box 5015, care The Automobile.

WANT—Station wagon (gasoline) in trade for fine building lot. Address "Hord," 334 5th Ave., New York.

WANTED—1909 or 1910 Packard, fully equipped. Box 5002, care The Automobile.

WILL consider a high-grade automobile on excellent quarter of Kansas land. John Brown, 628 New York Life Bldg., Kansas City, Mo.

$200 CASH and rich looking two-cylinder Rambler touring for good four-cylinder, late model. Address "P. S.," care The Automobile.

Parts and Accessories

FOR SALE

BUICK MODEL NO. 10 OWNERS—If you would have better control, write for circular descriptive of the F.-B. Automatic Clutch Releaser. Engine brake and low speed pedals throw out the high. The F.-B. Company, 1211 Lady St., Columbia, S. C.

BUICK—F. B. Hoadley, Waterbury, Conn., makes a tool designed especially and guaranteed to easily remove key holding valve stem, in Buick autos. Price $2.00 prepaid.

DO YOU WANT to remodel the appearance of your car? State model and proposed change. Ask for catalogue S of seats, bodies, fenders, etc. A. R. Co., 1307 Wabash Ave., Chicago, Ill.

DRAGON REPAIR PARTS—We manufacture and keep on hand all repair parts for Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

EXCEPTIONAL BARGAINS—Locking steering gears, 16-inch wheel, control on top, $10. Rack and pinion gears, $8. Steering wheels, 16 inches diameter, $2.50; 18 inches, $3; 14 inches, $2. Ball bearing front axles, $10 each. Chain drive axle, 30-tooth sprocket, $25; 52-tooth sprocket, $2.50; brake drum to fit, $3. Brass bound windshield, $17, wood shield, brass bound, $9. Brass hood radiators, $23. Folding hoods, 27½ inches long, with vents, $3; 42 inches long, $7. Fawn River magneto, with coil, $30. 2-cyl. A. C. 4x4 opposed motor mechanical valves, $62; type N, $58; trans. for same, $15. 3-cyl. A. C. 9-h.p. Continental motor, $80. 4-cyl. 4¼-4¾ A. C., $100. 14-h.p. A. C. motor, with 4-feed oiler, timer and carb., $95. 5x5½ 2-cyl. A. C. upright, $70. 2-h.p. marine 2-cyl. motor, $28. 3-speed sliding gear, chain-drive trans., 25-h.p., $20. 1-cyl. Olds 10-h.p., $40; 5x5 opposed W. C., $60; 4½x5, $45; 5¼x4½, A1 condition, $90. New 5x4, 4¼x5 A. C. opposed, $90. Cadillac motor and trans., $42. Air cooled fronts, $7; with 42-inch hood, $12. Thomas chain-drive trans. and levers, $60. Orient rear axles, $7. 5-pass. body, 33½x84, $70. Fenders, with skirts for large car, $8; for small car, with mud aprons, $10 per set. 28x3 clincher wheels, $11 per set; 30x3, $14; 34x3½, $18; 34x4½, $18. 36x4 Goodyear rims, $22. 28x2½ wheels, single-tube rim, $8 per set. Buggy bodies, 33x68 inches, $7. Front axle yokes and knuckles, some machined, $1 each. 32x3 wheels, single-tube tires, $30. Adjustable spring blocks, 3-inch axle, 2-inch spring, $2. 1-inch Buffalo carb., $3.50. Pressed steel frames, 33½x123 inches, with subframe, $15; unassembled, 34x135, $12. 4 inches deep, 144 inches long offset frames, $15. Monarch frames, assembled, 11 feet 8 inches, $20. Upholstered seats, 43 inches wide, $12. 6-gal. gasoline tanks, 50c each. 25-h.p. new Warner differential gears, $12; drive gears to fit, per set, $12. 100 truck hubs, suitable for 2 to 5-ton trucks, $4 to $5 each. 34 4½ clincher rims, $1 each. ½ elliptic springs, 2½x45x7 leaf, $2.50; nearly all other sizes, 39 4½x5¼ British-Am. 4-cyl. motors, oiler, timer and pump, $300. 30 sets of Timken axles, $150 per set. 20 40-h.p. Honeycomb radiators, with hoods, $40. 75 mahogany dashes, $3. High wheels, buggies complete, $350. Write before buying elsewhere. Get our No. 80 bargain sheet. We can save you money. Auto Parts Co., 517 W. Jackson Blvd., Chicago.

FOR SALE—Bodies made for Rider-Lewis 1910 cars; trimmed; some painted. R. J. Irvin Mfg. Co., Indianapolis, Ind.

FOR SALE—No. 10 Lingle power hammer, used less than 10 days, good as new; will sell cheap. If interested, send for complete information. Milton Mfg. Co., Milton, Pa.

FORD "T" OWNERS, get our catalogue of specialties for your car. It means $ $ $ $ for you. Oil gauges, electric light outfits, elevated timer attachments. Send dealer's name. Auto Parts Co., Providence, R. I.

FIVE REAR axles and transmissions a unit, will carry up to 25 horsepower; never been used and of this year's make. Vanderwater & Co., Elizabeth, N. J.

INCREASE the power of your engine and make it run like a six. The mixer will do it. Only $1.00 prepaid. Money refunded if not as represented. H. L. Noll, Lancaster, O.

LATHE and 7-horsepower gasoline engine both in first-class condition. Will sell either or both very cheap. Kearney Auto Co., Kearney, Neb.

MONOPLEX ELECTRIC HORN, new, $16. Stromberg 1-inch Carburetor, $10. Schebler 1-inch, $6.00. Address "B. B.," care The Automobile.

ONE SECOND-HAND AUTOCAR body, detachable tonneau; one new Zimmerman four-cylinder timer; one new 1-8 Roberts Sight feed lubricator for steam engine.—J. E. Morton, Palmyra, N. J.

RADIATORS, hoods, mudguards, metal dishes, gasoline and water tanks. If building or remodeling a car, it will pay you to write us, as we lead in this line. Auto Sheet Metal Works, 2230 Michigan Ave., Chicago, Ill.

TOPS—Until further notice, runabout tops, $20; touring car tops, $35. C. G. Meyer & Son, Tiffin, Ohio.

TRY CRAIG'S MUFFLER BLACK; will not burn off or scale. Craig, Bridesburg, Pa.

TWO NEW 150-gal. Bowser Gasoline Tanks. Apply Chicago Telephone Co., care I. W. Hull, 1521 W. Harrison St., Chicago, Ill.

45-H. P., 4-cylinder, water-cooled engine complete, $325. Pressed steel frame, $22.50. Complete set front and rear shaft drive axles, hubs, bearings, etc., $110. Front axles, complete, bearings, hubs, steering knuckles, rods, $22.50. McCord force-feed, 4-feed oiler, $12. 4-cylinder Autocoil, $12. New radiators and hoods, 22-25 H. P., $22.50. Automobile Appliance Co., 1714 Michigan Ave., Chicago, Ill.

$75 TAKES Chalmers tourabout body complete, with top; like new. 300 W. 69th St., Chicago, Ill. 'Phone Went, 616.

Parts and Accessories

WANTED

WANTED—Tonneau for '09 Reo; must be in good condition; state price. Reo Garage Co., Albia, Ia.

WANTED—Name and address of company that can produce gasoline motors in lots of one to five hundred. Motors to be built according to plans and specifications furnished by buyer. Workmanship must be of a high degree of excellence. One thousand motors a year needed but have capacity at present for only five hundred. No concern without experience in this line need answer this ad. Apply to Charles Kemke, 2206 Fifth Ave., New York City.

WANTED—Set quick detachable rims, 34 x 4½. Name price and make. P. O. Box 283, Wilkesbarre, Pa.

WANTED—A well-designed chassis including axles, transmission, frame, etc. (without engine) suitable for testing out a 25 horse power experimental motor. Address Box 3 care The Automobile.

Situations Wanted

AMERICAN, expert automobilist, 10 years' varied agency experience, speaks French and German, wants position with reliable concern desiring European business, or will act as courier chauffeur. C. S. Johnston, 37 Ave. Marceau, Paris, France.

BUYER OR ASSISTANT, for shop supplies, machinery, etc. Details at interview. Address "Buyer," care The Automobile.

CHAUFFEUR—Situation wanted by a colored man in private family; write or call. Eric Jenkins, 1561 Gratiot St., St. Louis, Mo.

CHIEF engineer open for engagement. University graduate, 10 years' experience designing and constructing. Expert in pleasure and commercial cars, taxicabs, racers, etc. Dead sure success. Address G. B. L., care The Automobile.

COMMERCIAL CAR BUILDERS—Can you use the services of a first-class man who knows thoroughly the sales end of the Commercial Car Business? If interested, address "Commercial," care The Automobile.

EXPERIENCED chauffeur wants position; can do work on any gasoline car; can furnish reference. Address Jones Anderson, Canonsburg, Pa.

SITUATION WANTED—Licensed chauffeur wishes position; can operate and repair any gasoline car; sober and reliable; references. James E. Griswold, Chana, Ill.

WANTED—Position as foreman in trimming department of automobile or carriage company; 10 years' experience. Address Box 7, care The Automobile.

YOUNG MAN, at present manager retail automobile concern, would like a position in factory sales department; 5 years' experience; best references. Address Box 497, care The Automobile.

Help Wanted

AGENT WANTED—Calling on auto supply houses, garages and owners, to represent a manufacturer of a successful specialty. Liberal commission contract. Address Box 2, care The Automobile.

GENERAL foreman wanted for our Automobile Department to take charge of assembling, testing, inspecting and experimental automobile work. Only experienced men, thoroughly familiar with high-class work of this nature, need apply. Applicants must state clearly experience, former employers, references, age and full qualifications. H. H. Babcock Co., Watertown, N. Y.

SELLING ABILITY—If you have demonstrated ability to sell automobiles ranging in price from $900 to $2,000 and have had at least two years' experience in this work, there is an opportunity for you to become connected with a large Detroit Motor Car Manufacturer who is looking for just these kind of men. There are two chances for two good men. Only applications from experienced men will be considered. All replies considered strictly confidential. Address "Box 4," The Automobile.

WANTED—First-class mechanic and trouble finder. Experienced in all kinds of automobiles. Permanent position for right man. Apply Benson's Garage, 357 No. Craig St., Pittsburgh, Pa.

WANTED—Commission salesman, calling on automobile accessories trade, to handle a high grade specialty as a side line; liberal proposition. Address Box 5, care The Automobile.

WANTED—We want to establish American agencies for Hotchkiss automobiles in large territories. Representatives must have wide experience and A-1 standing. Direct replies to Hotchkiss Import Company, 20 West 60th St., New York City.

WANTED—Salesmen, high-class, to sell "Sta-Rite" Ignition plugs. Leaders for eight years. The R. E. Hardy Co., 1735 Michigan Ave., Chicago.

Insurance

TIRE, THEFT, liability, collision, accident, property damaged and transportation fully covered; lowest rate. Colman Company, 165 Broadway, New York. 'Phone, Cortlandt 2409.

Repairing

ALUMINUM, cast-iron, steel welded and amalgamated to perfection; nothing too difficult; no soldering, patching or warping; gear cases and cylinders a specialty; only practical process; work guaranteed. "Futterman's Welding System," 798 10th Ave., N. Y.

ARE YOU disgusted with welding? If so, send to us your broken cylinders, motor-casing, gear boxes, crankshafts, etc. We repair any metal, regardless of shape or form—like new. Our reputation is your guarantee. Guarantee Welding Works, 355-59 West 42d St., New York.

EXHAUSTED dry batteries can be renewed for one cent each; sample scientific instructions, 25 cents; satisfaction guaranteed. Dirigo Company, Bath, Me.

MAGNETOS—Bought, sold, exchanged, repaired, rebuilt, rewound and remagnetized; spark coils repaired and for sale; platinum points for all makes of magnetos and coils; send for bargain lists. Robinson-Dubucs, 1777 Broadway, New York, Rooms 229-231.

SEND US BROKEN CYLINDERS, crankcases, etc., to be repaired by autogenous welding. Quicker and much cheaper than ordering replacement parts. No charge unless weld is successful. Estimates and references given. Remember we repair any broken metal parts without solder, pressure or brazing. Try us. Waterbury Welding Company, Waterbury, Conn.

TIRES REPAIRED—Automobile owners, do you want your tires repaired or re-covered by the people who know how? Give us a trial and be convinced. Inner tubes vulcanized at short notice. Jungkind & Vogler, 158 Chambers St., New York City. Telephone, 3386 Cortlandt.

Auto Schools

AUTOMOBILE INSTRUCTION, individual road work and small group classes. Day and evening. Arrangements for out-of-town men. Booklet on request. West Side Y. M. C. A. Automobile School, 310 West 57th St., New York City. Tel. 3800 Columbus.

OLDEST SCHOOL, twice the number of hours of instruction for less money than other schools; most practical instructors. Endorsed by auto trade. Catalogues sent on request. New York School of Automobile Engineers, Inc., 148 West 56th St., New York.

STEWART AUTOMOBILE SCHOOL. Best equipped instruction plant in U. S. Thorough individual mechanical and driving courses. Only up-to-date cars used. Arrangements made for out-of-town students. Special courses for ladies. Send for booklet "A." The Stewart Automobile Academy, 231 West 54th St., New York City.

For Sale or For Rent

FOR SALE—Modern manufacturing plant 55 miles from New York City, with excellent railroad facilities and large frontage on the Hudson River. For particulars address Dahl, 78 Wall St., New York City.

I HAVE a plant suitable for the manufacture of automobile or other purposes, with 45,000 ft. of floor space. Steam heated; electric power can be used. Large grounds on main line of Wabash R. R., an ideal factory site. Description and photograph will be furnished on application. This plant and grounds will be given to good parties with capital and an assured business. We may add cost of moving. No publicity given any correspondence. J. M. Harter, Wabash, Ind.

SOLID brick block, worth $6,000, used for machine shop and foundry, with $1,500 worth of machinery and tools; will sell the whole thing for $3,500, on terms. Shops would make a fine garage; a splendid territory to sell rebuilt autos. For further particulars address H. P. Madson, New London, Wis.

Business Opportunities

HAVE patent on wind shield that houses in dash; superb feature for intending manufacturer of cars with chassis not yet decided upon; sale or royalty. Qui Vive, care The Automobile.

MANUFACTURERS—ATTENTION—Starter successfully in use on motor car; automatic action; operated by foot lever; applicable to any gas engine for automobile, motor boat or stationary work; compact; demonstration given to interested manufacturers. Licenses issued on responsible terms. J. W. Tudor, 35 Congress St., Boston, Mass.

PATENT FOR SALE—Portable ignition trouble finder, cheap to manufacture. Every automobile will have one. Fully covered by U. S. patent. Box 210, care The Automobile.

(Special Notices continued on page 62.)

(Continued from page 59.)

Motor Boats, Etc.

FINE AUXILIARY Down East Catboat, 5 h. p. Bridgeport motor, bargain. P. O. Box 776, New Haven, Conn.

FOR SALE—25-foot Catboat with 8 h.p. engine; 2 years old. Herbert Bassett, Chathamport, Mass.

FOR SALE AT $1,200, or exchange for Renault car, cabin launch, 39 ft. long, 10 ft. beam, twin propellers; full inventory; ready for cruising; cost $3,000. Address Nock Auto Co., Providence, R. I.

FOR SALE OR EXCHANGE—Speed boat (21 miles) 27 ft. 6 in. by 4 ft. 2 in. beams; 16-20 h.p. Rochester engine; reverse gears; mahogany streak deck and combing spray head; cost over $1650; like new; perfect condition every way; sell at bargain or trade for good raceboat or runabout car. P. O. Box 1487, Lee, Mass.

29x8 GLASS CABIN, 11 horse engine and clutch; all new; cheap; can be seen at Hegaman's Dock, Fort Hamilton. E. Bell, 9214 3d Ave., Brooklyn, N. Y.

50-FT. RAISED DECK CRUISER for sale or to charter. Particulars, address P. Klein, 260 First Ave., Mount Vernon, N. Y.

Motor Cycles, Etc.

FOR SALE—Reading Standard, twin cylinder motorcycle. 335 North St., Rochester, N. Y. Will ship C.O.D. anywhere.

WILL EXCHANGE a complete electrical engineering course in I. C. S. for an up-to-date motorcycle. Address "Engineer," 76 Westland Ave., Roxbury, Mass.

Miscellaneous

AUTOMOBILES can find (dead) storage in clean building (124 East 13th St.), at $5 to $10 per month, according to size. Van Tassel & Kearney, 130 East 13th St., New York.

DOES your gasoline motor run smoothly? If not, send 10c. postage for 66-page textbook on "Carbureters and Engine Troubles." Breeze Carbureter Co., Newark, N. J.

IF YOUR GASOLINE MOTOR does not run smoothly, send 10 cents postage for 66-page text book on "Engine Troubles." Gives remedies for every motor trouble. Breeze Carburetors, Newark, N. J.

GUN METAL YOUR BRASS—Arsenal Liquid Gun Metal is easily applied and makes a lasting gun metal enamel on brass. Can be removed at any time without injury to lamps or radiators. The only article of proven merit of its kind. If not at your dealer's, we will forward a can prepaid on receipt of $1.00. Arsenal Varnish Co., Rock Island, Ill. (Motor Car Dept.)

METALLIC RAILROAD tie rail fastener and splice bar for sale, or trade for a good automobile and part cash. H. C. Stickel, P. O. Box 111, Star Junction, Pa.

Capital Stock For Sale

We have a large automobile manufacturing business but need more capital to take advantage of the extraordinary opportunities offered.

Therefore, we have decided to increase our capital stock, in order to take advantage of this new business. Here is an opportunity to put some money into the fastest growing industry in America, and one that is destined to become the largest of all industries. We are offering our stock in blocks of from $500.00 to $10,000.00.

If you are interested and will write the box number given below, we will take the matter up with you in detail. This notice will appear only twice.

Address Box 5050, care The Automobile

SIGHT-SEEING CARS FOR SALE

Three Sixteen-Passenger Grabowsky Sight-Seeing Cars, Covered. Cars used four months. Have just been completely overhauled and put in first class condition. New 45 horse power engine, new transmissions, new differential, and new rear tires installed on each car, making practically new cars. Will sell at reasonable price for cash. Address

PIONEER MOTOR CO., Marquette, Mich.

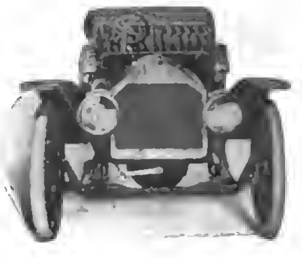
A Real Automobile
FOR $1,000

Model 38 of the Overland—with 25 horsepower and a 102-inch wheel base—sells for $1,000, lamps and magneto included. It is a better car than the $1,250 Overland last year. Our contracts from dealers call for 12,000 cars of Model 38 alone. We are turning out 80 per day. Because of this output we are giving more for the money than any other car ever gave.

Write for our catalog G-3; also for a copy of "The Wonderful Overland Story."

THE WILLYS-OVERLAND CO., TOLEDO OHIO
(14)

"The Car Ahead"
Pilot



4 Cyl. 35 H.P. Fully Equipped
TOURING CAR - $2,250
ROADSTER - - 2,000

Send for Detailed Description

PILOT MOTOR CAR COMPANY RICHMOND INDIANA

Franklin Automobiles

Franklin air cooling, Franklin light weight, Franklin resiliency, Franklin tire equipment unite in producing automobile results which today the exacting buyer demands.

H. H. FRANKLIN MANUFACTURING COMPANY
SYRACUSE, N. Y.
Licensed under Selden Patent

Austin
SIX CYLINDER CARS

Model 45	Model 50	Model 60
45-60 H. P., $3000	50-70 H. P., $4500	90-90 H. P., $6000

SEND FOR CATALOG

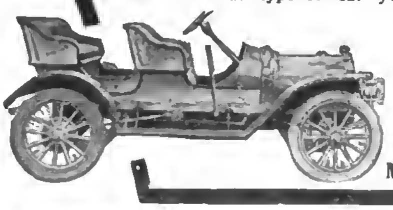
AUSTIN AUTOMOBILE CO.
GRAND RAPIDS, MICHIGAN

THE MAYTAG
Formerly THE MASON

Climbs the hills the other fellows go 'round and plows through roads of snow, mud and sand that are entirely out of the question for other cars to travel. Maytags are distinguished not only for great power, but ease of control, easy riding qualities and low cost of up-keep.

Complete Line—Six Models

Maytags offer the widest choice in style, power and price. No matter what type of car you have in mind don't decide until you know the Maytags. The Best Proposition of 1910 For Dealers.



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Maytag-Mason Motor Co.
Maytag Station, Waterloo, Iowa

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Everything about the Locomobile is in the Locomobile Book, which will be mailed on request to any address

"30" Shaft Drive "40" Chain Drive

The Locomobile Co. of America

New York Bridgeport, Conn. Boston
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"The Easiest Riding Car In The World"

Stock "Thirty-two" going 190 miles in 190 minutes without a stop. Price, $2650. Licensed under Selden patent. Write for catalog.

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Progressive dealers wanted in open territory. Get the benefit of our demonstrators who have started out to cover the country. *Write to-day*

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The Gabriel Horn is operated by a foot pedal, your hands never leave the steering wheel.

Its full rich notes can be heard for blocks on a busy street and for miles on a country road. It warns effectively without frightening.

THE GABRIEL TRUMPET HORN is the ideal horn for touring. Its Bugle calls echoing along country roads revive memories of the good old coaching days.

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suitable for use in connection with Automobile Garages, Pneumatic Water Plants, Gas Engine Starting Outfits, or anything of that nature. Can be provided in the most simple and satisfactory manner by the user of one of these outfits. The Jacobson Air Compressor is the pioneer among automobile garage Compressed Air Appliances. We make a specialty of Air Compressors—small ones at small prices. Write for Bulletin.

Compressors carried in stock by all the leading Automobile Supply Houses in the United States.

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give you the utmost of quality, comfort and service. They alone possess the patented "Rist-Fit." Summer styles have the ventilated back which we originated.

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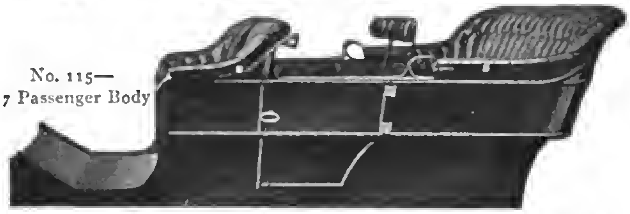
Runabout, Touring, Coupe, Limousine and Landaulet.



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7 Passenger Body

Unequalled facilities for executing orders of any size; in the white or painted and trimmed ready to mount.

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Protect Car and Passengers

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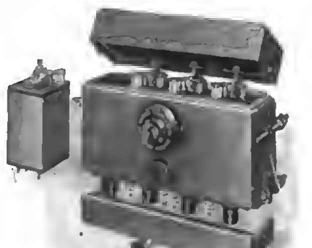
"H-C" SPARK COILS



are equipped with a combined throw over and polarity switch, which prevents building up on the platinum vibrator points. Also fitted with a safety spark gap within a glass tube which does away with the possibility of shock, and furnishes a reliable means of testing each unit.

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BEST BY TEST **HARRIS** EVERY DROP COUNTS

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There is nothing to doubt about their **Quality, Efficiency and Economy.** Their freedom from deposit on cylinders and spark plugs, and greater mileage per gallon insures more power, least wear and longer life to all moving parts.

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"THE STEADY HAND"

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YOU'LL WANT A
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Because it is the acknowledged
AUTHORITY
among Speedometers.
Four years of
DEPENDABILITY
is its record.
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WOODWORTH TREADS are the only true tire protectors. They never chafe or heat the tires. They are held in place by coil springs along the sides, which automatically take up all slack and prevent any looseness. The protector is always tight and smooth.

No other protector can be fitted in the way that these automatically fit themselves.

They fit all makes of tires—anyone can easily put them on. *Send for Catalogue.*

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Canadian trade supplied from Niagara Falls, Ont.

The Most Powerful Compound Pump
STAPLEY TIRE PUMP

MADE BY BRIDGEPORT BRASS CO.

Price Without Gauge, $5.00 Price With Gauge, $7.00

If your dealer doesn't carry it, we will send the "Stapley" prepaid in the U. S. on receipt of price.

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surpasses any other metal for toughness and strength, for shock resisting qualities, for endurance under intermittent or continuous stress, strain or load.

It greatly increases the strength and durability of any Steel, without added weight, in very many cases decreasing it.

Booklet waiting.

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HANG ON TO YOUR **OLD TIRES**
THEY CAN BE USED FOREVER
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The **KIMBALL STEEL PROTECTOR** makes **BLOW-OUTS PUNCTURES**, and **RIM CUTS** impossible. A few sections will hold any old blowout. Tires are as flexible as ever. *Send for detailed information.*
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Buy a Shock Absorber
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Get one that stops the damaging vibration—one that makes all roads ride like the best roads. A guarantee with each set. Three sizes, $25, $40 and $60.

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EMPIRE TIRE CO.
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KOEHLER'S NEVER BREAK CANTILEVER Springs

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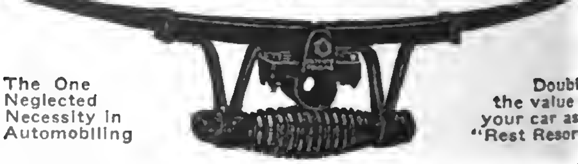

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Doubles the value of your car as a "Rest Resort"

Increases the life of your pneumatic tires, also engine and machinery. Rides with more ease than any other spring equipment. Makes it possible to use solid tires with as much comfort as you are now getting on properly inflated pneumatics.
We guarantee to replace all broken parts for one year.

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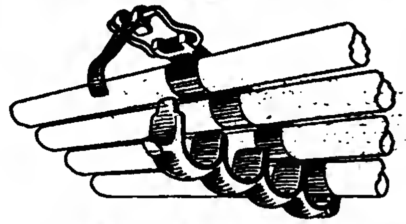
STOP TOP TROUBLES

Make Your Top Last as Long as Your Car

Bair Auto Top Holders (Pat'd)



THEY HOLD THE TOP SECURE

- No Jarring
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- No Chafing
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- No Broken-bows
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- No Buckles

You have tried the old way of cutting straps in your hurry to raise your top in a downpour or rain—Now try the new way—It's better

Ask your Dealer for a Demonstration or write for Illustrated Booklet "D"

The Auto Specialties Mfg. Co.

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A Real Battery At a Real Bargain

We have on hand a number of 6 V. 60 amp. dry type storage batteries, built for us by one of the best known manufacturers. These batteries were built to sell at $26.00 and are worth the money, but as we have accidentally become overstocked, we offer them while they last at $12.50.

No better battery is built or sold at any price.

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Established 1876 Randolph Street Bridge, Chicago, Ill.

Put a Casgrain Speedometer on Your Car for 30 Days at Our Expense

Put a Casgrain on your car. Try it out thoroughly. Give it every kind of test. Compare it with any other speed indicator. At the end of a month we know you will want to keep it. Pay for it then, not before. Write for booklet and details of this offer. It is open to every automobile owner.

The Casgrain is guaranteed "for all time."

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DESIGNERS AND BUILDERS OF

Artistic Aluminum Coachwork for Foreign and American Chassis.

Especial attention given to developing and perfecting original ideas. Dustproof luggage compartments for extended touring

Well equipped repair and storage departments. Estimates submitted.

Entire Plant Devoted Exclusively to Building and Repairing Automobile Coachwork. No Motors Repaired or Sold.

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THE AUTOMOBILE AIR SHOCK ABSORBER

is the only mechanically correct shock absorbing device in the world. No liquid or friction to stiffen normal spring play.

The success of the year!

Made for those seeking quality; not price.

Meets all requirements all of the time.

The addition of Kilgores to your machine means the maximum of comfort, combined with the minimum of expense.

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$1.00 BUYS the best spark plug on the market to-day. The plug recognized by engineers everywhere as being mechanically correct. Will spark under any and all conditions—ask your dealer or send for interesting booklet.

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Spark Plug Manufacturers

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SAVE MONEY ON YOUR AUTO SUPPLIES

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PROMPT SHIPMENTS OF LITTLE GIANT SHIELDS

COL. JAS. H. SPRAGUE

Demand Swamped us. But we are now able to take care of you. They are automatic.

COME ON

THE SPRAGUE UMBRELLA CO., Norwalk, O.

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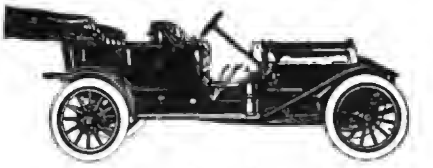

5-PASSENGER TOURING $1600

The Staver-Chicago *5-Passenger* Torpedo at $1850 and the Touring Car at $1600 will give you a decided advantage over your competitor who can only supply their equal at a much higher price.

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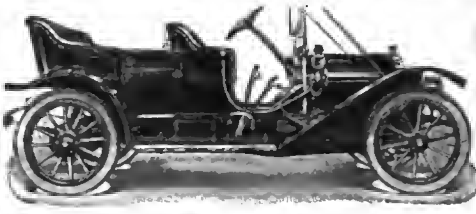

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Model L—4-40

Unusual Cars at Common Prices

Big Power, Big Tires, Big Cars—each model of the Midland is a leader in its respective class.

Model L—40 Horse-Power Cylinders 4¼" x 5". Wheel Base 115". Tires 34" x 4". Toy Tonneau or Roadster with Trunk.

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MIDLAND MOTOR CO., MOLINE, ILLINOIS

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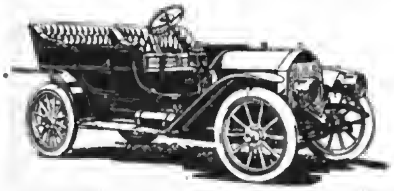
The Car With A Famous Engine

You will have to look to the high priced American and Foreign Cars for the same value you can get in a Pierce-Racine at

$1750



If you were to pay $4000 for a car you could not get a more satisfactory motor or an easier running car. Send for catalog to-day.

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100 22d St., Racine, Wis.

Most Critical Buyers Become Enthusiasts

Men who investigate all cars become most enthusiastic over the HENRY. Close comparisons prove it to be the greatest dollar-for-dollar automobile value today.

The Henry "35"

Built to Sell on Its Merits at $1,750

Touring Car or Pony Tonneau. Large motor, long wheel base, roomy tonneau, full-floating rear axles, extra long rear springs.

Write for details.

THE HENRY MOTOR CAR CO.
Station F MUSKEGON, MICHIGAN

THE BEST ADVERTISING CHASE MOTOR WAGONS

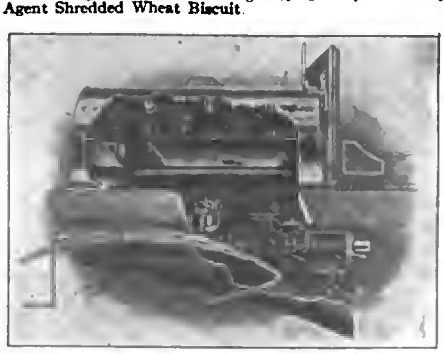
get is the word of mouth advertising of satisfied users.

Read what Mr. Turver, Western Sales Agent for Shredded Wheat Biscuit, has to say about the CHASE WAGON in use on his territory.

Minneapolis, Minn., May 26, 1910

Chase Motor Truck Co.,
Mr. George Gerem, Twin City Representative, St. Paul, Minn

Dear Sir: I am pleased to report that the Chase Motor Wagon, purchased from your Company this spring, has been in operation every day since received, and is giving excellent service. Our experience has been most satisfactory, and the expense of operation has been a revelation. We operate the car six days a week, and from ten to twelve hours per day, and our gasoline consumption per week is from 12 to 15 gallons, which compared with the boarding expense of a team of horses without considering the work done, is greatly in favor of the Chase Motor Wagon. This saving in delivery expense is one which should commend itself to every wide-awake merchant. Aside from the cost of gasoline, oil and dry cells for battery, we have had no expense whatever for repairs. In a short time I expect to send this motor wagon through western Minnesota and eastern South Dakota and shall be pleased to report to you our experience on this trip. Wishing you all success in the sale of your excellent commercial wagon, and with kind regards, I am yours truly, R. H. TURVER, Sales Agent Shredded Wheat Biscuit.



We have built Commercial wagons for every conceivable purpose. Tell us the use to which you would put a wagon and we will tell you just what success it has met in your particular line.

Chase Motor Truck Company
Tully Street
SYRACUSE, N.Y., U.S.A.

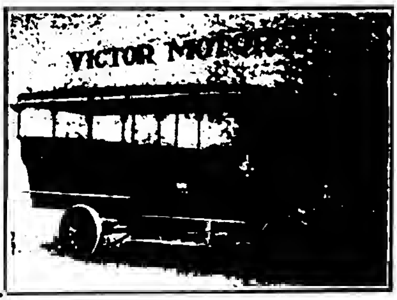
CORBIN

The Car of Constant Service.

Our 1910 Catalogue E sent on request.

THE CORBIN MOTOR VEHICLE CORPORATION,
NEW BRITAIN, CONN.

Licensed under Selden patent



VICTOR SIGHT SEEING CARS

are built to run at all times, under all conditions. Gasoline—Electric—Open—Enclosed. Write for particulars—Some Territory still open.

VICTOR MOTOR TRUCK COMPANY
651 Main Street, Buffalo, New York

The KLAXON

"The X Ray of Sound"

Not a toy

Not meant to be "played with," but

A powerful long-range signal with a definite use and purpose.

No other automobile signal approaches the KLAXON in loudness. Both the volume and the harshness of the tone class it as a country rather than a town signal.

Yet these very qualities—unnecessary at close range—make the KLAXON absolutely ideal for distance signaling. And they are particularly valuable to warn the possible driver unseen around a blind crossing or a bush-hidden bend in the road.

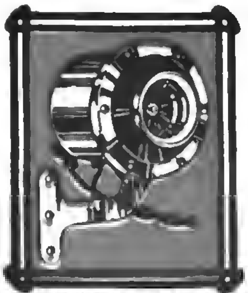
Type L Klaxon, $35.00

Type S, with short projector, $30 00

It is both pleasanter and safer to give the other fellow time to make way in comfort. There are times when it is positively dangerous not to, as every motorist knows.

That harsh tone has a purpose, too. It makes people "take notice" far more promptly than a musical signal. It is in itself a warning. The hearer doesn't stop to interpret it—he acts at once and unconsciously.

Ask your dealer. And send for catalog.



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LOVELL-McCONNELL MFG. CO.
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NEWARK, N. J.

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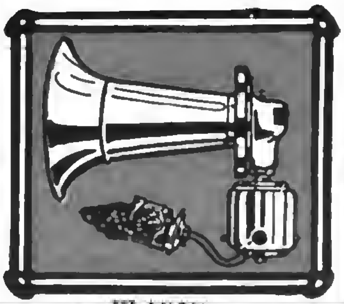
KLAXON

"The X Ray of Sound"



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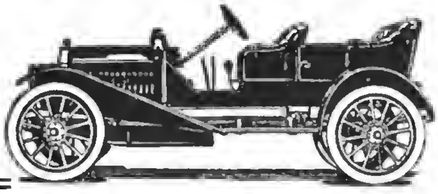
Warren-Detroit "30"

Standard Construction but MORE than Standard VALUE

A strictly high-grade car with strictly high-grade features. 110-inch wheel base. Sliding Gear Selective type transmission — three speeds forward and reverse. Cone Clutch; Double Ignition system Deliveries prompt. Write for full information.

Roadster $1100. 32x3-1/2 tires **Demi-tonneau $1250** 34x3-1/2 tires



Warren Motor Car Company, Detroit, Mich.

MERCER

Touring Car. Toy Tonneau. Speedster

Each $2150

1911 Models Now Being Shipped

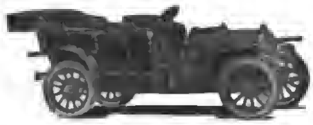
Style, Luxury, Quality Strength, Speed. Made Right and Stays Right.

Let us hear from you.

MERCER AUTOMOBILE CO., - - - Box 126, TRENTON, N. J.

$2500 Speedwell "50"

THE Speedwell's first appeal is to the man who has owned and driven motor cars for which he paid $3500 or $4500. He will recognize at once its equality with these other fine cars. Arrange for a Speedwell demonstration; and write for the literature.

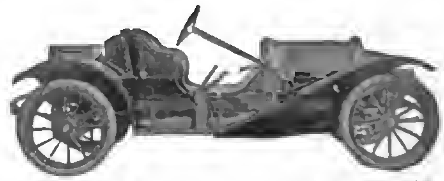


Model 10-B 5-Pass. Touring Car. Completely equipped except top, $2,500

THE SPEEDWELL MOTOR CAR CO., 10 Essex Avenue, Dayton, Ohio.

Licensed under Selden Patent

Badger 30—$1600.00



112" W.B.; 34" wheels; Q. D. rims; Bosch dual ignition with storage battery; selective type transmission; Brown-Sharpe gears; F & S ball bearings. Write for our very liberal agency proposition.

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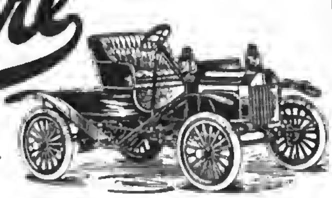

The Most for the Money and All of It Good

MANY MODELS

PLEASURE AND COMMERCIAL

W. H. McINTYRE COMPANY, Auburn, Ind

Licensed under Selden Patent

1730 Grand Avenue, Kansas City, Mo.
Tudhope-McIntyre Co., Orillia, Ont., Canada
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K-R-I-T

"The car with the invisible start."

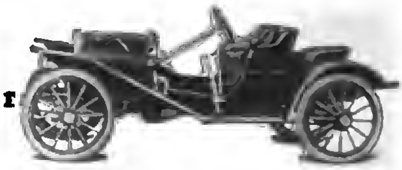
96 in. wheel base
32 in. wheels

$22\frac{1}{2}$ H.P. $800

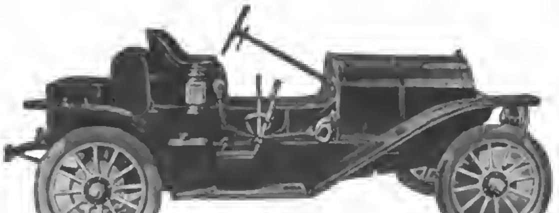
Sliding gear transmission. Multiple disc clutch.

Weight, 1200 lbs.

Runabout $800.
Roadster $825.
Surrey $850.
Write for Catalog



K-R-I-T Motor Car Co.
DETROIT



$1350

1910 Petrel Roadster 30 H. P.—4 Cylinder—108 Inch Wheel Base

PETREL 1910 MOTOR CARS

New Management Capacity Doubled

"THE ARISTOCRAT OF MEDIUM PRICED CARS"

If the Petrel is not represented in your vicinity, write us—today—before the opportunity is gone. Immediate delivery.

Former agents can renew contracts with new management.

PETREL MOTOR CAR CO., Milwaukee, U. S. A.

AGENTS WANTED

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D. W. F. HESS-BRIGHTS VANADIUM STEEL

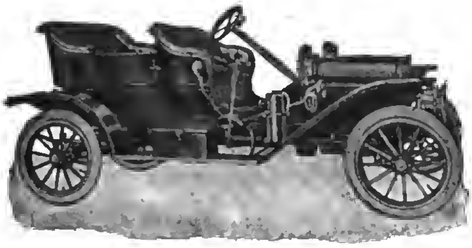
$1750
40 H P. GUARANTEED FOR 5 YEARS
FULLY EQUIPPED.
See catalogue

Every owner satisfied. **MORAL: Buy a Washington.**

CARTER MOTOR CAR CORPORATION, Munsey Bldg., WASHINGTON, D.C.
Factory—Hyattsville, Md.

Cameron Sixes

$1250 to $1500



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CAMERON CAR COMPANY, Beverly, Mass.

Investigate This Remarkable

$1275 DE TAMBLE

Specifications: 4 cycle, 34 h. p.; transmission and engine in a single unit, on 3 point suspension; 115-inch wheel base, 34-inch wheels; 5 passenger touring body; clearance 10½ inch; top of frame 21 inches from the ground (lowest hung standard touring car in the market); magneto, full lamp and tool equipment.

A few more live dealers can secure the agency for this quick-selling car

CAR MAKERS SELLING CO.

1256 Michigan Avenue, CHICAGO

Baker Electric

The Only Electric with Bevel Gear Shaft Drive

Write for Booklet "A Retrospect and A Forecast" that gives the facts about the Shaft Drive.

THE BAKER MOTOR VEHICLE CO.

29 West 80th Street Cleveland, Ohio.

Commercial Power Wagons

1910 Announcement

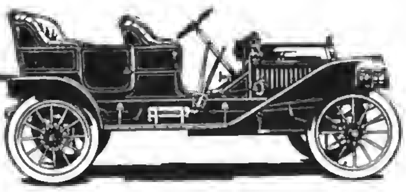
We manufacture the highest grade motor wagons ever produced—1000 pounds capacity only—we are Specialists in this particular line. Our entire new factory is producing only this one Chassis. We furnish bodies to suit any business.

Hart-Kraft Motor Co.

YORK, PENNA.

"CLARK CARS"

30 H.P. $1400
40 H.P. $1750



Good territory open for live dealers.

Write for specifications.

General Sales Agents:

The MEIXELL-DOWNING COMPANY

505 Odd Fellow Building, Indianapolis, Indiana

CLARK MOTOR CAR CO., Manufacturers, Shelbyville, Ind.

The Detroit Electric

Look always to the motor—be sure of that one feature before you buy an electric. The **Detroit** is the only electric equipped with a motor produced by the builder of the carriage, and built by men long experienced in building nothing but electric vehicle motors.

Before you buy, write for the Detroit literature.

ANDERSON CARRIAGE COMPANY, Sta. C, Detroit, Mich.

The Only Car of Established Reputation Selling at a Moderate Price.

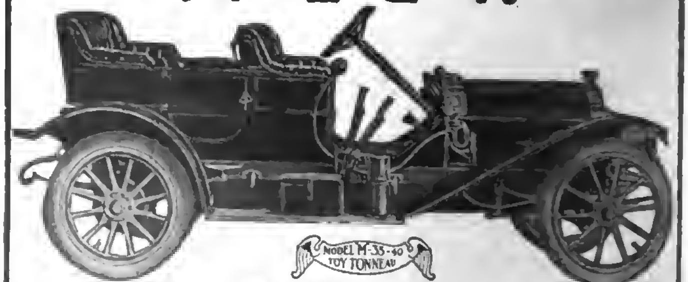
HAYNES

Station B

Kokomo, Ind.

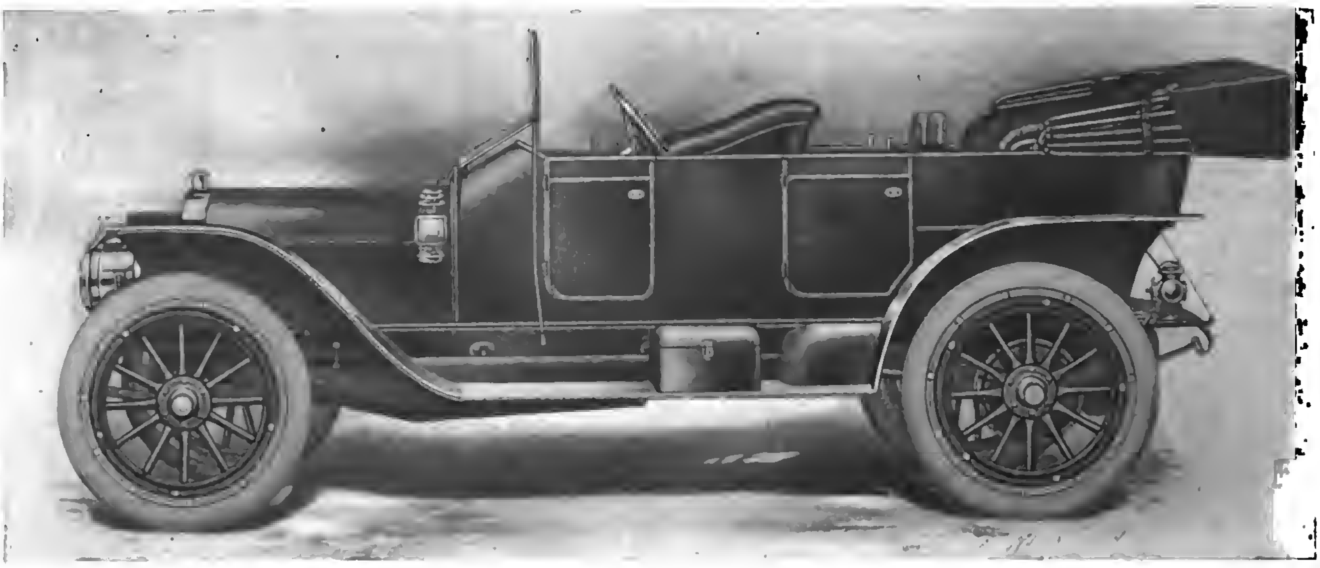
Licensed under Selden Patent

1910 F·A·L-CAR 35-40



One Chassis **$1750.00** Three Bodies

Fal Motor Company, Nos. 163-175 N. May St., **Chicago, Ill.**



Model "R" Four-40 Touring Car, Series B, Price $3,500.00

Knox

1911 ANNOUNCEMENT

Four Cylinder 40-H. P. **Six Cylinder 60-H. P.**

STANDARD AND TORPEDO TYPE TOURING CARS, 5 and 7 passengers.
CLOSE COUPLED TYPES.
LIMOUSINES AND LANDAULETS.
Made with detachable front seat doors.
TONNEAUETTES with Torpedo type front, high doors, made with tonneau detachable.
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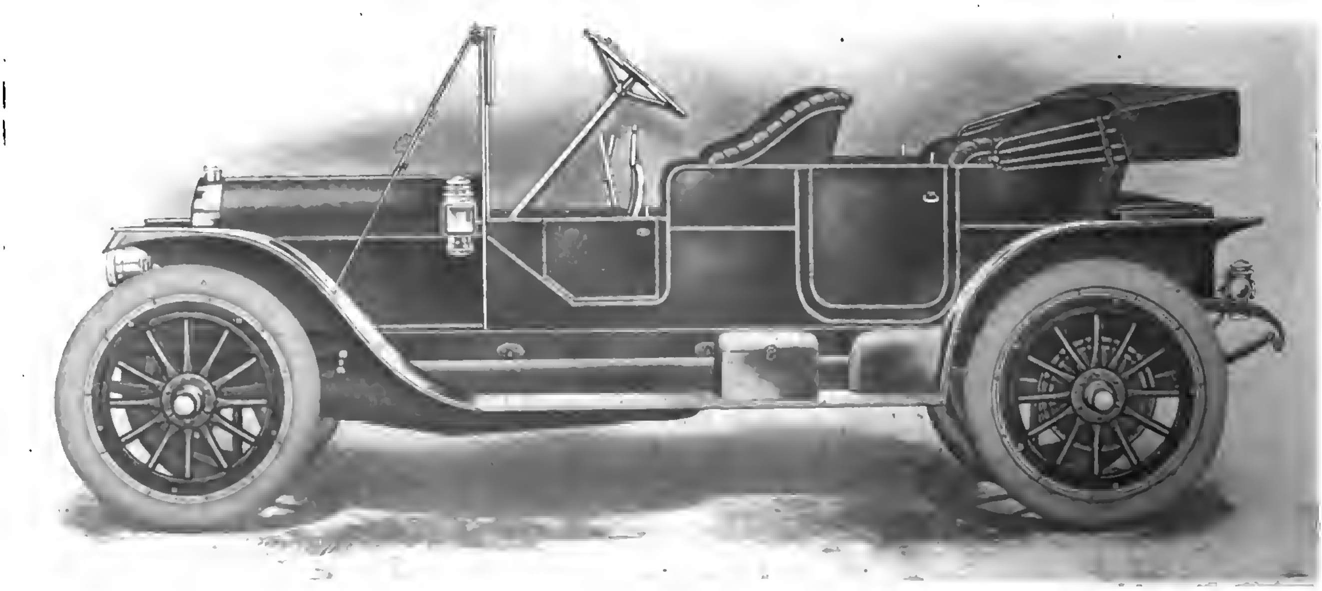

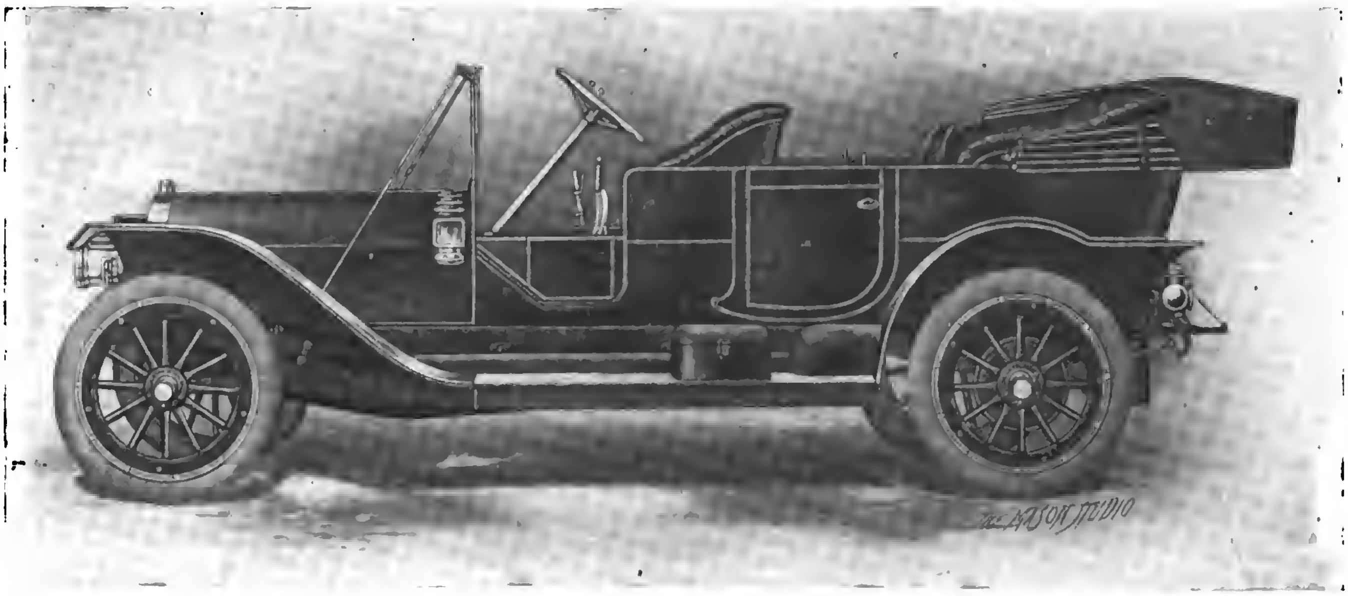

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